S5810-48TS-P Switch Command Line Interface Reference Guide

Model: S5810-48TS-P

CLI REFERENCE GUIDE

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Chapter 1 System Configuration Commands

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1. Command Line Interface Commands

1.1 Alias

Use this command to configure a command alias in global configuration mode. Use the **no** or **default** form of this command to restore the default setting.

alias *mode command-alias original-command*

no alias *mode* [*command-alias*]

default alias mode [*command-alias*]

Parameter Description

Parameter	Description
mode	Mode of the command represented by the alias
command-alias	Command alias
original-command	Syntax of the command represented by the alias

Defaults

Some commands in user or privileged EXEC mode have default alias.

Command Mode

Global configuration mode.

Usage Guide

The following table lists the default alias of the commands in privileged EXEC mode.

Alias	Actual Command
h	help
p	ping
s	show
u	undebug
un	undebug

The default alias cannot be removed by the **no alias exec** command.

After configuring the alias, you can use a word to replace a command. For example, you can create an alias to represent the first part of a command, and then type the rest part of the command.

The mode of the command represented by the alias is the command mode existing in the current system. In the global configuration mode, you can use the **alias ?** command to list all the modes under which you can configure alias for commands.

```
FS(config)# alias ?
  aaa-gs                    AAA server group mode
  acl                        acl configure mode
  bgp                       Configure bgp Protocol
  config                    globle configure mode
......
```

The alias also has its help information that is displayed after * in the following format:

```
*command-alias=original-command
```

For example, in the privileged EXEC mode, the default alias s stands for show. You can enter s? to query the key words beginning with s and the help information of the alias.

```
FS#s?
*s=show    show    start-chat    start-terminal-service
```

If an alias represents more than one word, the command will be displayed in brackets. For example, if you set sv stand for show version in the privileged EXEC mode, then:

```
FS#s?
*s=show    *sv="show version" show    start-chat
start-terminal-service
```

The alias must begin with the first letter of the command. The first letter of the command cannot be a space. The space before the command cannot be used as a valid alias.

```
FS# s?
show    start-chat    start-terminal-service
```

The command alias also has its help information. For example, if the alias ia represents ip address in the interface configuration mode, then:

```
FS(config-if)#ia ?
   A.B.C.D    IP address
   dhcp          IP Address via DHCP
FS(config-if)# ip address
```

The above help information lists the parameters of **ip address** and shows the actual command name.

You must enter an entire alias; otherwise it cannot be recognized.

Use the **show aliases** command to show the aliases setting in the system.

Configuration Examples

The following example uses def-route to represent the default route setting of ip route 0.0.0.0 0.0.0.0 192.168.1.1 in the global configuration mode:

```
FS# configure terminal
FS(config)# alias config def-route ip route 0.0.0.0 0.0.0.0 192.168.1.1
FS(config)#def-route?
*def-route="ip route 0.0.0.0 0.0.0.0 192.168.1.1"
FS(config)# end
FS# show aliases config
globle configure mode alias:
def-route                    ip route 0.0.0.0 0.0.0.0
192.168.1.1
```

Related Commands

Command	Description
show aliases	Displays the aliases settings.

Platform Description

N/A

1.2 Privilege

Use this command to attribute the execution rights of a command to a command level in global configuration

mode. Use the **no** form of this command to restore the default setting.

privilege *mode* [**all**] [**level** *level* **|** **reset**] *command-string*

no privilege *mode* [**all**] [**level** *level*] *command-string*

Parameter Description

Parameter	Description
mode	CLI mode of the command to which the execution rights are attributed.
all	Command alias
level *level*	Specifies the execution right levels (0–15) of a command or sub-commands
reset	Restores the command execution rights to its default level
command-string:	Command string to be authorized

Defaults N/A

Command Mode Global configuration mode.

Usage Guide The following table lists some key words that can be authorized by the **privilege** command in CLI mode. The number of command modes that can be authorized may vary with different devices. In the global configuration mode, you can use the **privilege ?** command to list all CLI command modes that can be authorized.

Mode	Description
config	Global configuration mode.
exec	Privileged EXEC mode
interface	Interface configuration mode
ip-dhcp-pool	DHCP address pool configuration mode
ip-dhcp-pool	DHCP address pool configuration mode
keychain	KeyChain configuration mode
keychain-key	KeyChain-key configuration mode

Configuration Examples The following example sets the password of CLI level 1 as **test** and attribute the **reload** rights to reset the device:

```
FS(config)#privilege exec level 1 reload
```

You can access the CLI window as level-1 user to usef the **reload** command:

```
FS>reload ?
LINE      Reason for reload
<cr>
```

You can use the key word **all** to attribute all sub-commands of reload to level-1 users:

```
FS(config)# privilege exec all level 1 reload
```

After the above setting, you can access the CLI window as level-1 user to use all sub commands of the **reload** command:

```
FS>reload ?
LINE      Reason for reload
at                    reload at a specific time/date
cancel                cancel pending reload scheme
in                    reload after a time interval
```

```
<cr>
```

Related Commands

Command	Description
enable secret	Sets the CLI-level password.

Platform Description N/A.

1.3 Show Aliases

Use this command to show all the command aliases or aliases in special command modes.

show aliases [*mode*]

Parameter Description

Parameter	Description
mode	Mode of the command represented by the alias.

Defaults N/A.

Command Mode Privileged EXEC mode.

Usage Guide This command displays the configuration of all aliases if no command mode is input.

Configuration Examples The following example displays the command alias in privileged EXEC mode:

```
FS#show aliases exec
exec mode alias:
h                    help
p                    ping
s                    show
u                    undebug
un                   undebug
```

Related Commands

Command	Description
alias	Sets a command alias.

Platform Description N/A.

2. Basic Configuration Management Commands

2.1 <1-99>

Use this command to restore the suspended Telnet Client session.

<1-99>

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode User EXEC mode

Usage Guide This command is used to restore the suspended Telnet Client session. Hot keys (ctrl+shift+6 x) are used to exit the Telnet Client session creation. The **<1-99>** command is used to restore the session. If the session is created, you can use the **show session** command to display the session.

Configuration Examples The following example restores the suspended Telnet Client session.

```
FS# 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.2 Banner Exec

Use this command to configure a message to welcome the user entering user EXEC mode through the line. Use the **no** form of this command to restore the default setting.

banner exec *c message c*

no banner exec

Parameter Description

Parameter	Description
c	Separator of the message. Delimiters are not allowed in the message.
message	Contents of the message.

Defaults N/A

Command Mode Global configuration mode

Usage Guide

This command is used to configure the welcome message. The system discards all the characters next to the terminating symbol.

When you are logging in to the device, the MOTD message is displayed at first, and then the banner login message. After you have logged in, the EXEC message or the incoming message is displayed. If it's a reverse Telnet session, the incoming message is displayed. Otherwise, the EXEC message is displayed.

The messages are for all lines. If you want to disable display the EXEC message on a specific line, configure the **no exec-banner** command on the line.

Configuration Examples

The following example configures a welcome message.

```
FS(config)# banner exec $ Welcome $
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.3 Banner Incoming

Use this command to configure a prompt message for reverse Telnet session. Use the **no** form of this command to remove the setting.

banner incoming *c message c*

no banner incoming

Parameter Description

Parameter	Description
c	Separator of the message. Delimiters are not allowed in the message.
message	Contents of the message.

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

This command is used to configure a prompt message. The system discards all the characters next to the terminating symbol.

When you are logging in to the device, the MOTD message is displayed at first, and then the banner login message. After you have logged in, the welcome message or the prompt message is displayed. If it's a reverse Telnet session, the prompt message is displayed. Otherwise, the welcome message is displayed.

Configuration Examples

The following example configures a prompt message for reverse Telnet session.

```
FS(config)# banner incoming $ Welcome $
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.4 Banner Login

Use this command to configure a login banner. Use **no** form of this command to r remove the setting.

banner login *c message c*

no banner login

Parameter Description

Parameter	Description
c	Separator of the message contained in the login banner. Delimiters are not allowed in the MOTD.
message	Contents of the login banner

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

This command sets the login banner message, which is displayed at login. The system discards all the characters next to the terminating symbol.

Configuration Examples

The following example configures a login banner.

```
FS(config)# banner login $ enter your password $
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.5 Banner Motd

Use this command to set the Message-of-the-Day (MOTD) . Use the **no** form of this command to remove the setting.

banner [**motd**] *c message c*

no banner [**motd**]

Parameter Description

Parameter	Description

c	Separator of the MOTD. Delimiters are not allowed in the MOTD.
message	Contents of an MOTD

Defaults N/A

Command Mode Global configuration mode

Usage Guide This command sets the MOTD, which is displayed at login. The letters that follow the separator will be discarded.

Configuration Examples The following example configures the MOTD.

```
FS(config)# banner motd $ hello,world $
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.6 Banner Prompt-timeout

Use this command to configure the prompt-timeout message to notify timeout. Use the **no** form of this command to remove the setting.

banner prompt-timeout *c message c*

no banner prompt-timeout

Parameter Description

Parameter	Description
c	Separator of the message. Delimiters are not allowed in the message.
message	Contents of the message.

Defaults N/A

Command Mode Global configuration mode

Usage Guide The system discards all the characters next to the terminating symbol.

When authentication times out, the banner prompt-timeout message is displayed.

Configuration Examples The following example configures the prompt-timeout message to notify timeout.

```
FS(config)# banner exec $ authentication timeout $
```

Related

Command	Description

Commands

N/A	N/A

Platform Description

N/A

2.7 Banner Slip-ppp

Use this command to configure the slip-ppp message for the SLIP/PPP session. Use the **no** form of this command to remove the setting.

banner slip-ppp *c message c*

no banner slip-pp

Parameter Description

Parameter	Description
c	Separator of the message. Delimiters are not allowed in the message.
message	Contents of the message.

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

This command is used to configure the slip-ppp message for the SLIP/PPP session. The system discards all the characters next to the terminating symbol.

When the SLIP/PPP session is created, the slip-ppp message is displayed on the corresponding terminal.

Configuration Examples

The following example configures the banner slip-ppp message for the SLIP/PPP session.

```
FS(config)# banner slip-ppp $ Welcome $
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.8 Boot Config

Use this command to modify the path for saving startup configurations and the corresponding file name.

boot config { flash:filename | **usb0:**filename**}**

no boot config

Parameter Description

Parameter	Description
flash	Saves the startup configuration file in the extensible Flash.

usb0	The startup configuration file is selected to be saved in USB0. This option is only supported when the device has 1 USB interface, and an extended USB device is inserted

Defaults

By default, startup configuration file of a device is saved in **Flash:/config.text**

Command Mode

Privileged EXEC mode

Usage Guide

The startup configuration file name follows a slash "/", for example, **Flash:/fs.text,usb0:/fs.text.**

The startup configuration file name consists of a path and a file name. The path is mandatory. Otherwise, configurations cannot be saved by using the **write** command. Take **Flash:/fs/fs.text** as examples, where the **Flash:/fs** folder must exist. In master-slave mode, all device paths are required.

To save the startup configuration file to the USB, the device must have a USB interface and be plugged into the USB device. Otherwise, executing the write command to save the configuration will fail. In a master-slave environment, USB devices need to be plugged into all devices.

Configuration Examples

The following example sets the startup configuration file path to flash:/fs.text..

```
FS(config)#boot config flash:/fs.text
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.9 Configure

Use this command to enter global configuration mode.

configure [**terminal**]

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example enters global configuration mode.

```
FS# configure
FS(config)#
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.10 Disable

Use this command to switch from privileged EXEC mode to user EXEC mode or lower the privilege level.

disable [*privilege-level*]

Parameter Description

Parameter	Description
privilege-level	Privilege level

Defaults

N/A

Command Mode

User EXEC mode

Usage Guide

Use this command to switch to user EXEC mode from privileged EXEC mode. If a new privilege level is added, the current privilege level will be lowered.

The privilege level that follows the **disable** command must be lower than the current level.

Configuration Examples

The following example lowers the current privilege level of the device to level 10.

```
FS# disable 10
```

Related Commands

Command	Description
enable	Moves from user EXEC mode enter to privileged EXEC mode or reaches a higher level of authority.

Platform Description

N/A

2.11 Disconnect

Use this command to disconnect the Telnet Client session.

disconnect *session-id*

Parameter Description

Parameter	Description
session-id	Telnet Client session ID.

Defaults N/A

Command Mode User EXEC mode

Usage Guide This command is used to disconnect the Telnet Client session by setting the session ID.

Configuration Examples The following example disconnects the Telnet Client session by setting the session ID.

```
FS# disconnect 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.12 Enable

Use this command to enter privileged EXEC mode.

Enable [*privilege-level*]

Parameter Description

Parameter	Description
privilege-level	Privilege level

Defaults N/A

Command Mode User EXEC mode

Usage Guide N/A

Configuration Examples The following example enters privileged EXEC mode and lowers the privilege level to 14.

```
FS> enable 14

Password:
```

Related Commands

Command	Description
N/A	N/A

Platform Description	N/A

2.13 Enable Password

Use this command to configure passwords for different privilege levels. Use the **no** form of this command to restore the default setting.

enable password [**level** *level*] { [**0**] *password* | **7** *encrypted-password* }

no enable password [**level** *leve l*]

Parameter Description

Parameter	Description
password	Password for the user to enter the EXEC configuration layer
level	User's level.
0	(Optional) The password is in plain text.
7 *encrypted-password*	The password is encyrpted.

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

No encryption is required in general. The encryption type must be specified for copying and pasting a encrypted password for the device.

A valid password is defined as follows:

- Consists of 1-26 upper/lower case letters and numbers
- Leading spaces are allowed but usually ignored. Spaces in between or at the end are regarded as part of the password.

If an encryption type is specified and a plaintext password is entered, you cannot enter privileged EXEC mode. A lost password that has been encrypted using any method cannot be restored. In this case, you can only reconfigure the device password.

Configuration Examples

The following example configures the password as **pw10**.

```
FS(config)# enable password pw10
```

Related Commands

Command	Description
enable secret	Sets the security password

Platform Description

N/A

2.14 Enable Secret

Use this command to configure a security password for different privilege levels. Use the **no** form of this command to restore the default setting.

enable secret [**level** ***level***] { [**0**] *password* | **5** ***encrypted-secret*** }
no enable secret [**level** *level*]

Parameter Description

Parameter	Description
secret	Password for the user to enter the EXEC configuration layer
level	User's level.
0	"0" for no encryption.
5 *encrypted-password*	"5" for security encryption.

Defaults N/A

Command Mode Global configuration mode

Usage Guide A password comes under two categories: "password" and "security". "Password" indicates a simple password, which can be set only for level 15. "Security" means a security password, which can be set for levels 0-15. If both types of passwords coexist in the system, no "password" type is allowed. If a "password" type password is set for a level other than 15, the system gives an alert and the password is automatically converted into a "security" password. If a "password" type password is set for level 15 and the same as a "security" password, an alert is given. The password must be encrypted, with simple encryption for "password" type passwords and security encryption for "security" type passwords.

Configuration Examples The following example configures the security password as **pw10**.

FS(config)# **enable secret** *0 pw10*

Related Commands

Command	Description
enable password	Sets passwords for different privilege levels.

Platform Description N/A

2.15 Enable Service

Use this command to enable or disable a specified service such as **SSH Server/Telnet Server/Web Server/SNMP Agent**.

enable service { **ssh-sesrver** | **telnet-server** | **web-server** [**http | https | all**] | **snmp-agent** }

Parameter Description

Parameter	Description
ssh-server	Enables SSH Server. IPv4 and IPv6 services are enabled at the same time.
telnet-server	Enables Telnet Server. IPv4 and IPv6 services are enabled at the same time.
web-server [**http	https	all**]	Enables HTTP Server. IPv4 and IPv6 services are enabled at the same time.
snmp-agent	Enables SNMP Agent. IPv4 and IPv6 services are enabled at the same time.

Defaults telnet-server, snmp-agent and web-server are enabled and ssh-server is disabled by default.

Command Mode Global configuration mode

Usage Guide Use this command to enable or disable a specified service. Use the **no enable service** command to disable the specified service.

The **enable service web-server** command is followed by three optional keywords: [**http** | **https** | **all**]. If the command is followed by no keyword or by **all**, the command enables http and https services. Followed by **http**, the command enables http service only. Followed by **https**, the command enables https service only.

Configuration Examples The following example enables the SSH Server.

```
FS(Config)# enable service ssh-sesrver
```

Related Commands

Command	Description
show service	Displays the service status in the current system.

Platform Description N/A

2.16 End

Use this command to return to privileged EXEC mode.

end

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode All modes except privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example returns to privileged EXEC mode.

```
FS#con
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#line vty 0
FS(config-line)#end
```

```
*May 20 09:49:38: %SYS-5-CONFIG_I: Configured from console by console
FS#
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.17 Exec-banner

Use this command to enable display of the EXEC message on a specific line. Use the **no** form of this command to restore the default setting.

exec-banner

no exec-banner

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The EXEC message is displayed on all lines by default.

Command Mode

LINE configuration mode

Usage Guide

After you configure the **banner exec** and the **banner motd** commands, the EXEC and the MOTD messages are displayed on all lines by default. If you want to disable display of the EXEC and the MOTD messages on a specific line, configure the **no** form of this command on the line.

This command does not work for the banner incoming message. If you configure the **banner incoming** command, the banner incoming message is displayed on all reverse Telnet sessions and the display cannot be disabled on a specific line.

Configuration Examples

The following example disables display of the EXEC message on line VTY 1.

```
FS(config)# line vty 1
FS(config-line)no exec-banner
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.18 Exec-timeout

Use this command to configure connection timeout for this device in LINE mode. Use the **no** form of this command to restore the default setting and the connection never expires.

exec-timeout *minutes* [*seconds*]

no exec-timeout

Parameter Description

Parameter	Description
minutes	Timeout in minutes.
seconds	(Optional) Timeout in minutes

Defaults

The default is 10 minutes.

Command Mode

Line configuration mode

Usage Guide

If there is no input or output for this connection within a specified time, this connection will expire, and this LINE will be restored to the free status.

Configuration Examples

The following example sets the connection timeout to 5'30".

FS(config-line)#**exec-timeout** *5 30*

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.19 Execute

Use this command to execute a command on the file.

execute { [**flash:**] *filename* }

Parameter Description

Parameter	Description
filename	Specifies the file path.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example executes a command to configure an IP address for the specified interface.

```
FS#execute flash:mybin/config.text
executing script file mybin/config.text ......
executing done
FS#config
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#interface gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)#ip address 192.168.21.158 24
FS(config-if-GigabitEthernet 0/1)#end
*Sep 29 23:35:49: %SYS-5-CONFIG_I: Configured from console by console
FS#
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.20 Exit

Use this command to return to the upper configuration mode.

exit

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

All configuration modes

Usage Guide

N/A

Configuration Examples

The following example returns to the upper configuration mode.

```
FS#con
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#line vty 0
FS(config-line)#end
*May 20 09:49:38: %SYS-5-CONFIG_I: Configured from console by console
FS#con
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#line vty 0
FS(config-line)#exit
```

```
FS(config)#exit
*May 20 09:51:48: %SYS-5-CONFIG_I: Configured from console by console
FS#exit

Press RETURN to get started
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.21 Help

Use this command to display the help information.

help

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Any mode

Command Mode

Usage Guide

This command is used to display brief information about the help system. You can use "?" to display all commands or a specified command with its parameters.

Configuration Examples

The following example displays brief information about the help system.

```
FS#help
Help may be requested at any point in a command by entering
a question mark '?'.    If nothing matches, the help list will
be empty and you must backup until entering a '?' shows the
available options.
Two styles of help are provided:
1. Full help is available when you are ready to enter a
     command argument (e.g. 'show ?') and describes each possible
     argument.
2. Partial help is provided when an abbreviated argument is entered
     and you want to know what arguments match the input
     (e.g. 'show pr?'.)
```

The following example displays all available commands in interface configuration mode.

```
FS(config-if-GigabitEthernet 0/0)#?
```

```
Interface configuration commands:
  arp                 ARP interface subcommands
  bandwidth           Set bandwidth informational parameter
  carrier-delay       Specify delay for interface transitions
  dampening           Enable event dampening
  default             Set a command to its defaults
  description         Interface specific description
  dldp                Exec data link detection command
  duplex              Configure duplex operation
  efm                 Config efm for an interface
  end                 Exit from interface configuration mode
  exit                Exit from interface configuration mode
  expert              Expert extended ACL
  flowcontrol         Set the flow-control value for an interface
  full-duplex         Force full duplex operation
  global              Global ACL
  gvrp                GVRP configure command F
  help                Description of the interactive help system
  ip                  Interface Internet Protocol config commands
  ipv6                Internet Protocol Version 6
  isis                Intermediate System - Intermediate System (IS-IS)
  l2                  Config L2 attribute
  label-switching     Enable interface process mpls packet
  lacp                LACP interface subcommands
  lldp                Link Layer Discovery Protocol
  load-interval       Specify interval for load calculation for an interface
  mac                 Mac extended ACL
  mac-address         Set mac-address
  mpls                Multi-Protocol Label Switching
  mtu                 Set the interface Maximum Transmission Unit (MTU)
  no                  Negate a command or set its defaults
  ntp                 Configure NTP
  port-group          Aggregateport/port bundling configuration
  redirect            Redirect packets
  rmon                Rmon command
  security            Configure the Security
  show                Show running system information
  shutdown            Shutdown the selected interface
  snmp                Modify SNMP interface parameters
  speed               Configure speed operation
  switchport          Set switching mode characteristics
  vrf                 Multi-af VPN Routing/Forwarding parameters on the interface
  vrrp                VRRP interface subcommands
```

```
xconnect            Xconnect commands
```

The current version does not support MPLS, ISIS and VRF. The configuration example is only for your reference.

The following example displays the parameters of a specified command.

```
FS(config)#access-list 1 permit ?
  A.B.C.D   Source address
  any       Any source host
  host      A single source host
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.22 Hostname

Use this command to specify or modify the hostname of a device.

hostname *name*

Parameter Description

Parameter	Description
name	Device hostname, string, number or hyphen, up to 63 characters.

Defaults

The default is FS.

Command Mode

Global configuration mode

Usage Guide

This hostname is mainly used to identify the device and is taken as the username for the local device during dialup and CHAP authentication.

Configuration Examples

The following example configures the hostname of the device as BeiJingAgenda.

```
FS(config)# hostname BeiJingAgenda
BeiJingAgenda(config)#
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.23 IP Telnet Source-interface

Use this command to configure the IP address of an interface as the source address for Telnet connection.

ip telnet source-interface *interface-name*

Parameter Description

Parameter	Description
interface-name	Configures the IP address of the interface as the source address for Telnet connection.

Defaults N/A

Command Mode Global configuration mode

Usage Guide This command is used to specify the IP address of an interface as the source address for global Telnet connetction. When using the telnet command to log in a Telnet server, apply the global setting if no source interface or source address is specified. Use the **no ip telnet source-interface** command to restore it to the default setting.

Configuration Examples The following example configures the IP address of the *Loopback1* interface as the source address for global Telnet connection.

FS(Config)# **ip telnet source-interface** *Loopback 1*

Related Commands

Command	Description
telnet	Logs in a Telnet server.

Platform Description N/A

2.24 Lock

Use this command to set a temporary password for the terminal.

lock

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode User EXEC mode

Usage Guide You can lock the terminal interface and maintain the session continuity to prevent access to the interface by setting a temporary password. Take the following steps to lock the terminal interface:

- Enter the **lock** command, and the system will prompt you for a password:
- Enter the password, which can be any character string. The system will prompt you to confirm the password, clear the screen, and display the "Locked" information.
- To access the terminal, enter the preset temporary password.
- To lock the terminal, run the **lockable** command in line configuration mode and enable terminal locking in the corresponding line.

Configuration Examples

The following example locks a terminal interface.

```
FS(config-line)# lockable
FS(config-line)# end
FS# lock
Password: <password>
Again: <password>
Locked
Password: <password>
FS#
```

Related Commands

Command	Description
lockable	Supports terminal locking in the line.

Platform Description

N/A

2.25 Lockable

Use this command to support the **lock** command at the terminal. Use the **no** form of this command to restore the default setting.

lockable

no lockable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default

Command Mode

Line configuration mode

Usage Guide

This command is used to lock a terminal interface in the corresponding line. To lock the terminal, run the lock command in EXEC mode.

Configuration Examples

The following example enables terminal locking at the console port and locks the console.

```
FS(config)# line console 0
```

```
FS(config-line)# lockable
FS(config-line)# end
FS# lock
Password: <password>
Again: <password>
Locked
Password: <password>
```

Related Commands

Command	Description
lock	Locks the terminal.

Platform Description

N/A

2.26 Login

Use this command to enable simple login password authentication on the interface if AAA is disabled. Use the **no** form of this command to restore the default setting.

login

no login

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Login is disabled for console and enabled for AUX, TTY and VTY terminals by default.

Command Mode

Line configuration mode

Usage Guide

If the AAA security server is inactive, this command enables simple password authentication at login. The password is configured for a VTY or console interface.

Configuration Examples

The following example sets a login password authentication on VTY..

```
FS(config)# no aaa new-model
FS(config)# line vty 0
FS(config-line)# password 0    normatest
FS(config-line)# login
```

Related Commands

Command	Description
password	Configures the line login password

Platform

N/A

Description

2.27 Login Access Non-aaa

Use this command to configure non-AAA authentication on line when AAA is enabled. Use the **no f**orm of this command to restore the default setting.

login access non-aaa

no login access non-aaa

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example configures VTY line authentication with AAA enabled.

```
FS(config)#log access non-aaa
FS(config)#aaa new-model
FS(config)#line vty 0 4
FS(config-line)#login local
FS(config-line)#
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.28 Login Authentication

If the AAA is enabled, login authentication must be performed on the AAA server. Use this command to associate login authentication method list. Use the **no** form of this command to remove the configuration.

login authentication { **default** | *list-name* }

no login authentication { **default** | *list-name* }

Parameter Description

Parameter	Description
default	Name of the default authentication method list
list-name	Name of the method list

Defaults The default authentication is used when AAA is enabled.

Command Mode Line configuration mode

Usage Guide

Configuration Examples The following example associates the method list on VTY and perform login authentication on a radius server.

```
FS(config)# aaa new-model
FS(config)# aaa authentication login default radius
FS(config)# line vty 0
FS(config-line)# login authentication default
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa authentication login	Configures the login authentication method list.

Platform Description N/A

2.29 Login Local

Use this command to enable local user authentication on the interface if AAA is disabled. Use the **no** form of this command to restore the default setting.

login local

no login local

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Line configuration mode

Usage Guide If the AAA security server is inactive, this command is used for local user login authentication. The user is allowed to use the **username** command.

Configuration Examples The following example sets local user authentication on VTY.

```
FS(config)# no aaa new-model
FS(config)# username test password 0 test
FS(config)# line vty 0
FS(config-line)# login local
```

Related Commands

Command	Description
username	Configures local user information.

Platform Description

N/A

2.30 Login Privilege Log

Use this command to log privilege change. Use the **no** form of this command to restore the default setting.

login privilege log

no login privilege log

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This command is disabled by default.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example enables the function of logging privilege change.

```
FS(config)# login privilege log
```

The following example displays the log of privilege change failure.

```
FS>enable 10


Password:

Password:

Password:


% Access denied

FS>

*Sep 10 11:34:19: %SYS-5-PRIV_AUTH_FAIL: Authentication to privilege level 10 from console failed
```

The following example displays the log of privilege change success.

```
FS>enable 10
```

```
Password:
FS#
*Sep 10 11:34:20: %SYS-5-PRIV_AUTH_SUCCESS: Authentication to privilege level 10 from console success
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.31 Motd-banner

Use this command to enable display of the MOTD message on a specified line. Use the **no** form of this command to restore the default setting.

motd-banner

no motd-banner

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The MOTD message is displayed on all lines by default.

Command Mode

Line configuration mode

Usage Guide

After you configure the **banner exec** and the **banner motd** commands, the EXEC and the MOTD messages are displayed on all lines by default. If you want to disable display of the EXEC and the MOTD messages on a specific line, configure the **no** form of this command on the line.

This command does not work for the incoming message. If you configure the **banner incoming** command, the banner incoming message is displayed on all reverse Telnet sessions and the display cannot be disabled on a specific line.

Configuration Examples

The following example disables display of the MOTD message on VTY 1.

```
FS(config)# line vty 1
FS(config-line)no motd-banner
```

Related Commands

Command	Description
N/A	N/A

Platform

N/A

Description

2.32 Password

Use this command to configure a password for line login, run the **password** command. Use the **no** form of this command to restore the default setting.

password { [**0**] *password* | ***7*** *encrypted-password* }

no password

Parameter Description

Parameter	Description
password	Password for remote line login
0	(Optional) The password is in plain text by a FS device.
7 *encrypted-password*	The password is encrypted

Defaults N/A

Command Mode Line configuration mode

Usage Guide

Configuration Examples The following example configures the line login password as "red".

```
FS(config)# line vty 0
FS(config-line)# password red
```

Related Commands

Command	Description
login	Moves from user EXEC mode to privileged EXEC mode or enables a higher level of authority.

Platform Description N/A

2.33 Prompt

Use this command to set the **prompt** command. Use the **no** form of this command to restore the default setting.

prompt *string*

no prompt

Parameter Description

Parameter	Description
string	Character string of the **prompt** command, containing up to 32 letters.

Defaults N/A

Command Mode Global configuration mode

Usage Guide If no prompt string is configured, the system name applies and varies with the system name. The **prompt** command is valid only in EXEC mode.

Configuration Examples The following example sets the prompt string to rgnos.

```
FS(config)# prompt rgnos
FS(config)# end
FSOS
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.34 Secret

Use this command to set a password encrypted by irreversible MD5 for line login. Use the **no** form of this command to restore the default setting.

secret { [**0**] *password* | **5** *encrypted-secret* }

no secret

Parameter Description

Parameter	Description
0	(Optional) sets the plaintext password text and encrypts it with irreversible MD5 after configuration.
password	Sets the password plaintext, a string ranging from 1 to 25 characters.
5 *encrypted-secret*	Sets the password text encrypted by irreversible MD5 and saves it as the encrypted password after configuration.

Defaults N/A

Command mode Line configuration mode

Usage Guide This command is used to set a password encrypted by irreversible MD5 that is authenticated by a remote user through line login.

If the specified encryption type is 5, the logical length of the cipher text to be entered must be 24 and the 1st, 3rd and 8th characters of the password text must be $.

In general, the encryption type does not need to be specified as 5 except when the encrypted password is copied and pasted.

Line mode allows configuration of both “password” and “secret” types passwords at the same time. When the two passwords are the same, the system will send alert notification but the configuration will be permitted. When the system is configured with the two passwords, if the user enters a password that does not match the “secret” type password, it will not continue to match the “password” type password and login fails, enhancing security for the system password.

Configuration Examples

The following example sets the password encrypted by irreversible MD5 for line login to vty0.

```
FS(config)# line vty 0
FS(config-line)# secret vty0
```

The following displays the encryption outcome by running the **show** command.

```
secret 5 $1$X834$wvx6y794uAD8svzD
```

Related Commands

Command	Description
login	Sets simple password authentication on the interface as the login authentication mode

Platform Description

N/A

2.35 Session

Use this command to connect to another device.

session { **master** | **device** *device-number* }

Parameter Description

Parameter	Description
master	Configures the slave host to connect with the master host or the slave management module with the master management module.
device *device-number*	Sets the device number.

Defaults

N/A

Command Mode

User EXEC mode

Usage Guide

N/A

Configuration Examples

The following example configures the slave host to connect with the master host in stacking environment.

```
FS# session master
```

The following example connects to device1 through session in stacking multiple-device environment (box-type device).

```
FS# session device 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.36 Session-timeout

Use this command to configure the session timeout for a remote terminal. Use the **no** form of this command to restore the default setting and the session never expires.

session-timeout *minutes* [**output**]

no session-timeout

Parameter Description

Parameter	Description
minutes	Timeout in minutes.
output	Regards data output as the input to determine whether the session expires.

Defaults

The default timeout is 0.

Command Mode

LINE configuration mode

Usage Guide

If no input or output in current LINE mode is found on the remote terminal for the session within a specified time, this connection will expire, and this LINE will be restored to the free status.

Configuration Examples

The following example specifies the timeout as 5 minutes.

FS(config-line)#**exec-timeout** *5* **output**

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.37 Show Boot Config

Use this command to display the path for saving startup configurations and the corresponding file name.

show boot config

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the path for saving startup configurations and the corresponding file name..

```
FS#show boot config

Boot config file: [flash:/fs.text]
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.38 Show Debugging

Use this command to display debugging state.

show debugging

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays debugging state.

```
FS#show debugging

debug fw-group detect intf-state
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.39 Show Line

Use this command to display the configuration of a line.

show line { **console** *line-num*| **vty** *line-num* | *line-num* }

Parameter Description

Parameter	Description
console	Displays the configuration of a console line.
vty	Displays the configuration of a vty line.
line-num	Number of the line.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

Configuration Examples

The following example displays the configuration of a console port.

```
FS# show line console 0
CON          Type        speed      Overruns
* 0          CON          9600       45927
Line 0, Location: "", Type: "vt100"
Length: 24 lines, Width: 79 columns
Special Chars: Escape    Disconnect    Activation
                         ^^x          none              ^M
Timeouts:            Idle EXEC        Idle Session
                         never              never
History is enabled, history size is 10.
Total input: 53564 bytes
Total output:    395756 bytes
Data overflow:    27697 bytes
stop rx interrupt:    0 times
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.40 Show Reload

Use this command to display the system restart settings.

show reload

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide

Configuration Examples The following example displays the restart settings of the system.

```
FS# show reload
Reload scheduled in 595 seconds.
At 2003-12-29 11:37:42
Reload reason: test.
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.41 Show Running-config

Use this command to display how the current device system is configured..

show running-config

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration N/A

Examples

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.42 Show Service

Use this command to display the service status.

show service

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays whether the service is enabled or disabled.

```
FS# show service
web-server      : disabled
web-server(https): disabled
snmp-agent        : enabled
ssh-server        : enabled
telnet-server : disabled
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.43 Show Sessions

Use this command to display the Telnet Client session information.

show sessions

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode User EXEC mode

Usage Guide Telnet Client session information includes the VTY number and the server IP address.

Configuration Examples The following example displays the Telnet Client session information.

```
FS#show sessions
Conn    Address
*1      127.0.0.1
*2      192.168.21.122
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.44 Show Startup-config

Use this command to display the device configuration stored in the Non Volatile Random Access Memory (NVRAM).

show startup-config

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide The device configuration stored in the NVRAM is executed while the device is starting.

On a device that does not support **startup-config** is contained in the default configuration file **/config.text** in the built-in flash memory.

Configuration Examples N/A

Related Commands

Command	Description
boot config	Sets the name of the boot configuration file.

Platform Description

N/A

2.45 Show This

Use this command to display effective configuration in the current mode.

show this

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

All modes.

Usage Guide

The configuration in the following range modes cannot be displayed. If the **show this** command is run, the outcome is NULL.

1. Use the **line** *first-line last-line* command to configure lines in a continuous group and enter LINE configuration mode.
2. Use the **vlan range** command to configure VLANs and enter vlan range configuration mode.

Use the **interface range** command to configure interfaces and enter interface range configuration mode.

Configuration Examples

The following example displays configuration on interface fastEthernet 0/1.

```
FS (config)#interface fastEthernet 0/1
FS (config-if-FastEthernet 0/1)#show this
Building configuration...
 !
 spanning-tree link-type point-to-point
 spanning-tree mst 0 port-priority 0
 !
end
FS (config-if-FastEthernet 0/1)#
```

The following example displays configuration on interface range vlan 1-3.

```
FS(config-if-range)#show this

Building configuration...
!
interface VLAN 1
```

```
 ip address dhcp
interface VLAN 2
 ip address 1.1.1.1 255.255.255.0
interface VLAN 3
 ip address 3.3.3.3 255.255.255.0
!
End
FS(config-if-range)#
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.46 Speed

Use this command to set the speed at which the terminal transmits packets. Use the **no** form of this command to restore the default setting.

speed *speed*

no speed

Parameter Description

Parameter	Description
speed	Transmission rate (bps) on the terminal. For serial ports, optional rates include 9600, 19200, 38400, 57600, and 115200 bps. The default rate is 9600 bps.

Defaults

The default is 9600.

Command Mode

Line configuration mode

Usage Guide

This command is used to set the speed at which the terminal transmits packets.

Configuration Examples

The following example sets the rate of the serial port to 57600 bps.

```
FS(config)# line console 0
FS(config-line)# speed 57600
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.47 Telnet

Use this command to log in a server that supports telnet connection.

telnet [**oob**] *host* [*port*] [**/source** { **ip** *A.B.C.D* | **ipv6** *X:X:X:X::X* | **interface** *interface-name* }] [**/vrf** *vrf-name*]

Parameter Description

Parameter	Description
oob	Remotely connect to the Telnet server through out-of-band communication (usually through the MGMT interface). This option is available only when the device has an MGMT management port
host	The IP address of the host or host name you want to log in.
port	Selects the TCP port number for login, 23 by default.
/source	Specifies the source IP address or source interface used by the Telnet client.
ip A.B.C.D	Specifies the source IPv4 address used by the Telnet client.
ipv6 X:X:X:X::X	Specifies the source IPv6 address used by the Telnet client.
interface *interface-name*	Specifies the source interface used by the Telnet client.
/vrf *vrf-name*	Specify the VRF routing table for query

Defaults

N/A

Command Mode

User EXEC mode

Usage Guide

Configuration Examples

The following example sets telnet to IPv6 address 2AAA:BBBB::CCCC.

```
FS# telnet 2AAA:BBBB::CCCC
```

Related Commands

Command	Description
ip telnet source-interface	Specifies the IP address of the interface as the source address for Telnet connection.
show sessions	Displays the currently established Telnet sessions.
exit	Exits current connection.

Platform Description

N/A

2.48 Username

Use this command to set a local username and optional authorization information.. Use the **no** form of this command to restore the default setting.

username *name* [**login mode** { **aux** | **console** | **ssh** | **telnet** }] [**online amount** *number*] [**permission** *oper-mode path*] [**privilege** *privilege-level*] [**reject remote-login**] [**web-auth**] [**pwd-modify**] [**nopassword** | **password** [**0** | **7**] *text-string*] | **secret** [**0** | **5**] *text-string*]

no username *name*

Parameter Description

Parameter	**Description**
name	Username
login mode	Sets the login mode.
aux	Sets the login mode to aux.
console	Sets the login mode to console.
ssh	Sets the login mode to ssh.
telnet	Sets the login mode to telnet.
online amount *number*	Sets the amount of users online simultaneously.
permission *oper-mode path*	Sets the permission on the specified file. *op-mode* refers to the operation mode and *path* to the file or the directory path.
privilege *privilege-level*	Sets the privilege level, in the range from 0 to 15.
reject remote-login	Confines the account to remote login.
web-auth	Confines the account to web authentication.
pwd-modify	Allows the web authentication user of this account to change the password. It works only when the **web-auth** command is configured.
nopassword	The account is not configured with a password.
password [**0** | **7**] *text-string*	If the password type is 0, the password is in plain text. If the type is 7, the password is encrypted. The password is in plain text by default.
secret [**0** | **5**] *text-string*	If the password type is 0, the password is in plain text. If the type is 5, the password is encrypted. The password is in plain text by default.

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

This command is used to establish a local user database for authentication.

If encryption type is 7, the cipher text you enter should contain seven characters to be valid.
In general, do not set the entryption type 7.
Instead, specify the type of encryption as 7 only when the encrypted password is copied and pasted.

Configuration Examples

The following example configures a username and password and binds the user to level 15.

```
FS(config)# username test privilege 15 password 0 pw15
```

The following example configures the username and password exclusive to web authentication.

```
FS(config)# username user1 web-auth password 0 pw
```

The following example configures user test with read and write permissions on all files and directories.

```
FS(config)# username test permission rw /
```

The following example configures user test with read, write and execute permissions on all files and directories

except the confix.text file.

```
FS(config)# username test permission n /config.text
FS(config)# username test permission rwx /
```

Related Commands

Command	Description
login local	Enables local authentication

Platform Description

N/A

2.49 Export

Use this command to export user information to the file.

username export *filename*

Parameter Description

Parameter	Description
filename	The file name.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

This command is used to export user information to the file.

Configuration Examples

The following example exports user information to the file.

```
FS# username export user.csv
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.50 Username Import

Use this command to import user information from the file.

username import *filename*

Parameter Description

Parameter	Description
filename	The file name.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to import user information from the file.

Configuration Examples The following example imports user information from the file.

```
FS# username import user.csv
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.51 Write

Use this command to save **running-config** at a specified location.

write [**memory | terminal**]

Parameter Description

Parameter	Description
memory	Writes the system configuration (running-config) into NVRAM, which is equivalent to **copy running-config startup-config**.
terminal	Displays the system configuration, which is equivalent to **show running-config**.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Despite the presence of alternative commands, these commands are widely used and accepted. Therefore, they are reserved to facilitate user operations.

The system automatically creates the specified file and writes it into system configuration if the device that stores the file exists;

The system will ask you whether to save the current configuration in default boot configuration file /config.text and perform an action as required if the device that stores the file does not exist possibly because the boot configuration file is stored on a removable storage device, and the device has not been loaded when you run the **write** [**memory**] command.

Configuration Examples The following example saves **running-config** at a specified location.

```
FS# write
```

```
Building configuration...
[OK]
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3. Line Commands

3.1 Absolute-timeout

Use this command to set the absolute timeout period. Use the **no** form of this command to restore the default setting.

absolute-timeout *minutes*

no absolute-timeout

Parameter Description

Parameter	Description
minutes	Sets the absolute timeout period, in the range from 0 to 60.

Defaults

No absolute timeout period is set by default.

Command Mode

LINE configuration mode

Usage Guide

If the absolute timeout period is configured, the line is disconnected once the timeout timer expires, Before the terminal logs out, a message is displayed to prompt the remaining time.

```
Terminal will be login out after 20 second
```

Configuration Examples

The following example sets the timeout period for the line between two consoles to 2 minutes.

```
FS(config)# line console 0
FS(config-line)#absolute-timeout 2
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.2 Access-class

Use this command to control login into the terminal through IPv4 ACL. Use the **no** form of this command to restore the default setting.

access-class { *access-list-number* | *access-list-name* } { **in** | **out** }

no access-class { *access-list-number* | *access-list-name* } { **in** | **out** }

Parameter Description

Parameter	Description
access-list-number	Specifies the ACL number. Standard IP ACL number is from 1 to 99 and from 1300 to 1999. Extended IP ACL number is from 100 to 199 and from 2000 to 2699.
access-list-name	Specifies the ACL name.

in	Filters the incoming connections.
out	Filters the outgoing connections.

Defaults N/A

Command Mode Line configuration mode

Usage Guide N/A

Configuration Examples The following example uses ACL 20 to filter the incoming connections in line VTY 0 5.

```
FS(config)# line vty 0 5
FS(config-line)access-list 20 in
```

The following example uses the ACL named "test" to filter the outgoing connections in line VTY 6 7.

```
FS(config)# line vty 6 7
FS(config-line)access-list test out
```

Related Commands

Command	Description
show running	Displays status information

Platform Description N/A

3.3 Accounting Commands

Use this command to enable command accounting in the line. Use the **no** form of this command to restore the default setting.

accounting commands *level* { **default** | *list-name* }

no accounting commands *level*

Parameter Description

Parameter	Description
level	Command level ranging from 0 to 15. The command of this level is accounted when it is executed.
default	Default authorization list name.
list-name	Optional list name.

Defaults This function is disabled by default.

Command Mode Line configuration mode

Usage Guide This function is used together with AAA authorization. Configure AAA command accounting first, and then apply

it on the line.

Configuration Examples

The following example enables command accounting in line VTY 1 and sets the command level to 15.

```
FS(config)# aaa new-model
FS(config)# aaa accounting commands 15 default start-stop group tacacs+
FS(config)# line vty 1
FS(config-line)# accounting commands 15 default
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.4 Accounting Exec

Use this command to enable user access accounting in the line. Use the **no** form of this command to restore the default setting.

accounting commands *level* { **default** | *list-name* }

no accounting commands *level*

Parameter Description

Parameter	Description
level	Command level ranging from 0 to 15. The command of this level is accounted when it is executed.
default	Default authorization list name.
list-name	Optional list name.

Defaults

This function is disabled by default.

Command Mode

Line configuration mode

Usage Guide

This function is used together with AAA authorization. Configure AAA EXEC accounting first, and then apply it on the line.

Configuration Examples

The following example enables user access accounting in line VTY 1.

```
FS(config)# aaa new-model
FS(config)# aaa accounting exec default start-stop group radius
FS(config)# line vty 1
FS(config-line)# accounting exec default
```

Related Commands

Command	Description

N/A	N/A

Platform Description N/A

3.5 Activation-character

Use this command to set the ASCII value of the character for activating the terminal session. Use the **no** form of this command to restore the default setting.

activation-character *ascii-value*

no activation-character

Parameter Description

Parameter	Description
ascii-value	Sets the ASCII value of the character for activating the terminal session, in the range from 0 to 127.

Defaults The default is CR (ASCII: 0x0D).

Command Mode LINE configuration mode

Usage Guide If the current line is configured with the **autoselect** function, *ascii-value* must be set to 0x0D.

Configuration Examples The following example configures Ctrl+Y (ASCII: 25) for activating the terminal session.

```
FS(config)#line console 0
FS(config-line)#activation-character 25
FS(config-line)#end
FS#exit

Press CTRL+y to get started

FS>
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.6 Authorization Commands

Use this command to enable authorization on commands, Use the **no** form of this command to restore the default setting.

authorization commands *level* { **default** | *list-name* }

no authorization commands *level*

Parameter Description

Parameter	Description
level	Command level ranging from 0 to 15. The command of this level is executed after authorization is performed.
default	Default authorization list name,
list-name	Optional list name.

Defaults This function is disabled by default.

Command Mode Line configuration mode

Usage Guide This function is used together with AAA authorization. Configure AAA authorization first, and then apply it on the line.

Configuration Examples The following example enables authorization on commands of level 15 in line VTY 1.

```
FS(config)# aaa new-model
FS(config)# aaa authorization commands 15 default group tacacs+
FS(config)# line vty 1
FS(config-line)# authorization commands 15 default
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.7 Authorization Exec

Use this command to enable EXEC authorization for the line. Use the **no** form of this command to restore the default setting.

authorization { **default** | *list-name* }

no authorization exec

Parameter Description

Parameter	Description
default	Default authorization list name,
list-name	Optional list name.

Defaults This function is disabled by default,

Command Line configuration mode

Mode

Usage Guide This function is used together with AAA authorization. Configure AAA EXEC authorization first, and then apply it on the line.

Configuration Examples The following example performs EXEC authorization to line VTY 1.

```
FS(config)# aaa new-model
FS(config)# aaa authorization exec default group radius
FS(config)# line vty 1
FS(config-line)# authorization exec default
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.8 Autocommand

Use this command to enable automatic command execution. Use the **no** form of this command to restore the default setting.

autocommand *autocommand-string*

no autocommand

Parameter Description

Parameter	Description
autocommand-string	Enables automatic command execution.

Defaults This function is disabled by default.

Command Mode LINE configuration mode

Usage Guide This command is used to enable the dumb terminal to log in to the specified host through Telnet or to obtain the specified app-based terminal service.

Configuration Examples The following example enables automatic command execution and connects to line vty 0.

```
FS(config)# line vty 0
FS(config-line)# autocommand telnet 192.168.21.100

//Initiates connection to line vty 0:
Trying 192.168.21.100, 23...

FS#show users
```

```
Line                User          Host(s)              Idle       Location
---------------- ------------ -------------------- ---------- -------------------
   0 con 0          ---            idle                 00:01:31     ---
*  1 vty 0          ---            idle                 00:00:00     192.168.21.200
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.9 Clear Line

Use this command to clear connection status of the line.

clear line { **console** *line-num* | **vty** *line-num* | *line-num* }

Parameter Description

Parameter	Description
console	Clears connection status of the console line.
vty	Clears connection status of the virtual terminal line.
line-num	Specifies the line to be cleared.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

This command is used to clear connection status of the line and restore the line to the unoccupied status to create new connections.

Configuration Examples

The following example clears connection status of line VTY 13. The connected session on the client (such as Telnet and SSH) in the line is disconnected immediately.

```
FS# clear line vty 13
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.10 Databits

Use this command to set the databit number for every character on the async line in flow communication mode.

Use the **no** form of this command to restore the default setting.

databits *bit*

no databits

Parameter Description

Parameter	Description
bit	Sets the databit number of every character, in the range from 5 to 8.

Defaults

The default is 8.

Command Mode

LINE configuration mode

Usage Guide

The async line device generates 7 databits with parity check in flow communication mode. If parity check is enabled, the databit number is 7. Otherwise, the databit number is 8. The databit number may set to 5 or 6 on the earlier device.

Configuration Examples

The following example sets the databit number for every character on the async line in flow communication mode to 7.

```
FS(config)# line console 0
FS(config-line)#databits 7
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.11 Disconnect-character

Use this command to set the hot key that disconnects the terminal service connection. Use the **no** form of this command to restore the default setting.

disconnect-character *ascii-value*

no disconnect-character

Parameter Description

Parameter	Description
ascii-value	ASCII decimal value of the hot key that disconnects the terminal service connection, in the range from 0 to 255.

Defaults

The default hot key is **Ctrl+D** and the ASCII decimal value is 0x04.

Command Mode

Line configuration mode

Usage Guide This command is used to set the hot key that disconnects the terminal service connection. The hot key cannot be the commonly used ASCII node such as characters ranging from a to z, from A to Z or numbers ranging from 0 to 9. Otherwise, the terminal service cannot operate properly.

Configuration Examples The following example sets the hot key that disconnects the terminal service connection on line VTY 0 5 to **Ctrl+E** (0x05).

```
FS(config)# line vty 0 5
FS(config-line)# disconnect-character 5
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.12 Escape-character

Use this command to set the escape character for the line. Use the **no** form of this command to restore the default setting.

escape-character *escape-value*

no escape-character

Parameter Description

Parameter	Description
escape-value	Sets the ASCII value corresponding to the escape character for the line, in the range from 0 to 255.

Defaults The default escape character is **Ctrl+^** (**Ctrl+Shift+6**) and the ASCII decimal value is 30.

Command Mode Line configuration mode

Usage Guide After configuring this command, press the key combination of the escape character and then press **x**, the current session is disconnected to return to the original session.

Configuration Examples The following example sets the escape character for the line to 23 (**Ctrl+w**).

```
FS(config)# line vty 0
FS(config-line)# escape-character 23
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.13 Exec

Use this command to enable the line to enter the command line interface. Use the **no** form of this command to disable the function.

exec

no exec

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Line configuration mode

Usage Guide The **no exec** command is used to ban the line from entering the command line interface. You have to enter the command line interface through other lines,

Configuration Examples The following example bans line VTY 1 from entering the command line interface.

```
FS(config)# line vty 1
FS(config-line)# no exec
FS# show users
Line                User          Host(s)              Idle       Location
---------------- ------------ -------------------- ---------- ------------------
*  0 con 0          ---           idle                 00:00:00   ---
   1 vty 0          ---           idle                 00:01:03   20.1.1.2
   3 vty 2          ---           idle                 00:00:13   20.1.1.2
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.14 Exec-character-bits

Use this command to configure the coded character set for the async line. Use the **no** form of this command to restore the default setting.

exec-character-bits { **7 | 8** }

no exec-character-bits

Parameter Description

Parameter	Description
7	Configures a 7-bit coded character set.
8	Configures an 8-bit coded character set.

Defaults

The default is 8.

Command Mode

LINE configuration mode

Usage Guide

If you want to enter Chinese characters in the command line or display Chinese characters, graphs or other international characters, configure the **exec-character-bits 8** command.

Configuration Examples

The following example configures a 7-bit coded character set for the async line.

```
FS(config)# line console 0
FS(config-line)#exec-character-bits 7
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.15 Flowcontrol

Use this command to configure the flow control mode for the async line. Use the **no** form of this command to restore the default setting.

flowcontrol { **hardware | none | software** }

no flowcontrol { **hardware | none | software** }

Parameter Description

Parameter	Description
hardware	Configures hardware flow control.
none	Configures no flow control.
software	Configures software flow control.

Defaults

No flow control is configured by default.

Command Mode

LINE configuration mode

Usage Guide

This command is used to control the data sending rate to make it consistent with the receiving rate at the receiving end. The terminal cannot receive data while sending data, so this function prevent s data drop. Flow control is also configured for the communication between high speed device and low speed device (for example,

printer and network interface). FSOS provides two flow control modes, namely, software flow control and hardware flow control. The stop and start characters are Ctrl+S (XOFF, ASCII: 19) and Ctrl+Q (XON, ASCII: 17) respectively.

Configuration Examples

The following example configures software flow control for the async line.

```
FS(config)#line console 0
FS(config-line)#flowcontrol software
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.16 History

Use this command to enable command history for the line or set the number of commands in the command history. Use the **no history** command to disable command history. Use the **no history size** command to restore the number of commands in the command history to the default setting.

history [**size** *size*]

no history

no history size

Parameter Description

Parameter	Description
size *size*	The number of commands, in the range from 0 to 256.

Defaults

This function is enabled by default, The default *size* is 10.

Command Mode

Line configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the number of commands in the command history to 20 for line VTY 0 5.

```
FS(config)# line vty 0 5
FS(config-line)# history size 20
```

The following example disables the command history for line VTY 0 5.

```
FS(config)# line vty 0 5
FS(config-line)# no history
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.17 Ipv6 access-class

Use this command to configure access to the terminal through IPv6 ACL. Use the **no** form of this command to restore the default setting.

ipv6 access-class *access-list-name* { **in** | **out** }

no ipv6 access-class *access-list-name* { **in** | **out** }

Parameter Description

Parameter	Description
access-list-name	Specifies the ACL name.
in	Filters the incoming connections.
out	Filters the outgoing connections.

Defaults N/A

Command Mode Line configuration mode

Usage Guide N/A

Configuration Examples The following example uses the ACL named "test" to filter the outgoing IPv6 connections in line VTY 0 4.

```
FS(config)# line vty 0 4
FS(config-line)ipv6 access-list test out
```

Related Commands

Command	Description
show running	Displays status information

Platform Description N/A

3.18 Length

Use this command to set the screen length for the line. Use the **no** form of this command to restore the default setting.

length *screen-length*

no length

Parameter Description

Parameter	Description
screen-length	Sets the screen length, in the range from 0 to 512.

Defaults The default is 24.

Command Mode Line configuration mode

Usage Guide N/A

Configuration Examples The following example sets the screen length to 10.

```
FS(config-line)# length 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.19 Line

Use this command to enter the specified LINE mode.

line [**console** | **vty**] *first-line* [*last-line*]

Parameter Description

Parameter	Description
console	Console port
vty	Virtual terminal line, applicable for telnet/ssh connection.
first-line	Number of first-line to enter
last-line	Number of last-line to enter

Defaults N/A

Command Mode Global configuration mode

Usage Guide

Configuration Examples The following example enters the LINE mode from LINE VTY 1 to 3:

```
FS(config)# line vty 1 3
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.20 Line Vty

Use this command to increase the number of VTY connections currently available. Use the **no** form of this command to restore the default setting.

line vty *line-number*

no line vty *line-number*

Parameter Description

Parameter	Description
line-number	Number of VTY connections, in the range from 0 to 35.

Defaults

Command Mode

Global configuration mode.

Usage Guide

Configuration Examples

The following example increases the number of available VTY connections to 20. The available VTY connections are numbered 0 to 19.

```
FS(config)# line vty 19
```

The following example decreases the number of available VTY connections to 10. The available VTY connections are numbered 0-9.

```
FS(config)# line vty 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.21 Location

Use this command to configure the line location description. Use the **no** form of this command to restore the default setting.

location *location*

no location

Parameter Description

Parameter	Description
location	Line location description

Defaults

N/A

Command

Line configuration mode

Mode

Usage Guide N/A

Configuration Examples The following example describes the line location as Swtich's Line VTY 0.

```
FS(config)# line vty 0
FS(config-line)# location Swtich's Line Vty 0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.22 Monitor

Use this command to enable log display on the terminal. Use the **no** form of this command to restore the default setting,

monitor

no monitor

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Line configuration mode

Usage Guide N/A

Configuration Examples The following example enables log display on the terminal in VTY line 0 5.

```
FS(config)# line vty 0 5
FS(config-line)# monitor
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.23 Parity

Use this command to configure the parity for the async line. Use the **no** form of this command to restore the default setting.

parity { **even** | **none** | **odd** }

no parity

Parameter Description

Parameter	Description
even	Configures even parity,
none	Configures no parity.
odd	Configures odd parity,

Defaults

No parity check is configured by default.

Command Mode

LINE configuration mode

Usage Guide

Parity is required in communication through some devices (such as async serial ports and console ports).

Configuration Examples

The following example configures even parity for the async line.

```
FS(config)#line console 0
FS(config-line)#parity even
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.24 Privilege Level

Use this command to set the privilege level for the line. Use the **no** form of this command to restore the default setting.

privilege level *level*

no privilege level

Parameter Description

Parameter	Description
level	Privilege level, in the range from 0 to 15.

Defaults

The default is 1.

Command

Line configuration mode

Mode

Usage Guide N/A

Configuration Examples The following example sets the privilege level for the line VTY 0 4 to 14.

```
FS(config)# line vty 0 4
FS(config-line)privilege level 14
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.25 Show History

Use this command to display the command history of the line.

show history

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the command history of the line.

```
FS# show history
exec:
sh privilege
sh run
show user
sh user all
show history
```

Related Commands

Command	Description
N/A	N/A

Platform N/A

Description

3.26 Show Line

Use this command to display line configuration.

show line { **console** *line-num* | **vty** *line-num* | *line-num* }

Parameter Description

Parameter	Description
console	Displays configuration for the console line.
vty	Displays configuration for the virtual terminal line.
line-num	Displays the line.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays configuration for the console port.

```
FS# show line console 0
CON          Type       speed      Overruns
* 0          CON        9600       45927
Line 0, Location: "", Type: "vt100"
Length: 24 lines, Width: 79 columns
Special Chars: Escape    Disconnect    Activation
                         ^^x           none          ^M
Timeouts:          Idle EXEC       Idle Session
                   never           never
History is enabled, history size is 10.
Total input: 53564 bytes
Total output:    395756 bytes
Data overflow:    27697 bytes
stop rx interrupt:    0 times
```

Field	Description
CON	Terminal type. CON indicates console; 0 indicates terminal line number and * ahead of the number means that the terminal is in use.
Type	Terminal type, including CON, AUX, TTY, and VTY.
speed	Asynchronous speed.
Overruns	The number of overrun errors received by the flash.
Line 0	Terminal line number.
Location: ""	Line location configuration.
Type: "vt100"	Compatibility standard.
Special Chars	Special characters, including Escape, Disconnect, and Activation characters.

Timeouts	Timeout value; "never" indicates no timeout.
History	Whether to enable command history; the number of commands in the command history.
Total input	Data volume received from the drive.
Total output	Date volume sent to the drive.
Data overflow	Overflowing data volume.
stop rx interrupt	Data reception interruption times.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.27 Show Privilege

Use this command to display the privilege level of the line.

show privilege

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the privilege level of the line.

```
FS# show privilege
Current privilege level is 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.28 Show Users

Use this command to display the login user information.

show users [**all**]

Parameter Description

Parameter	Description
all	Displays line user information, including users logging into the line and users not logging into the line.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the information about users logging into the line,

```
FS# show users
Line                User          Host(s)              Idle       Location
---------------- ------------ -------------------- ---------- -------------------
   0 con 0          ---          idle                 00:00:46    ---
   1 vty 0          ---          idle                 00:00:29    20.1.1.2
*  2 vty 1          ---          idle                 00:00:00    20.1.1.2
```

The following example displays all line user information,

```
FS(config)# show users all
Line                User          Host(s)              Idle       Location
---------------- ------------ -------------------- ---------- -------------------
   0 con 0          ---          idle                 00:00:49    ---
   1 vty 0          ---          idle                 00:00:32    20.1.1.2
*  2 vty 1          ---          idle                 00:00:00    20.1.1.2
   3 vty 2          ---                               00:00:00    ---
   4 vty 3          ---                               00:00:00    ---
   5 vty 4          ---                               00:00:00    ---
   6 vty 5          ---                               00:00:00    ---
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.29 Speed

Use this command to configure the baud rate for the specified line. Use the **no** form of this command to restore the default setting,

speed *baudrate*

no speed

Parameter Description

Parameter	Description
baudrate	Sets the baud rate, in the range from 9600 to 115200.

Defaults The default is 9600.

Command Mode LINE configuration mode

Usage Guide N/A

Configuration Examples The following example sets the baud rate to 115200,

```
FS(config-line)# speed 115200
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.30 Start-character

Use this command to

on the async line. Use the **no** form of this command to restore the default setting.

start-character *ascii-value*

no start-character

Parameter Description

Parameter	Description
ascii-value	Sets the ASCII value corresponding to the start character for software flow control on the async line, in the range from 0 to 255.

Defaults The default is Ctrl+Q (ASCII: 17).

Command Mode LINE configuration mode

Usage Guide The start character marks the start of the data transmission.

Configuration Examples The following example configures Ctrl+Y (ASCII: 25) for starting software flow control on the async line,

```
FS(config)#line console 0
FS(config-line)#start-character 25
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.31 Stopbits

Use this command to configure the stopbit number for every character for the async line. Use the **no** form of this command to restore the default setting.

stopbits { **1** | **2** }

no stopbits

Parameter Description

Parameter	Description
1	Configures 1 stopbit.
2	Configures 2 stopbits.

Defaults

The default is 2.

Command Mode

LINE configuration mode

Usage Guide

The stopbit is required in communication between the async line and the async device (such as the conventional numb terminals and modems).

Configuration Examples

The following example sets the stopbit number of every character for the async line to 1.

```
FS(config)#line console 0
FS(config-line)#stopbits 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.32 Stop-character

Use this command to configure the stop character for software flow control on the async line. Use the **no** form of this command to restore the default setting.

stop-character *ascii-value*

no stop-character

Parameter Description

Parameter	Description
ascii-value	Sets the ASCII value corresponding to the stop character for software flow control on the async line, in the range from 0 to 255.

Defaults The default is Ctrl+S (ASCII: 19).

Command Mode LINE configuration mode

Usage Guide The stop character marks the end of the data transmission.

Configuration Examples The following example configures Ctrl+Z (ASCII: 26) for stopping software flow control on the async line,

```
FS(config)#line console 0
FS(config-line)#stop-character 26
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.33 Terminal Databits

Use this command to configure the databit number of the character for the current terminal in flow communication mode. Use the **no** form of this command to restore the default setting.

terminal databits *bit*

terminal no databits

Parameter Description

Parameter	Description
bit	Configures the databit number of the character, in the range from 5 to 8.

Defaults The default is 8.

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example sets the databit number of every character for the current terminal in flow communication mode to 7.

```
FS#terminal databits 7
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.34 Terminal Escape-character

Use this command to set the escape character for the current terminal. Use the **no** form of this command to restore the default setting.

terminal escape-character *escape-value*

terminal no escape-character

Parameter Description

Parameter	Description
escape-value	Sets the ASCII value corresponding to the escape character for the current terminal, in the range from 0 to 255.

Defaults The default escape character is **Ctrl+^** (**Ctrl+Shift+6**) and the ASCII decimal value is 30.

Command Mode Privileged EXEC mode

Usage Guide After configuring this command, press the key combination of the escape character and then press **x**, the current session is disconnected to return to the original session.

Configuration Examples The following example sets the escape character for the current terminal to 23 (**Ctrl+w**).

```
FS# terminal escape-character 23
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.35 Terminal Exec-character-bits

Use this command to configure the coded character set for the current terminal. Use the **no** form of this command to restore the default setting.

terminal exec-character-bits { **7** | **8** }

terminal no exec-character-bits

Parameter Description

Parameter	Description
7	Configures a 7-bit coded character set.
8	Configures an 8-bit coded character set.

Defaults The default is 8.

Command Mode Privileged EXEC mode

Usage Guide If you want to enter Chinese characters in the command line or display Chinese characters, graphs or other international characters, configure the **exec-character-bits 8** command.

Configuration Examples The following example configures a 7-bit coded character set for the current terminal.

```
FS#terminal exec-character-bits 7
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.36 Terminal Flowcontrol

Use this command to configure the flow control mode for the current terminal. Use the **no** form of this command to restore the default setting.

terminal flowcontrol { **hardware | none | software** }

terminal no flowcontrol { hardware | none | software }

Parameter Description

Parameter	Description
hardware	Configures hardware flow control.
none	Configures no flow control.
software	Configures software flow control.

Defaults The default flow control mode is **none**.

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example configures software flow control for the current terminal.

```
FS#terminal flowcontrol software
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.37 Terminal History

Use this command to enable command history for the current terminal or set the number of commands in the command history. Use the **no history** command to disable command history. Use the **no history size** command to restore the number of commands in the command history to the default setting.

terminal history [**size** *size*]

terminal no history

terminal no history size

Parameter Description

Parameter	Description
size *size*	Sets the number of commands, in the range from 0 to 256.

Defaults This function is enabled by default, The default *size* is 10.

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example sets the number of commands in the command history to 20 for the current terminal.

```
FS# terminal history size 20
```

The following example disables the command history for the current terminal.

```
FS# terminal no history
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.38 Terminal Length

Use this command to set the screen length for the current terminal. Use the **no** form of this command to restore the default setting.

terminal length *screen-length*

terminal no length

Parameter Description

Parameter	Description
screen-length	Sets the screen length, in the range from 0 to 512.

Defaults The default is 24.

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example sets the screen length for the current terminal to 10.

```
FS# terminal length 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.39 Terminal Location

Use this command to configure location description for the current device. Use the **no** form of this command to restore the default setting.

terminal location *location*

terminal no location

Parameter Description

Parameter	Description
location	Configures location description of the current device.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example configures location description of the current device as "Swtich's Line Vty 0".

```
FS# terminal location Swtich's Line Vty 0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.40 Terminal Parity

Use this command to configure the parity for the current terminal. Use the **no** form of this command to restore the default setting.

terminal parity { **even** | **none** | **odd** }

terminal no parity

Parameter Description

Parameter	Description
even	Configures even parity,
none	Configures no parity.
odd	Configures odd parity,

Defaults No parity check is configured by default.

Command Mode Privileged EXEC mode

Usage Guide Parity is required in communication through some devices (such as async serial ports and console ports).

Configuration Examples The following example configures even parity for the current terminal.

```
FS#terminal parity even
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.41 Terminal Speed

Use this command to configure the baud rate for the current terminal. Use the **no** form of this command to restore the default setting,

terminal speed *baudrate*

terminal no speed

Parameter Description

Parameter	Description
baudrate	Sets the baud rate, in the range from 9600 to 115200.

Defaults The default is 9600.

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example sets the baud rate for the current terminal to 115200,

```
FS# terminal speed 115200
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.42 Terminal Start-character

Use this command to configure the start character for software flow control on the current terminal. Use the **no** form of this command to restore the default setting.

terminal start-character *ascii-value*

terminal no start-character

Parameter Description

Parameter	Description
ascii-value	Sets the ASCII value corresponding to the start character for software flow control on the current terminal, in the range from 0 to 255.

Defaults The default is Ctrl+Q (ASCII: 17).

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example configures Ctrl+Y (ASCII: 25) for starting software flow control on the current device,

```
FS#terminal start-character 25
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.43 Terminal Stopbits

Use this command to set the stopbit number of every character for the current terminal. Use the **no** form of this command to restore the default setting.

terminal stopbits { **1** | **2** }

terminal no stopbits

Parameter Description

Parameter	Description
1	Configures 1 stopbit,
2	Configures 2 stopbits.

Defaults The default is 2.

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example configures 1 stopbit for the current terminal.

```
FS#terminal stopbits 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.44 Terminal Stop-character

Use this command to configure the stop character for software flow control on the current terminal. Use the **no** form of this command to restore the default setting.

terminal stop-character *ascii-value*

terminal no stop-character

Parameter Description

Parameter	Description
ascii-value	Sets the ASCII value corresponding to the stop character for software flow control on the current terminal, in the range from 0 to 255.

Defaults The default is Ctrl+S (ASCII: 19).

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example configures Ctrl+Z (ASCII: 26) for stopping software flow control on the current device.

```
FS#terminal stop-character 26
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.45 Terminal Terminal-type

Use this command to configure the simulated terminal type string for the current terminal. Use the **no** form of this command to restore the default setting.

terminal terminal-type *terminal-type-string*

terminal no terminal-type

Parameter Description

Parameter	Description
terminal-type-string	Sets the terminal type string, such as vt100 and ansi.

Defaults The default is vt100.

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example sets the simulated terminal type string for the current terminal to ansi.

```
FS#terminal terminal-type ansi
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.46 Terminal Width

Use this command to set the screen width for the terminal.

terminal width *screen-width*

terminal no width

Parameter Description

Parameter	Description
screen-width	Sets the screen width for the terminal, in the range from 0 to 256.

Defaults The default is 79.

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example sets the screen width for the terminal to 10.

```
FS# terminal width 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.47 Terminal-type

Use this command to configure the simulated terminal type string of the async line.

terminal-type *terminal-type-string*

no terminal-type

Parameter Description

Parameter	Description
terminal-type-string	Configures the terminal type string, such as vt100 and ansi.

Defaults The default is vt100.

Command Mode LINE configuration mode

Usage Guide You can use the **terminal-type vt100** command to restore the default terminal type. If you want to enable telnet connection, you should use the simulated terminal type to perform terminal type negotiation (Telnet: 0x18). See RFC 854 for details.

Configuration Examples The following example sets the simulated terminal type of the async line to ansi.

```
FS(config)#line console 0
FS(config-line)#terminal-type ansi
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.48 Timeout Login

Use this command to set the login authentication timeout for the line. Use the **no** form of this command to restore the default setting.

timeout login response *seconds*

no timeout login response

Parameter Description

Parameter	Description
response	The time period during which the line waits for the user to enter any message.
seconds	Timeout value, in the range from 1 to 300 in the unit of seconds.

Defaults The default is 30.

Command Mode Line configuration mode

Usage Guide N/A

Configuration Examples The following example sets the login authentication timeout to 300 seconds for line VTY 0 5.

```
FS(config)# line vty 0 5
FS(config-line)login timeout response 300
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.49 Transport Input

Use this command to set the specified protocol under Line that can be used for communication. Use the **no** form of this command to restore the default setting.

transport input { **all** | **ssh** | **telnet** | **none** }

no transport input { **all** | **ssh** | **telnet** | **none** }

Parameter Description

Parameter	Description
all	Allows all the protocols under Line to be used for communication
ssh	Allows only the SSH protocol under Line to be used for communication
telnet	Allows only the Telnet protocol under Line to be used for communication
none	Allows none of protocols under Line to be used for communication

Defaults **all**, **ssh** and **telnet** protocols are allowed.

Command Mode Line configuration mode

Usage Guide N/A

Configuration Examples The following example specifies that only the Telnet protocol is allowed to login in line vty 0 4.

```
FS(config)# line vty 0 5
FS(config-line)transport input ssh
```

Related Commands

Command	Description
show running	Displays status information

Platform Description N/A

3.50 Vacant-message

Use this command to set the logout message. Use the **no** form of this command to restore the default setting.

vacant-message [*c message c*]

no vacant-message

Parameter Description

Parameter	Description
c	Delimiter of the logout message, which is not allowed within the message.
message	Logout message.

Defaults N/A

Command Mode Line configuration mode

Usage Guide This command is used to set the logout message for the line. The characters entered after the ending delimiter are discarded directly, The logout message is displayed when the user logs out.

Configuration The following example sets the logout message to “Logout from the fs device”.

Examples

```
FS(config-line)#vacant-message @ Logout from the fs device @
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.51 Width

Use this command to set the screen width for the line. Use the **no** form of this command to restore the default setting,

width *screen-width*

no width

Parameter Description

Parameter	Description
screen-width	Sets the screen width for the line, in the range from 0 to 256,

Defaults

The default is 79.

Command Mode

Line configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the screen width for the line to 10.

```
FS(config-line)# width 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4. File System Commands

4.1 CD

Use this command to set the present directory for the file system.

cd *[filesystem:] [directory]*

Parameter Description

Parameter	Description
filesystem:	The URL of filesystem, followed by a colon (:). The filesystem includes **flash:**, and **tmp:**.
directory	The path name. A file name starts with "/" is an absolute path. Otherwise, it is a relative path.

Defaults

The default directory is the flash root directory.

Command Mode

Privileged EXEC mode.

Usage Guide

Configuration Examples

Related Commands

Command	Description
pwd	Displays the present word directory.

Platform Description

N/A.

4.2 Copy

Use this command to copy a file from the specified source directory to the specified destination directory.

copy *source-url destination-url*

Parameter Description

Parameter	Description
source-url	Source file URL, which can be local or remote.
destination-url	Destination file URL, which can be local or remote.

Defaults

N/A.

Command Mode

Privileged EXEC mode.

Usage Guide

when the file to be copied exists on the target URL, the target file system determines the action, such as error report, overwrite, or offering you the choice.

The following table lists the URL:

Prefix	Description
running-config	Running configuration file.
startup-config	startup configuration file.
flash:	local FLASH file system.
tftp:	The URL of TFTP network server, in the format as follows: **tftp**:[[//location]/directory]**/filename**
oob_tftp:	The URL of the TFTP network server connected to the external port

Configuration Examples

The following example copies the netconfig file from device 192.168.64.2 to the FLASH disk and the netconfile file exists locally.

```
Do you want to overwrite [/data/netconfig]? [Y/N]:y
Press Ctrl+C to quit
!
Copy success.
```

Related Commands

Command	Description
delete	Deletes the file.
rename	Renames the file.
dir	Displays the file list of the specified directory.

Platform Description

N/A

4.3 Delete

Use this command to delete the files in the present directory.

delete [*filesystem*:] *file-url* | **startup-config** }

Parameter Description

Parameter	Description
filesystem:	The URL of file system, followed by a colon (:). The file system includes **flash:**, **usb:** and **tmp:**.
file-url	The file name containing the path. A file name starts with "/" is an absolute path. Otherwise, it is a relative path.
startup-config	The startup file.

Defaults

The default *filesystem*: is **flash:**.

Command Mode

Privileged EXEC mode.

Usage Guide

Configuration Examples

The following example deletes the fstab file on the FLASH disk.

```
FS#pwd
flash:/
FS#dir
Directory of flash:/
1    -rw-        336    Jan 03 2012 18:53:42    fstab
2    -rw-       4096    Jan 03 2012 12:32:09    rc.d
3    -rw-   10485760    Jan 03 2012 18:13:37    rpmdb
3 files, 0 directories
10,490,192 bytes total (13,192,656 bytes free)
FS#delete flash:/fstab
Do you want to delete [flash:/fstab]? [Y/N]:y
Delete success.
FS#dir
Directory of flash:/
1    -rw-       4096    Jan 03 2012 12:32:09    rc.d
2    -rw-   10485760    Jan 03 2012 18:13:37    rpmdb
2 files, 0 directories
10,489,856 bytes total (13,192,992 bytes free)
```

Related Commands

Command	Description
copy	Copies the file.
dir	Displays the file list of the specified directory.

Platform Description

N/A

4.4 Dir

Use this command to display the files in the present directory.

dir [*filesystem*:] [*directory*]

Parameter Description

Parameter	Description
filesystem	The URL of file system, followed by a colon (:). The file system includes **flash:**, **usb:** and **tmp:**.
directory	The path name. A file name starts with "/" is an absolute path. Otherwise, it is a relative path.

Defaults

By default, only the information under the present working path is displayed.

Command Mode

Privileged EXEC mode.

Usage Guide

Configuration Examples

The following example displays the file information of the root directory in the FLASH disk.

```
FS#dir flash:/
Directory of flash:/
1    -rw-        336    Jan 03 2012 18:53:42    fstab
2    -rw-       4096    Jan 03 2012 12:32:09    rc.d
3    -rw-   10485760    Jan 03 2012 18:13:37    rpmdb
3 files, 0 directories
10,490,192 bytes total (13,192,656 bytes free)
```

Field	Description
1, 2, 3…	Index number
-rw-	Permissions on a file include: ● d: directory ● r: read ● w: write ● x: executable
10485760	File size
rpmdb	File name
files	File number
directories	Directory number
total	Total size
free	Available space

Related Commands

Command	Description
pwd	Displays the present directory.
cd	Sets the present directory of the file system.

Platform Description

N/A.

4.5 Erase

Use this command to erase the device or file that does't have a file system.

erase *filesystem*

Parameter Description

Parameter	Description
filesystem:	Name of the file system, followed by a colon (:).

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

N/A

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.6 File

Use this command to display the information about a file.

file [*filesystem*:] *file-url*

Parameter Description

Parameter	Description
filesystem:	The URL of file system, followed by a colon (:). The file system includes **flash:**, **usb:** and **tmp:**.
file-url	The file name containing the path. A file name starts with "/" is an absolute path. Otherwise, it is a relative path.

Defaults

The default *filesystem*: is **flash:**.

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the information about gcc executable file.

```
FS#file flash:/gcc
/usr/bin/gcc-4.6: ELF 32-bit LSB executable, Intel 80386, version 1 (SYSV), dynamically linked (uses shared libs), for GNU/Linux 2.6.15, stripped
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.7 File Prompt

Use this command to set the prompt mode.

file prompt [**noisy** | **quiet**]

Parameter Description

Parameter	Description
noisy	Displays prompt for all operation.

quiet	Displays prompt rarely.

Defaults The default mode is noisy.

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example sets the prompt mode to noisy.

```
FS#file prompt noisy
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.8 Mkdir

Use this command to create a directory.

mkdir [*filesystem*:] *directory*

Parameter Description

Parameter	Description
filesystem:	The URL of file system, followed by a colon (:). The file system includes **flash:**, **usb:** and **tmp:**.
directory	The path name. A file name starts with "/" is an absolute path. Otherwise, it is a relative path.

Defaults The default *filesystem*: is **flash**:.

The default *directory* is the root directory.

Command Mode Privileged EXEC mode.

Usage Guide

Configuration Examples The following example creates a directory named newdir:

```
FS#dir
Directory of flash:/
1    -rw-        336    Jan 03 2012 18:53:42    fstab
2    -rw-       4096    Jan 03 2012 12:32:09    rc.d
3    -rw-   10485760    Jan 03 2012 18:13:37    rpmdb
3 files, 0 directories
10,490,132 bytes total (13,192,656 bytes free)
```

```
FS#mkdir newdir
Created dir flash:/newdir
FS#dir
Directory of flash:/
1    -rw-        336    Jan 03 2012 18:53:42    fstab
2    -rw-       4096    Jan 03 2012 12:32:09    rc.d
3    -rw-   10485760    Jan 03 2012 18:13:37    rpmdb
4    drw-       4096    Jan 03 2012 18:13:37    newdir
3 files, 1 directories
10,494,228 bytes total (13,188,560 bytes free)
```

Related Commands

Command	Description
rmdir	Deletes the directory.
pwd	Displays the present directory.

Platform Description

N/A

4.9 More

Use this command to display the content of a file.

more [/**ascii** | /**binary**] [*filesystem*:] *file-url*

Parameter Description

Parameter	Description
/**ascii**	Displays the file content in the ASCII format.
/**binary**	Displays the file content in the
filesystem:	The URL of file system, followed by a colon (:). The file system includes **flash:** and **tmp:**.
file-url	The file name containing the path. A file name starts with "/" is an absolute path. Otherwise, it is a relative path.

Defaults

The file is displayed in its own format by default.

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the content of the netconfig file under root directory of FLASH disk.

```
FS#more flash:/netconfig
#
# The network configuration file. This file is currently only used in
# conjunction with the TI-RPC code in the libtirpc library.
#
# Entries consist of:
```

```
#
#            <network_id> <semantics> <flags> <protofamily> <protoname> \
#                         <device> <nametoaddr_libs>
#
# The <device> and <nametoaddr_libs> fields are always empty in this
# implementation.
#
udp          tpi_clts       v     inet      udp      -        -
tcp          tpi_cots_ord   v     inet      tcp      -        -
udp6         tpi_clts       v     inet6     udp      -        -
tcp6         tpi_cots_ord   v     inet6     tcp      -        -
rawip        tpi_raw        -     inet      -        -        -
local        tpi_cots_ord   -     loopback  -        -        -
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.10 Pwd

Use this command to display the working path.

pwd

Parameter Description

Parameter	Description
N/A.	N/A.

Defaults

N/A.

Usage Guide

Configuration Examples

Related Commands

Command	Description
cd	Changes the file system in the present directory.

Platform Description

N/A.

4.11 Rename

Use this command to move or rename the specified file.

rename *src-url dst-url*

Parameter Description

Parameter	Description
src-url	The source file URL to move.
dst-url	The URL of the destination file or directory.

Defaults

N/A.

Command Mode

Privileged EXEC mode.

Usage Guide

N/A

Configuration Examples

The following example renames the fstab file in the root directory on the FLASH disk as new-fstab.

```
FS#dir
Directory of flash:/
1    -rw-        336    Jan 03 2012 18:53:42    fstab
2    -rw-       4096    Jan 03 2012 12:32:09    rc.d
3    -rw-   10485760    Jan 03 2012 18:13:37    rpmdb
3 files, 0 directories
10,490,192 bytes total (13,192,656 bytes free)
FS#rename flash:/fstab flash:/new-fstab
Renamed file flash:/new-fstab
FS#dir
Directory of flash:/
1    -rw-        336    Jan 03 2012 18:53:42    new-fstab
2    -rw-       4096    Jan 03 2012 12:32:09    rc.d
3    -rw-   10485760    Jan 03 2012 18:13:37    rpmdb
3 files, 0 directories
10,490,192 bytes total (13,192,656 bytes free)
```

Related Commands

Command	Description
delete	Deletes the file.
copy	Copies the file.

Platform Description

N/A

4.12 Rmdir

Use this command to delete an empty directory.

rmdir [*filesystem*:] *directory*

Parameter Description

Parameter	Description
filesystem:	The URL of file system, followed by a colon (:). The file system includes **flash:**, and **tmp:**.

directory	The path name. A file name starts with "/" is an absolute path. Otherwise, it is a relative path.

Defaults The default *filesystem*: is **flash:**.

Command Mode Privileged EXEC mode.

Usage Guide

Configuration Examples The following example deletes the null test directories.

```
FS#mkdir newdir
FS#dir
Directory of flash:/
1    -rw-        336    Jan 03 2012 18:53:42   fstab
2    -rw-       4096    Jan 03 2012 12:32:09   rc.d
3    -rw-   10485760    Jan 03 2012 18:13:37   rpmdb
4    drw-       4096    Jan 03 2012 18:13:37   newdir
3 files, 1 directories
10,494,228 bytes total (13,188,560 bytes free)
FS#rmdir newdir
removed dir flash:/newdir
FS#dir
Directory of flash:/
1    -rw-        336    Jan 03 2012 18:53:42   fstab
2    -rw-       4096    Jan 03 2012 12:32:09   rc.d
3    -rw-   10485760    Jan 03 2012 18:13:37   rpmdb
3 files, 0 directories
10,490,132 bytes total (13,192,656 bytes free)
```

Related Commands

Command	Description
N/A.	N/A.

Platform Description N/A.

4.13 Show Disk

Use this command to display USB/Flash information.

show disk [usb | *flash]*

Parameter Description

Parameter	Description
usb	Displays usb information.
flash	Displays FLASH information.

Defaults N/A

Command Mode User EXEC mode/Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays FLASH information.

```
FS#show disk flash
Nand flash size: 512MB
Nor flash size: 1MB
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.14 Show File Systems

Use this command to display the file system information.

show file systems

Parameter Description

Parameter	Description
N/A.	N/A.

Defaults N/A.

Command Mode User EXEC mode/Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

Configuration Examples The following example displays the file system information:

```
FS#show file systems
  Size(KB)      Free(KB)     Type    Flags   Prefixes
        NA            NA      ram       rw   tmp:
        NA            NA  network       rw   tftp:
        NA            NA  network       rw   oob_tftp:
      8192          2416     disk       rw   flash:
   1048576        548576     disk       rw   usb0:
```

Field	Description
Size(KB)	File system space, in the unit of KB.
Free(KB)	Available file system space, in the unit of KB.

Type	File system type
Flags	Permissions on the file system include: ● ro: read-only ● wo: write-only ● rw: read and write
Prefixes	File system prefix

Related Commands

Command	Description
N/A.	N/A.

Platform Description

N/A.

4.15 Show Mount

Use this command to display the mounted information.

show mount

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

User EXEC mode/Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example displays the mounted information.

```
FS#show mount
/dev/sda1 on / type ext4 (rw,errors=remount-ro,commit=0)
proc on /proc type proc (rw,noexec,nosuid,nodev)
sysfs on /sys type sysfs (rw,noexec,nosuid,nodev)
fusectl on /sys/fs/fuse/connections type fusectl (rw)
none on /sys/kernel/debug type debugfs (rw)
none on /sys/kernel/security type securityfs (rw)
udev on /dev type devtmpfs (rw,mode=0755)
devpts on /dev/pts type devpts (rw,noexec,nosuid,gid=5,mode=0620)
tmpfs on /run type tmpfs (rw,noexec,nosuid,size=10%,mode=0755)
none on /run/lock type tmpfs (rw,noexec,nosuid,nodev,size=5242880)
none on /run/shm type tmpfs (rw,nosuid,nodev)
/dev/sda3 on /hao-share type ext3 (rw,commit=0)
binfmt_misc on /proc/sys/fs/binfmt_misc type binfmt_misc (rw,noexec,nosuid,nodev)
```

Field	Description
proc	Source address of mount.

on	-
/proc	Destination address of mount.
type	-
proc	Mount type.
(rw,noexec,nosuid,nodev)	Mount property.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.16 Tftp-client Source

Use this command to bind a source IP address or source interface with a TFTP client. Use the **no** or **default** form of this command to restore the default setting.

tftp-client source { **ip** *ip-address* | **ipv6** *ipv6-address* | *interface* }

no tftp-client source { **ip** *ip-address* | **ipv6** *ipv6-address* | *interface*}

default tftp-client source { **ip** *ip-address* | **ipv6** *ipv6-address* | *interface* }

Parameter Description

Parameter	Description
ip-address	Specifies the IPv4 source address.
Ipv6-address	Specifies the IPv6 source address.
interface	Specifies the source interface

Defaults No source interface or IP address is bound with the TFTP client by default.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples

The following example binds source IP address 192.168.23.236 with the TFTP client.

```
FS(config)# tftp-client source ip 192.168.23.236
```

The following example binds source IPv6 address 2003:0:0:0::2 with the TFTP client.

```
FS(config)# tftp-client source ipv6 2003:0:0:0::2
```

The following example binds source interface gigabitEthernet 0/0 with the TFTP client.

```
FS(config)# tftp-client source gigabitEthernet 0/0
```

The following example removes the configuration.

```
FS(config)# no tftp-client source ip 192.168.23.236
```

The following example restores the default setting.

```
FS(config)# default tftp-client source ip 192.168.23.236
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.17 Tree

Use this command to display the file tree of the current directory.

tree [*filesystem*:] [*directory*]

Parameter Description

Parameter	Description
filesystem:	The URL of file system, followed by a colon (:). The file system includes **flash** and **tmp:**.
directory	The path name. A file name starts with "/" is an absolute path. Otherwise, it is a relative path.

Defaults The default *filesystem*: is **flash:**.

Command Mode User EXEC mode/Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the file tree of flash:/echo

```
FS#tree flash:/echo
+-- client_module
+-- client_userspace
+-- echo_cli.c
+-- echo_client.c
+-- echo_client.h
+-- echo_client.o
+-- echo_cli.o
+-- echo_flag.h
+-- echo.h
+-- echo.ko
+-- echo_server.h
+-- exec_set_echo.h
+-- exec_show_echo.h
+-- Makefile
+-- module
¦   +-- echo.ko
¦   +-- echo.mod.c
¦   +-- echo.mod.o
¦   +-- echo_module.c
¦   +-- echo_module.o
¦   +-- echo.o
¦   +-- echo_server.c
```

```
¦   +-- echo_server.o
¦   +-- echo_sysfs.c
¦   +-- echo_sysfs.h
¦   +-- echo_sysfs.o
¦   +-- Makefile
¦   +-- modules.order
¦   +-- Module.symvers
¦   +-- msg_fd.c
¦   +-- msg_fd.o
+-- readme
+-- server_module
+-- server_userspace
+-- sys_fsos.ko
+-- user_space
      +-- echo_server.c
      +-- echo_server.o
      +-- Makefile
      +-- msg_fd.c
      +-- msg_fd.o 10,490,132 bytes total (13,192,656 bytes free)
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.18 Verify

Use this command to compute, display and verify Message Digest 5 (MD5).

verify [**/md5** *md5-value*] *filesystem***:** [*file-url*]

Parameter Description

Parameter	Description
/md5	Computes and displays MD5.
md5-value	The file MD5, which is compared with the computed MD5.
filesystem:	The URL of file system, followed by a colon (:). The file system includes **flash:**, and **tmp:**.
file-url	The file name containing the path. A file name starts with "/" is an absolute path. Otherwise, it is a relative path.

Defaults The default *filesystem:* is **flash:**.

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples

The following example computes MD5 of flash:/gcc.

```
FS#verify flash:/gcc
8b072de7db7affd8b2ef824e7e4d716c
```

The following example computes MD5 and makes a comparison.

```
FS#verify /md5 8b072de7db7affd8b2ef824e7e4d716c flash:/gcc
%SUCCESS verifying /mnt/flash/gcc = 8b072de7db7affd8b2ef824e7e4d716c
FS#verify /md5 8b072de7db7affd8b2ef824e7e4d71 flash:/gcc
%Error verifying flash:/gcc
Computed signature = 8b072de7db7affd8b2ef824e7e4d716c
Submitted signature = 8b072de7db7affd8b2ef824e7e4d71
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5. SYS Commands

5.1 Calendar Set

Use this command to set the hardware calendar.

calendar set { *hour* [*:minute* [*:second*]] } [*month* [*day* [*year*]]]

Parameter Description

Parameter	Description
hour [:minute [:second]]	Sets hardware time in the format of hour: minute: second. Only the specified parameters (hour, minute, or second) can be reset. The unspecified parameters keep the current system values.
month	Sets month. The range is from 1 to 12.
day	Sets date. The range is from 1 to 31.
year	Sets year. The range is from 1970 to 2069.

Defaults

-

Command Mode

Privileged EXEC mode

Default Level

-

Usage Guide

1. The time parameter is mandatory. After setting time, set month, day, and year, which can be neglected according to your needs. The parameter that is neglected keeps the current system value. For example, if the current hardware time is "2012-02-29 09:33:44" and you want to change month and hour and keep values of other parameters, use the **calendar set** *12 5* command to change the current time into "2012-05-29 12:33:44".

The hardware time of the system is used as the UTC time, while the software time of the system refers to the local time of the device.

Configuration Examples

The following example changes the current hardware time of the system (for example, 2012-02-01 18:23:06) into 6 o'clock and keeps the values of other parameters.

```
FS# calendar set 6
06:41:39 UTC Fri, Jul 6, 2012
```

The following example changes the current hardware time of the system (for example, 2012-02-01 18:23:06) into 06:42 and keeps the values of other parameters.

```
FS# calendar set 6:42
06:42:27 UTC Fri, Jul 6, 2012
```

The following example changes the current hardware time of the system (for example, 2012-02-01 18:23:06) into March 2 and keeps the values of other parameters.

```
FS# calendar set 18 3 2
18:43:05 UTC Fri, Mar 2, 2012
```

Because the *hour* parameter is mandatory, set it to the current time if you do not need to change its value. As

shown in the last example, enter **18** (hour), and then enter **3** (month) and **2** (day).

Check Method -

Platform Description -

5.2 Clock Read-calendar

Use this command to enable the system to synchronize the software time with the hardware time.

clock read-calendar

Parameter Description

Parameter	Description
-	-

Defaults -

Command Mode Privileged EXEC mode

Default Level -

Usage Guide After you configure this command, the system will synchronize the software time with the current hardware time according to the time zone and summer time settings of the device.

Configuration Examples The following example enables the system to synchronize the software time with the hardware time.

```
FS# clock read-calendar
Set the system clock from the hardware time.
```

Check Method -

Platform Description -

5.3 Clock Set

Use this command to set the system software clock.

clock set { *hour* [*:minute* [*:second*]] } [*month* [*day* [*year*]]]

Parameter Description

Parameter	Description
hour [:minute [:second]]	Sets software time in the format of hour: minute: second. Only the specified parameters (hour, minute, or second) can reset. The unspecified parameters keep the current system values.
month	Sets month. The range is from 1 to 12.
day	Sets date. The range is from 1 to 31.

year	Sets year. The range is from 1970 to 2069.

Defaults -

Command Mode Privileged EXEC mode

Default Level -

Usage Guide

1. The time parameter is mandatory. After setting time, set month, day, and year, which can be neglected according to your needs. The parameter that is neglected keeps the current system value.

For example, if the current hardware time is "2012-02-29 09:33:44" and you want to change month and hour and keep values of other parameters, use the **clock set** *12 5* command to change the current time into "2012-05-29 12:33:44".

Configuration Examples

The following example changes the current software time of the system (for example, 2012-02-01 18:23:06) into 6 o'clock and keeps the values of other parameters.

```
FS# clock set 6
06:48:13 CST Fri, Mar 2, 2012
```

The following example changes the current software time of the system (for example, 2012-02-01 18:23:06) into 06:42 and keeps the values of other parameters.

```
FS# clock set 6:42
06:42:31 CST Fri, Mar 2, 2012
```

The following example changes the current software time of the system (for example, 2012-02-01 18:23:06) into March 2 and keeps the values of other parameters.

```
FS# clock set 18 3 2
18:42:48 CST Fri, Mar 2, 2012
```

Because the *hour* parameter in this command is mandatory, set it to the current time if you do not need to change its value. As shown in the last example, enter **18** (hour), and then enter **3** (month) and **2** (day).

Check Method -

Platform Description -

5.4 Clock Summer-time

Use this command to set the summer time.

clock summer-time *zone* **start** *start-month* [*week*|**last**] *start-date hh:mm* **end** *end-month* [*week*| **last**] *end-date hh:mm*

[**ahead** *hours-offset* [*minutes-offset*]

Use this command to disable the summer time.

no clock summer-time

Parameter Description

Parameter	Description
zone	Summer time name. It can only be a letter between A and Z or between a and z, which is not case sensitive. The summer time name contains 3 to 31 characters.
start	Indicates the start time of the summer time.
start-month	Start month. Value range: January, February, March, April, May, June, July, August, September, October, November, and December. The value is not case sensitive and you are allowed to enter an incomplete word, for example, Febr and FebRu.
week	Start week in the start month. The range is from 1 to 5.
last	The last week of the specified month.
start-date	Day in the start week of the start month. Value range: Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday. The value is not case sensitive and you are allowed to enter an incomplete word, for example, Web and WeDne.
hh:mm	Time, in the format of hour : minute.
end	Indicates the end time of the summer time.
end-month	End month. Value range: January, February, March, April, May, June, July, August, September, October, November, and December. The value is not case sensitive and you may enter an incomplete word, for example, Febr and FebRu.
ahead	Indicates how much time for the summer time ahead of the standard time during the effective period of the summer time. By default, the summer time is one hour ahead of the standard time.
hours-offset	Hours ahead of the standard time. The range is from 0 to 12. You are not allowed to set it to 00:00.
minutes-offset	Minutes ahead of the standard time. The range is from 0 to 59. If *hours-offset* has been set to 0, you are not allowed to set *minutes-offset* to 0.

Defaults

-

Command Mode

Global configuration mode

Default Level

-

Usage Guide

Configuration Examples

Assume that the time zone name of your living place is ABC and the standard time is 8:15 ahead of UTC, namely, GMT+08:15. The summer time period starts from the first Saturday in February to the third Monday in May and the summer time is 01:20 ahead of the standard time. In this case, the summer time is 09:35 ahead of the UTC time, but non-summer time is still 08:15 ahead of the UTC time.

```
FS(config)# clock timezone ABC 8 15
```

```
Set time zone name: ABC (GMT+08:15)
FS(config)#show clock
16:39:16 ABC Wed, Feb 29, 2012
FS(config)#show calendar
08:24:35 GMT Wed, Feb 29, 2012

FS(config)# clock summer-time TZA start Feb 1 sat 2:00 end May 3 Monday 18:30 ahead 1 20
*May 10 03:45:58: %SYS-5-CLOCKUPDATE: Set summer-time: TZA from February the 1st Saturday at 2:00 TO May the 3rd
Monday at 18:30, ahead 1 hour 20 minute
Set summer-time: TZA from February the 1st Saturday at 2:00 TO May the 3rd Monday at 18:30, ahead 1 hour 20 minute

FS# show clock
18:00:08 TZA Wed, Feb 29, 2012

# If the time is set to non-summer time, the time zone name is restored to ABC.
FS#clo set 18 1 1
*Jan    1 18:00:09: %SYS-5-CLOCKUPDATE: Set system clock: 18:00:09 ABC Sun, Jan    1, 2012
Set system clock: 18:00:09 ABC Sun, Jan    1, 2012
FS#show clock
18:00:12 ABC Sun, Jan    1, 2012
```

If the system uses the default summer time that is one hour ahead of the standard time, ahead and the parameters behind ahead can be neglected. For example, set the summer time to start from 2:00 a.m. of the first Sunday in April to 2:00 a.m. of the last Sunday in October and set the summer time to one hour ahead of the standard time.

```
FS(config)#clo summer-time PDT start April 1 sunday 2:00 end October last Sunday 2:00
*May 10 03:15:05: %SYS-5-CLOCKUPDATE: Set summer-time: PDT from April the 1st Sunday at 2:00 TO October the last
Sunday at 2:00, ahead 1 hour
Set summer-time: PDT from April the 1st Sunday at 2:00 TO October the last Sunday at 2:00, ahead 1 hour
```

The following example disables summer time.

```
FS(config)#no clock summer-time
*Jan    1 18:01:09: %SYS-5-CLOCKUPDATE: Set no summer time.
Set no summer time.
```

Check Method -

Platform Description -

5.5 clock timezone

Use this command to set the time zone.

clock timezone [*name hours-offset* [*minutes-offset*]]

Use this command to remove the time zone settings.

no clock timezone

Parameter Description

Parameter	Description
name	Time zone name. It can only be a letter between A and Z or between a and z, which is not case sensitive. The name contains 3 to 31 characters.
hours-offset	Hours of time difference. It indicates whether the time is faster or smaller than the hardware UTC time. The range is from -12 to 12. The negative digit indicates that the time is slower than the hardware time, while the positive digit indicates that the time is faster than the hardware time. If the time is slower than the UTC time, add "-" before *hours-offset*.
minutes-offset	Minutes of time difference. The range is from 0 to 59.

Defaults

-

Command Mode

Global configuration mode

Default Level

-

Usage Guide

Configuration Examples

The following example sets the time zone name to CST. The software time is 8 hours faster than the hardware time.

```
FS(config)# clock timezone CST 8
Set time zone name: CST (GMT+08:00)

FS# show clock
18:00:17 CST Wed, Dec 5, 2012
```

The following example sets the time zone name TZA. The software time is 06:13 slower than the hardware time.

```
FS(config)# clock timezone TZA -6 13
Set time zone name: TZA (GMT-06:13)
```

The following example removes the time zone settings.

```
FS(config)# no clock timezone
Set no clock timezone.
```

Check Method

-

Platform Description

-

5.6 Clock Update-calendar

Use this command to enable the system to synchronize the hardware time with the software time.

clock update-calendar

Parameter Description

Parameter	Description
-	-

Defaults

-

Command Mode

Privileged EXEC mode

Default Level

-

Usage Guide

After you configure this command, the system will synchronize the hardware time with the current software time according to the time zone and summer time settings of the device.

Configuration Examples

The following example enables the system to synchronize the hardware time with the software time.

```
FS# clock update-calendar
Set the hardware time from the system clock.
```

The following example sets the time zone of the hardware time to GMT+5:10, which indicates that the hardware time is 5:10 slower than the software time. The summer time is not set.

```
FS# show clock
09:30:21 TSZ Wed, Feb 29, 2012

FS# clock update-calendar
Set the hardware time from the system clock.

FS#show calendar
04:20:25 UTC Wed, Feb 29, 2012
```

The following example sets the hardware time. If it is set to GMT+5:10 and the summer time is set to be 1:15 faster from the first Monday in February 1 to the second Sunday in June 1, it indicates that the hardware time is 6:25 slower than the software time during the effective period of the summer time.

```
FS# show clock
09:30:02 TSZ Wed, Feb 29, 2012

FS# clock update-calendar
Set the hardware time from the system clock.

FS#show calendar
03:05:08 UTC Wed, Feb 29, 2012
```

Check Method

-

Platform

-

Description

5.7 Cpu High-watermark Set

Use this command to set the watermark range of the CPU usage of the control core and enable CPU usage monitoring.

cpu high-watermark set [[**up** *up-value*] [**down** *down-value*]]

Use this command to disable CPU usage monitoring.

no cpu high-watermark set

Use this command to restore the default settings.

default cpu high-watermark set

Parameter Description

Parameter	Description
up *up-value*	Sets the high watermark of the CPU usage. The range is from 1 to 99.
down *down-value*	Sets the low watermark of the CPU usage. The range is from 1 to 99.

Defaults By default, the range of the CPU usage watermark is from 75% and 85%.

Command Mode Global configuration mode

Default Level -

Usage Guide You can use this command to set the high watermark of the CPU usage and enable CPU usage monitoring. When detecting that the CPU usage exceeds the fluctuation range of the highest watermark, the system prints prompts.

Configuration Examples The following example sets the CPU usage watermark to the default value and enables CPU usage monitoring (if it is disabled).

```
FS(config)# default cpu high-watermark set
Reset default cpu watermark monitor
Set system cpu high-watermark up 85%, down 75%
```

The following example disables CPU usage monitoring.

```
FS(config)# no cpu high-watermark set
Close cpu watermark monitor
```

The following example enables CPU usage monitoring. Keep the defined watermark value.

```
FS(config)# cpu high-watermark set
Open cpu watermark monitor
Set system cpu high-watermark up 85%, down 75%
```

The following example enables CPU usage monitoring and sets the watermark range to 70%-90%.

```
FS(config)# cpu high-watermark set up 90 down 70
Open cpu watermark monitor
Set system cpu high-watermark up 90%, down 70%
```

Check Method -

Prompt Message

If the high watermark of the CPU usage is allowed to fluctuate from 85% to 91%, the system will print the following warning message when the CPU usage exceeds the upper limit of the high watermark:

```
*Jan 19 16:23:01: %FS_SYSMON-4-CPU_WATERMARK_HIGH: warning! system cpu usage above high watermark(91%),current cpu usage 100%
```

When the CPU usage is less than the lower limit of the high watermark, the system will print the following message about warning release:

```
*Jan 20 07:02:52:    %FS_SYSMON-5- CPU_WATERMARK:withdraw warning! system cpu usage below high watermark(85%), current cpu usage 36%
```

Platform Description

-

5.8 Memory History Clear

Use this command to clear the history of the memory usage.

memory history clear [**one-forth | half | all**]

Parameter Description

Parameter	Description
one-forth	Clears one fourth entries.
half	Clears a half of entries.
all	Clears all the entries.

Defaults

-

Command Mode

Global configuration mode

Default Level

-

Usage Guide

-

Configuration Examples

The following example clears a half of the history of the memory usage.

```
FS# show memory history

Time Thu Jan    1 00:24:45 1970
Used(k) 148516
Maxinum memory users for this period
Process Name        Holding
tcpip.elf            270028
cli-memory            60600
fs_syslogd            36640

Time Thu Jan    1 00:24:41 1970
Used(k) 148492
```

```
Maxinum memory users for this period
Process Name        Holding
tcpip.elf           270028
cli-memory           52408
fs_syslogd           36640

Time Thu Jan    1 00:24:41 1970
Used(k) 148444
Maxinum memory users for this period
Process Name        Holding
tcpip.elf           270028
cli-memory           44088
fs_syslogd           36640

FS(config)#memory history clear half
2 out of 5 records in the history table to be cleared...
Clear done !
```

Check Method -

Prompt Message -

Platform Description -

5.9 Memory Low-watermark Set

Use this command to set the low watermark threshold of the memory and enable the memory low watermark detection.

memory low-watermark set *mem-rate*

Use this command to disable the detection of memory low watermark.

no memory low-watermark set

Parameter Description

Parameter	Description
mem-rate	Memory watermark threshold. The range is from 1% to 100%.

Defaults By default, the memory watermark threshold is 90%.

Command Mode Global configuration mode

Default Level -

Usage Guide You can use this command to enable the detection of the memory low watermark and set the memory watermark

threshold. When the system memory is less than this threshold, the system will print prompts.

Configuration Examples

The following example sets the low watermark threshold of the memory to 80% and enables detection.

```
FS(config)#memory low-watermark set 80
```

Check Method

-

Prompt Message

When the system memory is less than the defined watermark value (such as 500000 KB), the system prints the following message:

```
FS(config)#<187> Jan    1 00:18:59 syslog: Free Memory has dropped below 500000k
```

Platform Description

-

5.10 Reload

Use this command to reload the device.

reload [**at** { *hour* [:*minute* [:*second*]] } [*month* [*day* [*year*]]]

Parameter Description

Parameter	Description
hour [:*minute* [:*second*]]	Sets the restart time in the format of hour : minute : second. Other neglected parameters keep the current system values.
month	Sets the month, in the range from 1 to 12.
day	Sets the day, in the range from 1 to 31.
year	Sets the year, in the range from 1970 to 2069.

Defaults

-

Command Mode

Privileged EXEC mode

Default Level

-

Usage Guide

-

Configuration Examples

The following example reloads the device.

```
FS# reload
Reload system?(Y/N) Y
Sending all processes the TERM signal...                    [   OK   ]
Sending all processes the KILL signal...                    [   OK   ]
Restarting system...
```

Check Method

-

Prompt Message

-

Platform Description

-

5.11 Show Calendar

Use this command to display the hardware calendar.

show calendar

Parameter Description

Parameter	Description
-	-

Command Mode

Privileged EXEC mode/ global configuration mode

Default Level

-

Usage Guide

-

Configuration Examples

The following example displays the hardware calendar.

```
FS# show calendar
21:57:48 GMT Sun, Feb 28, 2012
```

Prompt Message

-

Platform Description

-

5.12 Show Clock

Use this command to display the system software clock.

show clock

Parameter Description

Parameter	Description
-	-

Command Mode

Privileged EXEC mode / global configuration mode

Default Level

-

Usage Guide

-

Configuration Examples

The following example displays the software clock when the time zone is disabled.

```
FS# show clock
18:22:20 UTC Tue, Dec 11, 2012
```

The following example displays the software clock when the time zone is enabled.

```
FS# show clock
03:07:49 TSZ Wed, Feb 29, 2012
```

Prompt Message -

Platform Description -

5.13 Show Cpu

Use this command to display the information on the system task running on the control core instead of the non-virtual core.

show cpu

Parameter Description

Parameter	Description
-	-

Command Mode Privileged EXEC mode/ global configuration mode

Default Level -

Usage Guide If the system is equipped with a virtual core, you can use the **show processes cpu** command to check the CPU usage of the virtual core.

Configuration Examples The following example displays the information on the system task running on the control core instead of the non-virtual core.

```
FS#show cpu
=================================================
CPU Using Rate Information
CPU utilization in five seconds:    4.80%
CPU utilization in one minute:    4.10%
CPU utilization in five minutes:    4.00%

 NO          5Sec       1Min       5Min Process
      1     0.00%      0.00%      0.00% init
      2     0.00%      0.00%      0.00% kthreadd
      3     0.00%      0.00%      0.00% ksoftirqd/0
      4     0.00%      0.00%      0.00% events/0
--More--
```

Prompt Message -

Platform -

Description

5.14 Show Memory

Use this command to display the system memory.

show memory [**sorted total | history | low-watermark |** *process-id* **|** *process-name*]

Parameter Description

Parameter	Description
sorted total	Ranked according to the memory usage.
history	Displays the history of memory usage.
low-watermark	Displays the memory low watermark threshold of the system.
process-id	Displays the memory usage of the task specified by *process-id*.
process-name	Displays the memory usage of the task specified by *process-name*.

Command Mode Privileged EXEC mode/ global configuration mode

Default Level -

Usage Guide Every time when the **show memory history** command is used, the number of displayed entries increases by one. Up to 10 entries can be displayed. You can use the **memory history clear** command to clear history entries.

Configuration Examples The following example displays the memory usage of each task and the ranking (based on the total memory usage).

```
FS# show memory sorted
System Memory: 508324K total, 160124K used, 348200K free, 31.5% used rate
Used detail:     149112K active, 247776K inactive, 30460K mapped, 50460K slab, 3752K others

PID     Text(K) Rss(K)  Data(K)         Stack(K) Total(K)        Process
807     1568    4584    264728          84       270028          tcpip.elf
854     40      1436    246076          84       248840          cli-filesystem
1237    52      1492    123260          84       126036          cli-memory
803     56      1104    74064           84       76920           ping.elf
727     84      1276    33812           84       36640           fs_syslogd
733     84      796     33536           84       36364           fs_syslogd
776     224     1416    16896           84       19800           lsmdemo
858     40      1324    16844           84       19612           fs-tty-admin
769     40      3600    11052           84       13812           skbdemo
--More--
```

Description of some keywords in the command:

Keyword	Description
total	Total system memory
used	Used memory
free	Remaining memory
used rate	Memory usage (percentage)

Active	Active page
inactive	Inactive page
mapped	Mapped memory
slab	Memory consumed by Slab
others	Memory capacity of the used memory except the memory used by active and inactive pages, mapped memory, and slab memory.

Description of the displayed information on each task:

Field	Description
PID	Process ID
Text	Code segment size
Rss	Resident memory size
Data	Data segment size
Stack	Stack size
Total	Total used memory
Process	Task name

Prompt Message -

Platform Description -

5.15 Show Pci-bus

Use this command to display the information on the device mounted to the PCI bus.

show pci-bus

Parameter Description

Parameter	Description
-	-

Command Mode Privileged EXEC mode/ global configuration mode

Default Level -

Usage Guide -

Configuration Examples The following example displays the information on the device mounted to the PCI bus.

```
FS# show pci-bus
NO:0
Vendor ID                : 0x1131
Device ID                : 0x1561
Domain:bus:dev.func      : 0000:00:05.0
Status / Command         : 0x2100000
```

```
Class / Revision          : 0xc031030
Latency                   : 0x0
first 64 bytes of configuration address space:
00: 31 11 61 15 00 00 10 02 30 10 03 0c 20 00 80 00
10: 00 00 00 f0 00 00 00 00 00 00 00 00 00 00 00 00
20: 00 00 00 00 00 00 00 00 00 00 00 00 31 11 61 15
30: 00 00 00 00 dc 00 00 00 00 00 00 00 29 01 01 2a

NO:1
Vendor ID                 : 0x1131
Device ID                 : 0x1562
Domain:bus:dev.func       : 0000:00:05.1
Status / Command          : 0x2100156
Class / Revision          : 0xc032030
Latency                   : 0x30
First 64 bytes of configuration address space:
00: 31 11 62 15 56 01 10 02 30 20 03 0c 20 30 80 00
10: 00 10 00 f0 00 00 00 00 00 00 00 00 00 00 00 00
20: 00 00 00 00 00 00 00 00 00 00 00 00 31 11 62 15
30: 00 00 00 00 dc 00 00 00 00 00 00 00 29 01 02 10
```

Prompt Message -

Platform Description -

5.16 Show Processes Cpu

Use this command to display system task information.

show processes cpu [**history** [**table**] | [**5sec | 1min | 5min | 15min**] [**nonzero**]]

Parameter Description

Parameter	Description
5sec | 1min | 5min | 15min	Displays lists of tasks in descending order of CPU usage within the last five seconds, one minute, five minutes, and 15 minutes.
nonzero	Does not display the task with 0 CPU usage.
history	Displays the CPU usage of the control core within the last 60 seconds, 60 minutes, and 72 hours in histogram.
table	Displays the CPU usage of the control core within the last 60 seconds, 60 minutes, and 72 hours in table.

Command Mode Privileged EXEC mode/ global configuration mode

Default Level -

Usage Guide

Configuration Examples

The following example displays the tasks listed in ascending order of task IDs.

```
FS# show processes cpu
System Uptime: 19:08.6
CPU utilization for five seconds:1.2%; one minute:0.8%; five minutes:0.8%
set system cpu watermark (open): high 80%(85%~75%)

Tasks Statistics: 375 total, 10 running, 365 sleeping, 0 stopped, 0 zombie
  Pid Vsd S    PRI   P        5Sec        1Min        5Min       15Min Process
    1   0 S     20   0    0.0(0.0)    0.0(0.0)    0.0(0.0)    0.0(0.0) init
    2   0 S     20   1    0.0(0.0)    0.0(0.0)    0.0(0.0)    0.0(0.0) kthreadd
    3   0 S   -100   0    0.0(0.0)    0.0(0.0)    0.0(0.0)    0.0(0.0) migration/0
    4   0 S     20   0    0.0(0.0)    0.0(0.0)    0.0(0.0)    0.0(0.0) ksoftirqd/0
    5   0 S   -100   1    0.0(0.0)    0.0(0.0)    0.0(0.0)    0.0(0.0) migration/1

 --More--
```

The following example displays the tasks listed in ascending order of task IDs without displaying the tasks with 0 CPU usage within 15 minutes.

```
FS# show processes cpu nonzero
```

Description of the information displayed in this command:

Field	Description
System Uptime	Total running time of the device, precious to seconds.
CPU Utilization	Total CPU usage of the control core within the last five seconds, one minute, and five minutes.
Virtual CPU usage	Total CPU usage of the virtual control core within the last five seconds, one minute, and five minutes.
Tasks Statistics	Task statistics information, including the total number of statistics tasks and the task status.
set system cpu watermark	CPU watermark value and status of the control core.

The task running statuses are listed below:

Task Running Status	Description
running	Running task
sleeping	Suspended task
stopped	Stopped task
zombie	Terminated task, but not reclaimed by the system

Description of each task:

Field	Description
PID	Task ID

S	Task status. Five statuses in total: R (running), T (stopped), S (sleeping), D (waiting), and Z (zombie).
PRI	Task running priority
P	The core of the CPU on which the task runs
5sec/1min/5min/15min	CPU usage of the task within the last five seconds, one minute, five minutes, and 15 minutes. The value in the round brackets is the CPU usage that is not divided by the total number of cores where the task runs.
Process	Task name. Only the first 15 characters are displayed. The remaining characters are truncated.

The following example displays the CPU usage in ascending order of task IDs and only the processes with non-zero CPU usage within 15 minutes are displayed.

```
FS #show processes cpu nonzero
```

The following example displays the CPU usage in descending order within five seconds and the tasks with zero CPU usage within one second are not displayed.

```
FS #show processes cpu 5sec nonzero
```

The following example displays the CPU usage of the control core in histograms within the last 60 seconds, 60 minutes, and 72 hours.

The first histogram displays the CPU usage of the control core within 300 seconds. Every segment in the x-coordinate is five seconds, and every segment in the y-coordinate is 5%. The symbol "*" indicates the CPU usage at the last specified second. In other words, the first segment on the x-coordinate nearest to 0 is the CPU usage in the last five seconds, measured in %.

The second histogram displays the CPU usage of the control core within the last 60 minutes, measured in %. Every segment on the x-coordinate is 1 minute.

The third histogram displays the CPU usage of the control core within the last 72 hours, measured in %. Every segment on the x-coordinate is 1 hour.

Example:

```
FS#show processes cpu history

                    system cpu percent usage(%) [last 300 second]
     _
 100|
  95|
  90|
  85|
  80|
  75|
  70|
  65|
  60|
  55|
  50|
```

```
  45|
  40|*********
  35||||||||||
  30||||||||||*
  25||||||||||
  20||||||||||
  15||||||||||
  10||||||||||
   5||||||||||***************
   0||||||||||||||||||||||||||
     #=========#=========#=====*==>
     0              50             100          second
            system cpu percent usage(%) per 5second (last 125 second)
-------------------------------------------------------------------------------



                    system cpu percent usage(%) [last 60 minute]
     _
 100|
  95|
  90|
  85|
  80|
  75|
  70|
  65|
  60|
  55|
  50|
  45|
  40|
  35|
  30|*
  25||
  20||
  15||
  10||
   5||*
   0|||
     #==*==>
     0        minute
            system cpu percent usage(%) per 1minute (last 2 minute)
-------------------------------------------------------------------------------
```

The following example displays the CPU usage of the core 0 in tables within the last 60 seconds, 60 minutes, and 72

hours.

The first table lists the CPU usage within 300 seconds. The first cell indicates the CPU usage within the last five seconds.

The second table lists the CPU usage within the last 60 minutes, measured in %. The two adjacent cells show the CPU usage measured at an interval of one minute.

The third table lists the CPU usage within the last 72 hours, measured in %. The two adjacent cells show the CPU usage measured at an interval of one hour.

Example:

```
FS #show processes cpu history table
                    system cpu percent usage(%) [last 300 second]
#-----------------------------------------------------------------------#
|          |     1|     2|     3|     4|     5|     6|     7|     8|     9|    10|
#-----------------------------------------------------------------------#
#-----------------------------------------------------------------------#
|        0|  2.0|  2.4|  2.3|  2.3|  2.8|  3.0|  2.7|  3.2|  2.6|  2.4|
#-----------------------------------------------------------------------#
|        1|  2.7|  2.5|  2.7|  2.2|  2.4|  2.6|  2.2|  2.7|  2.3|  2.5|
#-----------------------------------------------------------------------#
|        2|  2.9|  2.0|  2.4|  2.5|  2.7|  2.4|  2.4|  2.6|  2.6|  2.5|
#-----------------------------------------------------------------------#
|        3|  2.7|  2.8|  2.8|  3.2|  2.5|  3.2|  3.1|  4.0|  2.7|  2.7|
#-----------------------------------------------------------------------#
|        4|  4.0|  2.3|  2.1|  2.2|  2.7|  2.4|  2.5|  2.6|  2.4|  2.6|
#-----------------------------------------------------------------------#
|        5|  2.4|  3.2|  2.5|  2.3|  2.3|  3.6|  2.8|  2.5|  2.2|  2.4|
#-----------------------------------------------------------------------#

                    system cpu percent usage(%) [last 60 minute]
#-----------------------------------------------------------------------#
|          |     1|     2|     3|     4|     5|     6|     7|     8|     9|    10|
#-----------------------------------------------------------------------#
#-----------------------------------------------------------------------#
|        0|  2.6|  2.5|  3.0|  2.4|  2.6|
#-----------------------------------------------------------------------#
```

Prompt Message -

Platform Description -

5.17 Show Processes Cpu Detailed

Use this command to display the details of the specified task.

show processes cpu detailed { *process-id* | process-*name* }

Parameter Description

Parameter	Description
process-id	Displays the information on the task of the specified task ID.
process-name	Displays the information on the task of the specified task name.

Command Mode Privileged EXEC mode/ global configuration mode

Default Level -

Usage Guide

Configuration Examples The following example displays the information on the task of the specified task name.

```
FS# show processes cpu detailed demo
Process Id        : 1820
Process Name      : demo
Vsdid             : 0
Process Ppid      : 1

State             : R(running)
On CPU            : 0
Priority          : 20
Age Time          : 24:06.5
Run Time          : 00:01.0
Cpu Usage         :
      Last    5 sec      0.3% (0.6%)
      Last    1 min      0.3% (0.6%)
      Last    5 min      0.3% (0.6%)
      Last 15 min        0.3% (0.6%)
Tty               : ?
```

Code Usage: 209.6 KB. If the specified task name is not unique, the system displays the following message:

```
FS# show processes cpu detailed demo
duplicate process, choose one by id not name.
name: demo, id: 1089, state: S(sleeping)
name: demo, id: 1091, state: R(running)
process name: monitor_procps, do NOT exist, or NOT only one.
```

Description of the displayed information:

Field	Description
Process Id	Task ID
Process Name	Task name
Process Ppid	Parent process task ID
State	Task running status

On CPU	CPU where the task is running
Priority	Task priority
Age Time	Duration for the task from self-startup to now
Run Time	Duration for the task from self-startup to being executed
Cpu Usage	CPU usage of the task within the last five seconds, one minute, five minutes, and 15 minutes. The value in the round brackets is the CPU usage that is not divided by the total number of cores where the task runs. For example, the demo task is running on No.0 core, which is the control core and the system has two control cores. In this case, the CPU usage is 0.3% (0.6%).
Tty	Tty ID, in the format of "Primary device ID, secondary device ID". If it is 0, the value is **?**.
Code Usage	Size occupied by the task code segment

The following example displays the information on the task of the specified task ID.

```
FS# show process cpu detailed 1715
Process Id        : 130
Process Name      : crypto
Vsdid             : 0
Process Ppid      : 2

State             : S(sleeping)
On CPU            : 0
Priority          : 0
Age Time          : 03:41:09.9
Run Time          : 00:00.0
Cpu Usage         :
      Last    5 sec       0.0%(    0.0%)
      Last    1 min       0.0%(    0.0%)
      Last    5 min       0.0%(    0.0%)
      Last 15 min         0.0%(    0.0%)
Tty               : ?
Code Usage        : 0.0KB.
```

Prompt Message -

Platform Description -

5.18 Show Reboot-reason

Use this command to display the reboot reason.

show reboot-reason

Parameter Description

Parameter	Description
-	-

Command Mode Privileged EXEC mode/ global configuration mode/ User EXEC mode

Default Level -

Usage Guide -

Configuration Examples The following example displays the reboot reason of the device.

```
FS#show reboot-reason
time: 1970-01-01 08:03:13
reason: reload cmd
info: /sbin/fs-sysmon/3844

FS#
```

Prompt Message -

Platform Description -

5.19 Show Version

Use this command to display the system version information.

show version

Parameter Description

Parameter	Description
-	-

Command Mode Privileged EXEC mode/ global configuration mode

Default Level -

Usage Guide -

Usage Guide -

Prompt Message -

Platform Description -

6. Time Range Commands

6.1 Absolute

Use this command to configure an absolute time range.

absolute { [**start** *time date*] [**end** *time date*] }

Use the **no** form of this command to remove the absolute time range.

no absolute

Parameter Description

Parameter	Description
start *time date*	Indicates the start time of the range.
end *time date*	Indicates the end time of the range.

Defaults

The default absolute time range is the maximum range, which is from 00:00 January 1, 0 to 23:59 December 31, 9999.

Command Mode

Time range configuration mode

Default Level

14

Usage Guide

Use the **absolute** command to configure a time absolute time range between a start time and an end time to allow a certain function to take effect within the absolute time range.

The maximum absolute time range is from 00:00 January 1, 0 to 23:59 December 31, 9999.

Configuration Examples

The following example creates a time range and enters time range configuration mode.

```
FS(config)# time-range no-http
FS(config-time-range)#
```

The following example configures an absolute time range.

```
FS(config-time-range)# absolute start 1:1 1 JAN 2013 end 1:1 1 JAN 2014
```

Check Method

Use the **show time-range** [*time-range-name*] command to display the time range configuration.

Prompt Message

-

Platform Description

-

6.2 Periodic

Use this command to configure periodic time.

periodic *day-of-the-week time* **to** [*day-of-the-week*] *time*

Use the **no** form of this command to remove the configured periodic time.

no periodic *day-of-the-week time* **to** [*day-of-the-week*] *time*

Parameter Description

Parameter	Description
day-of-the-week	Indicates the week day when the periodic time starts or ends.
time	Indicates the exact time when the periodic time starts or ends.

Defaults No periodic time is configured by default.

Command Mode Time range configuration mode

Default Level 14

Usage Guide Use the **periodic** command to configure a periodic time interval to allow a certain function to take effect within the periodic time. If you want to modify the periodic time, it is recommended to disassociate the time range first and associate the time range after the periodic time is modified.

Configuration Examples The following example creates a time range and enters time range configuration mode.

```
FS(config)# time-range no-http
FS(config-time-range)#
```

The following example configures a periodic time interval.

```
FS(config-time-range)# periodic Monday 1:1 to Tuesday 2:2
```

Check Method Use the **show time-range** [*time-range-name*] command to display the time range configuration.

Prompt Message -

Platform Description -

6.3 Show Time-range

Use this command to display the time range configuration.

show time-range [*time-range-name*]

Parameter Description

Parameter	Description
time-range-name	Displays a specified time range.

Command Mode Privileged EXEC mode

Default Level 14

Usage Guide Use this command to check the time range configuration.

Configuration Examples The following example displays the time range configuration.

```
FS# show time-range
time-range entry: test (inactive)
   absolute end 01:02 02 February 2012
```

Prompt Message -

Platform Description -

6.4 Time-range

Use this command to create a time range and enter time range configuration mode.

time-range *time-range-name*

Use the **no** form of this command to remove the configured time range.

no time-range *time-range-name*

Parameter Description

Parameter	Description
time-range-name	Time range name

Defaults No time range is configured by default.

Command Mode Global configuration mode

Default Level 2

Usage Guide Some applications (such as ACL) may run based on time. For example, an ACL can be effective within certain time ranges of a week. To this end, first you must configure a time range. After the time range is created, you can configure relevant time control in time range mode.

Configuration Examples The following example creates a time range.

```
FS(config)# time-range no-http
FS(config-time-range)#
```

Check Method Use the **show time-range** [*time-range-name*] command to display the time range configuration.

Prompt -

Message

Platform -

Description

7. HTTP Service Commands

7.1 Enable Service Web-server

Use this command to enable the HTTP service function.

Use the **no** form of this command to disable the HTTP service function.

enable service web-server [**http** | **https** | **all**]

{ no | **default } enable service web-server** [**http** | **https** | **all**]

Parameter Description

Parameter	Description
http	Enables the HTTP service.
https	Enables the HTTPS service.
all	Enables both the HTTP service and the HTTPS service.

Defaults

By default, the HTTP service function is disabled.

Command mode

Global configuration mode.

Usage Guide

If run a command ends with the keyword **all** or without keyword, it indicates enabling both the HTTP service and the HTTPS service; if run a command ends with keyword **http**, it indicates enabling the HTTP service; if run a command ends with keyword **https**, it indicates enabling the HTTPS service. Use the command **no enable service web-server** to disable the corresponding HTTP service.

Configuration Examples

The following example enables both the HTTP service and the HTTPS service:

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#enable service web-server
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.2 Http Port

Use this command to configure the HTTP port number.

Use the **no** form of this command to restore the default HTTP port number.

http port *port-number*

no http port

Parameter Description

Parameter	Description
port-number	Configures the HTTP port number. The value includes 80, 1025 to 65,535.

Defaults The default HTTP port number is 80.

Command mode Global configuration mode.

Usage Guide Use this command to configure the HTTP port number.

Configuration Examples The following example configures the HTTP port number as 8080:

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#http port 8080
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.3 Http Secure-port

Use this command to configure the HTTPS port number.

Use the **no** form of this command to restore the default HTTPS port number.

http secure-port *port-number*

no http secure-port

Parameter Description

Parameter	Description
port-number	Configures the HTTPS port number. The value includes 443, 1025 to 65,535.

Defaults The default HTTP port number is 443.

Command mode Global configuration mode.

Usage Guide Use this command to configure the HTTPS port number.

Configuration Examples The following example configures the HTTPS port number as 4443:

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#http secure-port 4443
```

Related Commands

Command	Description
enable service web-server	Enables the HTTP service.

show web-server status	Displays the configuration and status of the Web service.

Platform Description N/A

7.4 Show Web-server Https Certificate Information

Use this command to display HTTPS certificate information.

show web-server https certificate information

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays HTTPS certificate information.

```
FS# show web-server https certificate information
Source: Default
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 1 (0x1)
    Signature Algorithm: sha256WithRSAEncryption
        Issuer: CN=Self-Signed-CA472E87
        Validity
            Not Before: Feb 20 07:26:51 2019 GMT
            Not After : Feb 17 07:26:51 2029 GMT
        Subject: CN=Self-Signed-CA472E87
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
```

```
                Public-Key: (2048 bit)
                Modulus:
                    00:ec:39:13:5a:09:da:97:d1:83:8f:a7:77:cf:b4:
                    88:96:a0:85:23:68:4d:5a:c6:d3:4b:d9:c0:d6:1b:
                    f4:42:29:ce:33:2e:2f:79:5e:cc:bb:bd:5f:63:5b:
                    41:f3:9f:fb:82:c7:ca:8a:21:a9:c2:fb:36:db:62:
                    08:3c:05:b8:a2:47:07:1a:20:99:80:24:63:a4:08:
                    66:22:86:b6:aa:46:43:8a:91:7d:99:f3:8a:7c:58:
                    ac:1f:ef:6c:4c:d1:d6:bf:ef:a1:77:64:4b:53:16:
                    29:2f:1c:e8:ec:d6:6b:b6:34:64:32:00:1f:09:30:
                    69:8d:2e:85:d5:6a:db:45:cb:b8:fd:38:ba:bd:68:
                    1d:de:38:65:ef:3f:c6:90:bf:ca:1a:9e:df:c3:75:
                    5f:20:bd:61:b4:bd:43:6b:77:ef:25:c6:43:0a:0f:
                    dc:5a:0e:28:53:37:14:77:8b:bd:ea:14:54:c5:e1:
                    45:27:c9:14:63:37:67:bc:0f:09:15:1f:73:ae:bb:
                    46:b1:ad:cd:23:89:fd:2c:0c:9f:a3:34:62:f0:14:
                    0d:c8:92:09:68:df:8f:69:fb:1c:49:91:d8:1c:f7:
                    ee:67:a3:25:c5:9a:e2:f6:1c:a8:8c:af:7e:08:29:
                    44:32:b1:d8:a9:86:04:a2:80:65:24:47:56:f4:fd:
                    e4:19
                Exponent: 65537 (0x10001)
        X509v3 extensions:
            X509v3 Basic Constraints:
                CA:FALSE
    Signature Algorithm: sha256WithRSAEncryption
        16:b8:e2:1e:45:13:56:9c:48:ef:ec:40:fb:9a:e3:4c:da:e4:
        95:c4:3b:92:10:9a:27:a0:da:ab:45:86:4c:39:fd:73:0c:e8:
        98:8b:0e:a4:28:72:66:0a:74:cc:9c:91:71:2f:94:dd:4b:4b:
        a2:54:e5:8f:47:82:bd:82:4d:70:93:6e:af:72:ce:cf:db:e2:
```

```
36:b1:64:1a:1f:5e:c1:d9:57:12:15:5f:81:d3:ab:40:66:2a:
3d:ab:d4:fb:24:a6:dd:1f:82:a2:33:9d:3d:da:a7:75:fa:0d:
e6:be:1f:3b:a9:7f:d0:94:67:bf:e7:8b:19:32:5c:ea:0f:ae:
3e:1e:41:55:06:c9:cb:42:b9:45:de:0e:d9:48:a5:75:90:5b:
d7:89:ff:60:f2:31:ed:d7:52:0a:3d:91:87:c3:9a:85:76:8a:
44:6f:c5:4e:9b:65:f6:78:cf:ee:7b:28:f5:10:c8:d1:39:3f:
13:a7:96:f1:4b:11:5f:34:96:8f:13:b1:b6:de:9c:23:9e:f6:
9d:b8:a3:f7:03:07:76:ce:bd:f6:76:1d:fc:5d:83:1e:8e:74:
fb:78:b6:4a:ad:73:ce:e7:71:72:7d:0a:1e:49:5d:9e:65:30:
aa:6f:b4:2f:9d:c3:e5:e6:38:de:0b:26:20:69:98:e4:6d:99:
d2:15:ec:bd
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.5 Show Web-server Status

Use this command to display the configuration and status of the Web service.

show web-server status

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the configuration and status of the Web service:

```
FS#show web-server status
http server status : enabled
http server port : 80
https server status: enabled
```

```
https server port: 443
```

Related Commands

Command	Description
enable service web-server	Enables the HTTP service.
http port	Configures the HTTP port number.
http secure-port	Configures the HTTPS port number.

Platform Description N/A

7.6 Upgrade Web

Use this command to upgrade the Web package in local file system.

upgrade web *uri*

Parameter Description

Parameter	Description
uri	The storage path of the Web package.

Defaults N/A

Command mode Privileged EXEC mode

Usage Guide Please use the **copy** command to copy the Web package into the file system before you use this command to upgrade the Web package.

Configuration Examples The following example copies a Web package into the file system and upgrades the package.

```
FS#copy tftp://192.168.23.24/web.upd flash:/web.upd
FS#upgrade web flash:/web.upd
```

Related Commands

Command	Description
enable service web-server	Enables the HTTP service.

Platform Description N/A

7.7 Upgrade Web Download

Use this command to download the Web package from the TFTP server and upgrade the package automatically.

upgrade web download tftp: *path*

Parameter Description

Parameter	Description
tftp: *path*	*path* indicates the storage path of the Web package on the TFTP server.

	tftp indicates the system downloads the Web package from the TFTP server through the physical port and upgrades the Web package automatically.

Defaults N/A

Command mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example downloads a Web package form the TFTP server and upgrades the package automatically.

```
FS#upgrade web download tftp://192.168.23.24/web.upd
```

Related Commands

Command	Description
enable service web-server	Enables the HTTP service.

Platform Description N/A

7.8 Webmaster Level

Use this command to configure the username and password for Web login authentication. Use the **no** form of this command to restore the default setting.

webmaster level *privilege-level* **username** *name* **password** { *password* | [**0 | 7**] *encrypted-password* }

no webmaster level *privilege-level* [**username** name]

Parameter Description

Parameter	Description
privilege-level	Configures the user privilege-level.
name	Username.
password	Password.
0 | **7**	Password type; 0 indicates plaintext, 7 indicates ciphertext.
encrypted-password	Password text.

Defaults By default, two users are configured.

1. User1 is configured with privilege level 1, username of admin and plaintext password of admin.
2. User2 is configured with privilege level 2, username of guest and plaintext password of guest.

Command mode Global configuration mode.

Usage Guide When HTTP is enabled, users can log in to the Web interface only after being authenticated. Use this command to configure the username and password for Web login authentication.

Use the **no webmaster level** *privilege-level* command to delete all the usernames and passwords with a specified

privilege-level.

Use the **no webmaster level** *privilege-level* **username** *name* command to delete the specified username and password.

Usernames and passwords come with three permission levels, each of which includes at most 10 usernames and passwords.

By default, the system creates the **admin** account. The account cannot be deleted and only the password of the account can be changed. The administrator account is the **admin** account, which corresponds to the level 0 permission. The administrator account owns all permissions on the Web page and can edit other management accounts and authorize the accounts to access pages.

Configuration Examples

The following example configures the username and password for Web login authentication,

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#webmaster level 0 username FS password admin
```

Related Commands

Command	Description
enable service web-server	Enables the HTTP service.

Platform Description

N/A

7.9 Web-server Http Redirect-to-https

Use this command to configure HTTP redirection to HTTPS. Use the **no** form of this command to restore the default settings.

web-server http redirect-to-https

no web-server http redirect-to-https

Parameter Description

Parameter	Description
N/A	N/A

Defaults

HTTP redirection to HTTPS is disabled by default.

Command mode

Global configuration mode

Usage Guide

Run the **no web-server http redirect-to-https** or **default web-server http redirect-to-https** to disable HTTP redirection.

Both HTTP and HTTPS must be enabled.

If the destination IP address is an NAPT address, HTTP redirection may fail. Please disable NAPT if you enable

want to access the device by using the HTTP protocol. If you want to access the device by using the HTTPS protocol, please use the HTTPS protocol directly.

Configuration Examples

The following example enables HTTP redirection to HTTPS.

```
FS(config)# web-server http redirect-to-https
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.10 Web-server Https Certificate

Use this command to install the HTTPS certificate. Use the **no** form of this command to restore the default settings.

web-server https certificate { **pem** *cert-filename* **private-key** *key-filename* } | { **pfx** *cert-filename* } [**password** *password-text*]

no web-server https certificate

Parameter Description

Parameter	Description
pem	Imports certificate and key file in pem format.
pfx	Imports the certificate in pfx format.
cert-filename	Specifies the name of the certificate in flash:.
key-filename	Specifies the name of the key file in flash:.
password-text	Specifies the decryption password for the key file.

Defaults

N/A

Command mode

Global configuration mode

Usage Guide

Run the **copy** command to place the certificate and the key file into the flash partition before installing the certificate. After installation, the certificate and the key file can be deleted.

Run the **no web-server https certificate** command to delete the HTTPS certificate. The auto-signed certificate will be used after the HTTPS certificate is deleted.

This command is not displayed in running-config.

After you install the HTTPS certificate, the browser may ask you to add trust before accessing Web management. It is recommended to close the browser and then open the Web management page.

Configuration Examples

The following example installs the HTTS certificate.

```
FS#configure terminal

FS(config)# web-server https certificate pfx usercert.pfx password 123456

*Feb 28 14:38:37: %HTTPD-4-CERT_CHANGE: HTTPS certificate changed.

% The certificate was successfully installed.
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.11 Web-server Https Generate Self-signed-certificate

Use this command to generate the HTTPS self-signed-certificate again.

web-server https generate self-signed-certificate

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The HTTPS self-signed-certificate is enabled by default.

Command mode

Global configuration mode

Usage Guide

This command is a communication command. After running the command, please enter the information required by auto-signed certificate or press Ctrl+C to abort the operation.

If you have already installed HTTPS certificate, the HTTPS certificate will be used preferentially. The HTTPS certificate will not be replaced by the auto-signed certificate.

This command is not displayed in running-config.

After you install the HTTPS certificate, the browser may ask you to add trust before accessing Web management. It is recommended to close the browser and then open the Web management page.

Configuration Examples

The following example generates the HTTPS self-singed-certificate again.

```
FS#configure terminal

FS(config)# web-server https generate self-signed-certificate

RSA key modulus bits (1024~4096) [2048]:

Common Name (e.g. server IP) [Self-Signed-600B16C2]:
```

```
% Generate self-signed certificate successfully.
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8. Syslog Commands

8.1 Clear Logging

Use this command to clear the logs from the buffer in privileged EXEC mode.

clear logging

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

This command clears the log packets from the memory buffer. You cannot clear the statistics of the log packets.

Configuration Examples

The following example clears the log packets from the memory buffer.

FS# **clear logging**

Related Commands

Command	Function
logging on	Turns on the log switch.
show logging	Displays the logs in the buffer.
logging buffered	Records the logs in the memory buffer.

Platform Description

N/A

8.2 Logging

Use this command to send the log message to the specified syslog server.

logging { *ip-address* | **ipv6** *ipv6-address* } [**udp-port** *port*][**vrf** vrf-name]

Use this command to delete the specified syslog server.

no logging { *ip-address* [**vrf** vrf-name] | **ipv6** *ipv6-address* }

Use this command to restore the default port 514.

no logging { *ip-address [* ***vrf*** *vrf-name]* | **ipv6** *ipv6-address* } **udp-port**

Parameter Description

Parameter	Description
ip-address	Sets the IP address of the host receiving log messages.
vrf-name	Specify the VRF (VPN routing and forwarding table) instance connected to the log host.
ipv6-address	Sets the IPv6 address of the host receiving log messages.
udp-port *port*	Sets the port number of the host receiving log messages. The default is 514.

Defaults No log message is sent to syslog server by default.

Command Mode Global configuration mode

Usage Guide This command is used to configure a syslog server to receive log messages from the device. You can configure up to five syslog servers, log messages are sent to all configured syslog servers simultaneously,

Configuration Examples The following example configures a syslog server with IP address 202.101.11.1.

```
FS(config)# logging 202.101.11.1
```

The following example configures a syslog server with IP address 202.101.11.1 and port number 8099.

```
FS(config)# logging 202.101.11.1 udp-port 8099
```

The following example configures a syslog server with IPv6 address AAAA:BBBB::FFFF.

```
FS(config)# logging ipv6 AAAA:BBBB::FFFF
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

8.3 Logging Buffered

Use this command to set the memory buffer parameters (log severity, buffer size) for logs at global configuration layer. Use the **no** form of the command to disable recording logs in the memory buffer. Use the **default** form of this command to restore the default setting.

logging buffered [*buffer-size* | *level*]

no logging buffered

Parameter Description

Parameter	Description
buffer-size	Size of the buffer is related to the specific device type: 1. For the access switches, 4 K to 1 M Bytes.
level	Severity of logs, from 0 to 7. The name of the severity or the numeral can be used.

default logging buffered

Defaults The buffer size is related to the specific device type.

access switches: 128 K Bytes

The log severity is 7.

Command Mode

Global configuration mode

Usage Guide

The memory buffer for log is used in recycled manner. That is, when the memory buffer with the specified size is full, the oldest information will be overwritten. To show the log information in the memory buffer, run the **show logging** command in privileged user mode.

The logs in the memory buffer are temporary, and will be cleared in case of device restart or the execution of the **clear logging** command in privileged user mode. To trace a problem, it is required to record logs in flash or send them to Syslog Server.

The log information is classified into the following 8 levels (Table 1):

Table-1

Keyword	Level	Description
Emergencies	0	Emergency case, system cannot run normally
Alerts	1	Problems that need immediate remedy
Critical	2	Critical conditions
Errors	3	Error message
warnings	4	Alarm information
Notifications	5	Information that is normal but needs attention
informational	6	Descriptive information
Debugging	7	Debugging messages

Lower value indicates higher level. That is, level 0 indicates the information of the highest level.

When the level of log information to be displayed on devices is specified, the log information at or below the set level will be allowed to be displayed.

After running the system for a long time, modifying the log buffer size especially in condition of large buffer may fails due to the insufficent availble continuous memory. The failure message will be shown. It is recommended to modify the log buffer size as soon as the system starts.

Configuration Examples

The following example allows logs at and below severity 6 to be recorded in the memory buffer sized 10,000 bytes.

FS(config)# **logging buffered** *10000 6*

Related Commands

Command	Description
logging on	Turns on the log switch.
show logging	Displays the logs in the buffer.
clear logging	Clears the logs in the log buffer.

Platform

N/A

Description

8.4 Logging Console

Use this command to set the severity of logs that are allowed to be displayed on the console in global configuration mode. Use the **no** form of this command to prohibit printing log messages on the console.

logging console [*level*]

no logging console

Parameter Description

Parameter	Description
level	Severity of log messages, 0 to 7. The name of the severity or the numeral can be used. For the details of log severity, see table 1.

Defaults

The default is debugging (7).

Command Mode

Global configuration mode

Usage Guide

When a log severity is set, the log messages at or below that severity will be displayed on the console.
The **show logging** command displays the related setting parameters and statistics of the log.

Configuration Examples

The following example sets the severity of log that is allowed to be displayed on the console as 6:

FS(config)# **logging console informational**

Related Commands

Command	Description
logging on	Turns on the log switch.
show logging	Displays the logs and related log configuration parameters in the buffer.

Platform Description

N/A

8.5 Logging Count

Use this command to enable the log statistics function in global configuration mode. Use the **no** form of this command to restore the default setting.

logging count

no logging count

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The log statistics function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

This command enables the log statistics function. The statistics begins when the function is enabled. If you run the **no logging count** command, the statistics function is disabled and the statistics data is deleted.

Configuration Examples

The following example enables the log statistics function:

FS(config)# **logging count**

Related Commands

Command	Description
show logging count	Displays log information about modules of the system.
show logging	Displays basic configuration of log modules and log information in the buffer.

Platform Description

N/A

8.6 Logging Facility

Use this command to configure the device value of the log information in global configuration mode. Use the **no** form of the command to restore the default setting.

logging facility *facility-type*

no logging facility

Parameter Description

Parameter	Description
facility-type	Syslog device value. For specific settings, refer to the usage guide.

Defaults

The default is 23 if the RFC5424 format is enabled (Local7, local use).

The default is 16 if the RFC5424 format is disabled (Local0, local use).

Command Mode

Global configuration mode

Usage Guide

The following table (Table-2) is the possible device values of Syslog:

Numerical Code	Facility
0 (kern)	Kernel messages
1 (user)	User-level messages
2 (mail)	Mail system
3 (daemon)	System daemons
4 (auth1)	security/authorization messages

5 (syslog)	Messages generated internally by syslogd
6 (lpr)	Line printer subsystem
7 (news)	USENET news
8 (uucp)	Unix-to-Unix copy system
9 (clock1)	Clock daemon
10 (auth2)	security/authorization messages
11 (ftp)	FTP daemon
12 (ntp)	NTP subsystem
13 (logaudit)	log audit
14 (logalert)	log alert
15 (clock2)	clock daemon
16 (local0)	Local use
17 (local1)	Local use
18 (local2)	Local use
19 (local3)	Local use
20 (local4)	Local use
21 (local5)	Local use
22 (local6)	Local use
23 (local7)	Local use

The default device value of FSOS is 23 (local 7).

Configuration Examples

The following example sets the device value of **Syslog** as **kernel**:

```
FS(config)# logging facility kern
```

Related Commands

Command	Description
logging console	Sets the severity of logs that are allowed to be displayed on the console.

Platform Description

N/A

8.7 Logging File

Use this command to save log messages in the log file, which can be saved in hardware disk, expanded FLASH.

Use the **no** form of this command to restore the default setting,

logging file { **flash:***filename* | *usb0:filename* } [*max-file-size*] [*level*]

no logging file

Parameter Description

Parameter	Description

flash	Saves the log file in expanded FLASH.
usb0	The log file is selected to be saved in USB0. This option is only supported when the device has 1 USB interface and an extended USB device is inserted.
filename	Sets the file name. The file type is omitted, which is fixed as txt.
max-file-size	Sets the maximum file size, in the range from 128K to 6M bytes, The default is 128K,
level	Sets the level of the log message saved in the log file, which can be either the level name or the level number. The default is 6. See Usage Guide for details.

Defaults Log messages are not saved in expanded FLASH by default.

Command Mode Global configuration mode

Usage Guide You can save log messages in expanded FLASH if you don't want to transmit log messages on the network or there is no syslog server,

The log file cannot be configured with the suffix, which is fixed as txt.

If there is no expanded FLASH, the **logging file flash** command is hidden automatically and cannot be configured.

Keyword	Level	Description
Emergencies	0	Emergency case. The system fails to run.
Alerts	1	Problem that call for immediate solution.
Critical	2	Critical message.
Errors	3	Error message.
warnings	4	Alarm message.
Notifications	5	message that is normal but calls for attention.
informational	6	Descriptive message.
Debugging	7	Debugging message

Configuration Examples The following example saves the log message in expanded FLASH and sets file name, file size and log level to syslog.txt, 128K and 6 respectively.

```
FS(config)# logging file flash:syslog
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

8.8 Logging File Numbers

Use this command to set the number of log files written into FLASH. Use the **no** form of this command to restore the default setting.

logging file numbers *numbers*

no logging file numbers

Parameter Description

Parameter	Description
numbers	Sets the number of log files written into FLASH, in the range from 2 to 32.

Defaults

The default is 16.

Command Mode

Global configuration mode

Usage Guide

The system does not delete previously generated log files even if you change this configuration, Therefore, you need to delete the log files manually to save FLASH size (you can send log files to the server through TFTP before that). For example, 16 log files are generated by default before you want to change the number to 2. New logs are overwritten constantly in log files indexed 0 to 1. However, log files indexed from 2 to 16 remain. You can delete these log files manually as needed.

Configuration Examples

The following example sets the number of log files written into FLASH to 8.

```
FS(config)# logging file numbers 8
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.9 Logging Filter Direction

Use this command to filter the log messages destined to a certain direction. Use the **no** form of this command to restore the default setting.

logging filter direction { **all** | **buffer** | **file** | **server** | **terminal** }

no logging filter direction { **all** | **buffer** | **file** | **server** | **terminal** }

Parameter Description

Parameter	Description
all	Log messages destined to all directions are filtered, including console, VTY terminal, log buffer, log file and log server.
buffer	Log messages destined to the log buffer are filtered, including log messages displayed by running the **show logging** command.

file	Log messages destined to the log file are filtered.
server	Log messages destined to the log server are filtered.
terminal	Log messages destined to the console and the VTY terminal (including Telnet and SSH).

Defaults Log messages destined to all directions are filtered by default.

Command Mode Global configuration mode

Usage Guide In general, log messages destined to all directions are filtered, including console, VTY terminal, log buffer, log file and log server. If you want to filter log messages destined to a certain direction, the terminal for instance, configure the **terminal** parameter.

Configuration Examples The following example filters log messages destined to the terminal (including the console and the VTY terminal).

```
FS(config)# logging filter direction terminal
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

8.10 Logging Filter Rule

Use this command to configure the filter rule of the log message,

logging filter rule { **exact-match module** *module-name* **mnemonic** *mnemonic-name* **level** *level* | **single-match** [**level** *level* | **mnemonic** *mnemonic-name* | **module** *module-name*] }

Use this command to delete the "exact-match" filter rule.

no logging filter rule exact-match [**module** *module-name* **mnemonic** *mnemonic-name* **level** *level*]

Use this command to delete the "single-match" filter rule.

no logging filter rule single-match [**level** *level* | **mnemonic** *mnemonic-name* | **module** *module-name*]

Parameter Description

Parameter	Description
exact-match	Exact-match filter rule. Fill in all the following three parameters.
single-match	Single-match filter rule. Fill in one of the following three parameters.
module *module-name*	Module name.
mnemonic *mnemonic-name*	Mnemonic name.
level *level*	Log level,

Defaults No filter rule is configured by default,

Command Global configuration mode

Mode

Usage Guide

If you want to filter a specific log message, use the "exact-match" filter rule and fill in all three parameters, namely, module name, mnemonic name and log level.

If you want to filter a specific kind of log messages, use the "single-match" filter rule and fill in one of three parameters, namely, module name, mnemonic name and log level.

When configured with the same module name, mnemonic name or log level, the "single-match" filter rule has a higher priority than the "exact-match" filter rule,

Configuration Examples

The following example configures the "exact-match" filter rule with parameters of module name LOGIN, log level 5 and mnemonic name LOGOUT.

```
FS(config)# logging filter rule exact-match module LOGIN mnemonic LOGOUT level 5
```

The following example configures the "single-match" filter rule with the parameter of module name SYS.

```
FS(config)# logging filter rule single-match module SYS
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.11 Logging Filter Type

Use this command to configure the filter type of log messages. Use the **no** form of this command to restore the default setting.

logging filter type { **contains-only** | **filter-only** }

no logging filter type

Parameter Description

Parameter	Description
contains-only	The log message containing the key word of the filter rule is printed.
filter-only	The log message containing the key word of the filter rule is filtered.

Defaults

The default filter type is filter-only.

Command Mode

Global configuration mode

Usage Guide

1. When too many log messages are printed, the terminal screen keeps being refreshed. If you are not concerned with these log messages, use the "filter-only" filter type to filter the log messages,
2. If you are concerned with certain log messages, use the "contains-only" filter type to print log messages containing the key word of the filter rule, so as to monitor whether certain events happen.

In real operation, the contains-only and the fitler-only filter types cannot be configured at the same time.

If you configure the filter direction and the filter type without configuring the filter rule, the log messages are not filtered.

Configuration Examples

The following example sets the filter type to contains-only.

```
FS(config)# logging filter type contains-only
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.12 Logging Flash Flush

Use this command to write log messages in the system buffer into the flash file immediately.

logging flash flush

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

In general, the log messages are cached in the log buffer. Only when the buffer is full or the timer expires are log messages written into the flash file. This command is used to write log messages in the system buffer into the flash file immediately.

The **logging flash flush** command takes effect only once for each configuration. The log messages cached in the buffer are written into the flash file immediately after configuration.

Configuration Examples

The following example writes log messages in the system buffer into the flash file immediately.

```
FS(config)# logging flash flush
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.13 Logging Flash Interval

Use this command to set the interval to write log messages into the flash file, Use the **no** form of this command to restore the default setting.

logging flash interval *seconds*

no logging flash interval

Parameter Description

Parameter	Description
interval *seconds*	The interval to write log messages into the flash file, in the range from 1 to 57840 in the unit of seconds.

Defaults

The default is 3600.

Command Mode

Global configuration mode

Usage Guide

This command is used to set the interval to write log messages into the flash file. The timer starts after configuration, If you want to restore the interval to 3600 seconds, use the **no logging flash interval** command.

To avoid writing log messages into the flash file too frequently, it is not recommended to set a short interval.

Configuration Examples

The following example sets the interval to write log messages into the flash file to 300 seconds.

```
FS(config)# logging flash interval 300
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.14 Logging Life-time

Use this command to configure the preservation duration of logs in expanded FLASH. Use the **no** form of this command to restore the default setting.

logging life-time level *level days*

no logging life-time level *level*

Parameter Description

Parameter	Description
level	Sets the log level, which can be either the level name or the level number.
days	Sets the preservation duration of logs.

Defaults

No preservation duration is set by default.

Command Mode Global configuration mode

Usage Guide Due to difference in expanded FLASH size and log level, logs with different levels can be configured with different preservation durations.

Once log preservation based on time is enabled, log preservation based on file size is disabled automatically. The log files are stored under the syslog/ directory of the expanded FLASH,

Configuration Examples The following example sets the preservation duration of logs whose level is 6 to 10 days.

```
FS(config)# logging life-time level 6 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

8.15 Logging Monitor

Use this command to set the severity of logs that are allowed to be displayed on the VTY window (telnet window, SSH window, etc.) in global configuration mode. Use the **no** form of this command to disable this function.

logging monitor [*level*]

no logging monitor

Parameter Description

Parameter	Description
level	Severity of the log message. The name of the severity or the numeral can be used. For the details of log severity, see Table-1.

Defaults The default is debugging (7).

Command Mode Global configuration mode

Usage Guide To print log information on the VTY window, run the **terminal monitor** command in privileged EXEC mode. The level of logs to be displayed is defined by **logging monitor**.

The log level defined with "Logging monitor" is for all VTY windows.

Configuration Examples The following example sets the severity of log that is allowed to be printed on the VTY window as 6:

FS(config)# **logging monitor informational**

Related

Command	Description

logging on	Turns on the log switch.
show logging	Displays the log messages and related log configuration parameters in the buffer.

Platform Description

N/A

8.16 Logging On

Use this command globally to allow logs to be displayed on different devices. Use the **no** form of this command to disable this fucntion.

logging on

no logging on

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Logs are allowed to be displayed on different devices.

Command Mode

Global configuration mode

Usage Guide

Log information can not only be shown in the Console window and VTY window, but also be recorded in different equipments such as the memory buffer, the expanded FLASH and the Syslog Server. This command is the total log switch. If this switch is turned off, no log will be displayed or recorded unless the severity level is greater than 1.

Configuration Examples

The following example disables the log switch on the device.

FS(config)# **no logging on**

Related Commands

Command	Description
logging buffered	Records the logs to a memory buffer.
logging server	Sends logs to the Syslog server.
logging file flash:	Records logs on the expanded FLASH.
logging console	Allows the log level to be displayed on the console.
logging monitor	Allows the log level to be displayed on the VTY window (such as telnet window) .
logging trap	Sets the log level to be sent to the Syslog server.

Platform Description

N/A

8.17 Logging Rate-limit

Use this command to enable log rate limit function to limit the output logs in a second in the global configuration mode. Use the **no** form of this command to disable this function.

logging rate-limit { *number* | **all** *number* | **console** { *number* | **all** *number* } } [**except** *severity*]

no logging rate-limit

Parameter Description

Parameter	Description
number	The number of logs that can be processed in a second in the range from 1 to 10000.
all	Sets rate limit to all the logs with severity level 0 to 7.
console	Sets the amount of logs that can be shown in the console in a second.
except	By default, the severity level is error (3). The rate of the log whose severity level is less than or equal to error (3) is not controlled.
severity	Log severity level in the range from 0 to 7. The lower the level is, the higher the severity is.

Defaults

The log rate limit function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

Use this command to control the syslog outpt to prevent the massive log output.

Configuration Examples

The following example sets the number of the logs (including debug) that can be processed in a second as 10. However, the logs with warning or higher severity level are not controlled:

FS(config)#**logging rate-limit all** *10* **except warnings**

Related Commands

Command	Description
show logging count	Displays log information about modules of the system.
show logging	Displays basic configuration of log modules and log information in the buffer.

Platform Description

N/A

8.18 Logging Rd On

Use this command in global configuration mode on the host to enable the log re-direction function and allow re-directing logs on slave or backup devices to the host in the stacking environment. Use **no** form of this command to disable this function.

logging rd on

no logging rd on

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The log re-direction function is enabled by default.

Command Mode

Global configuration mode

Usage Guide

The log information on slave or back devices not only can be shown on the Console window of slave or backup devices, but also can be re-directed to the host and exported to the Console and VTY windows of the host, and recorded in cache, expanded FLASH and Syslog Server of the host.

Configuration Examples

The following example enables the log re-direction function on a device:

```
FS(config)#logging rd on
```

Related Commands

Command	Description
show logging count	Displays log information about modules of the system.
show logging	Displays basic configuration of log modules and log information in the buffer.

Platform Description

N/A

8.19 Logging Rd Rate-limit

Use this command in global configuration mode on the host to enable the log re-direction rate limiting function to limit the number of logs that can be re-directed from a slave or backup device to the host each second in the stacking environment. Use the **no** form of this command to disable this function.

logging rd rate-limit *number* [**except** [*severity*]]

no logging rd rate-limit

Parameter Description

Parameter	Description
number	Log information that can be re-directed each second, ranging from 1 to 10,000 logs
except	Log information on or lower than the severity level will not be limited; error (3) by default, log information on or lower than the error level is not limited.
severity	Log information severity level; lower the level is, higher the severity is, ranging from 0 to 7

Defaults The maximum number of logs that can be re-directed each second is 200 by default.

Command Mode Global configuration mode

Usage Guide This command is used to control the output of log information by system re-direction. You can use this command to prevent a slave or backup device from re-directing a large number of logs to the host.

Configuration Examples The following example sets the maximum number of logs (including debug) that can be re-directed from a slave device to the host each second at 10, excepting logs on and above the warning severity level:

```
FS(config)#logging rd rate-limit 10 except warnings
```

Related Commands

Command	Description
show logging count	Displays log information about modules of the system.
show logging	Displays basic configuration of log modules and log information in the buffer.

Platform Description N/A

8.20 Logging Server

Use this command to send the logs to the specified Syslog Sever in global configuration mode. Use the **no** form of this command to remove the setting. Use the **default** form of this command to restore the default setting.

logging server [oob] { *ip-address* | **ipv6** *ipv6-address* } [**udp-port** *port*][vrf vrf-name]

no logging server [oob] { *ip-address* [vrf vrf-name] | **ipv6** *ipv6-address* }

no logging server { *ip-address* [vrf vrf-name] | **ipv6** *ipv6-address* } **udp-port**

Parameter Description

Parameter	Description
oob	Specifies the log server as out-of-band communication (generally means sending to the log server through the MGMT port), this option is only available when the device has an MGMT management port.
ip-address	IP address of the host that receives log information.
vrf-name	Specifies the VRF (VPN routing and forwarding table) instance connected to the log host.
ipv6-address	Specifies IPV6 address for the host receiving the logs.
udp-port *port*	Specifies the port number for the specified host (The default port number is 514).

Defaults No log is sent to any syslog server by default.

Command Global configuration mode

Mode

Usage Guide This command specifies a Syslog server to receive the logs of the device. Users are allowed to configure up to 5 Syslog Servers. The log information will be sent to all the configured Syslog Servers at the same time.

Configuration Examples The following example specifies a syslog server of the address 202.101.11.1:

FS(config)# **logging server** *202.101.11.1*

The following example specifies an ipv6 address as AAAA:BBBB:FFFF:

FS(config)# **logging server ipv6** *AAAA:BBBB:FFFF*

Related Commands

Command	Description
logging on	Turns on the log switch.
show logging	Displays log messages and related log configuration parameters in the buffer.
logging trap	Sets the level of logs allowed to be sent to Syslog server.

Platform Description N/A

8.21 Logging Source Interface

Use this command to configure the source interface of logs in global configuration mode. Use the **no** form of this command to restore the default setting.

logging source [**interface**] *interface-type interface-number*

no logging source [**interface**]

Parameter Description

Parameter	Description
interface-type	Interface type.
interface-number	Interface number.

Defaults No source interface is configured by default.

Command Mode Global configuration mode

Usage Guide By default, the source address of the log messages sent to the syslog server is the address of the sending interface. For easy tracing and management, this command can be used to fix the source address of all log messages as an interface address, so that the administrator can identify which device is sending the message through the unique addresses. If the source interface is not configured on the device, or no IP address is configured for the source interface, the source address of the log messages is the address of the sending interface.

Configuration Examples

The following example specifies loopback 0 as the source address of the syslog messages:

FS(config)# **logging source interface loopback** *0*

Related Commands

Command	Description
logging server	Sends logs to the Syslog server.

Platform Description

N/A

8.22 Logging Source ip | ipv6

Use this command to configure the source IP address of logs in global configuration mode. Use the **no** form of this command to restore the default setting.

logging source {**ip** *ip-address* | **ipv6** *ipv6-address*}

no logging source { **ip | ipv6** }

Parameter Description

Parameter	Description
ip-address	Specifies the source IPV4 address sending the logs to IPV4 log server.
ipv6-address	Specifies the source IPV6 address sending the logs to IPV6 log server.

Defaults

No source address is configured by default.

Command Mode

Global configuration mode

Usage Guide

By default, the source address of the log messages sent to the syslog server is the address of the sending interface. For easy tracing and management, this command can be used to fix the source address of all log messages as an address, so that the administrator can identify which device is sending the message through the unique addresses. If this IP address is not configured on the device, the source address of the log messages is the address of the sending interface.

Configuration Examples

The following example specifies 192.168.1.1 as the source address of the syslog messages:

FS(config)# **logging source ip** *192.168.1.1*

Related Commands

Command	Description
logging server	Sends the logs to the Syslog server.

Platform Description

N/A

8.23 Logging Synchronous

Use this command to enable synchronization function between user input and log output in line configuration

mode to prevent interruption when the user is keying in characters. Use the **no** form of this command to restore the default setting.

logging synchronous

no logging synchronous

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The synchronization function between user input and log output is disabled by default.

Command Mode

Line configuration mode

Usage Guide

This command enables synchronization function between user input and log output, preventing the user from interrupting when keying in the characters.

Print UP-DOWN logs on the port when keying in the command, the input command will be output again:

```
FS# configure terminal
Oct    9 23:40:55 %LINK-5-CHANGED: Interface GigabitEthernet 0/1, changed state to down
Oct    9 23:40:55 %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet 0/1, changed state to DOWN
FS# configure terminal//----the input command by the user is output again rather than being intererupted.
```

Configuration Examples

```
FS(config)#line console 0
FS(config-line)#logging synchronous
```

Related Commands

Command	Description
show running-config	Displays the configuration.

Platform Description

N/A

8.24 Logging Trap

Use this command to set the severity of logs that are allowed to be sent to the syslog server in global configuration mode. Use the **no** form of this command to prohibit sending log messages to the Syslog server.

logging trap [*level*]

no logging trap

Parameter Description

Parameter	Description
level	Severity of the log message. The name of the severity or the numeral can be used. For the details of log severity, see Table 1.

Defaults The default is informational(6)

Command Mode Global configuration mode

Usage Guide To send logs to the Syslog Server, run the **logging** command in global configuration mode to configure the **Syslog Server**. Then, run the **logging trap** command to specify the severity level of logs to be sent.

The **show logging** command displays the configured related parameters and statistics of the log.

Configuration Examples The following example enables logs at severity 6 to be sent to the Syslog Server with the address of 202.101.11.22:

FS(config)# **logging** *202.101.11.22*

FS(config)# **logging trap informational**

Related Commands

Command	Description
logging on	Turns on the log switch.
logging	Sends logs to the Syslog server.
show logging	Displays the log messages and related log configuration parameters in the buffer.

Platform Description N/A

8.25 Logging Userinfo

Use this command to enable the logging function to record user log/exit. Use the **no** form of this command to restore the default setting.

logging userinfo

no logging userinfo

Parameter Description

Parameter	Description
N/A	N/A

Defaults No log message is printed recording user log/exit by default.

Command Mode Global configuration mode

Usage Guide This command is used to print the log message to remind the administrator of user login. The log message is in the format as follows:

Mar 22 14:05:45 %LOGIN-5-LOGIN_SUCCESS: User login from vty0 (192.168.23.68) OK.

Configuration Examples

The following example enables the logging function to record user log/exit.

```
FS(config)# logging user-info
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.26 Logging Userinfo Command-log

Use this command to enable the logging function to record user operation. Use the **no** form of this command to restore the default setting.

logging userinfo command-log

no logging userinfo command-log

Parameter Description

Parameter	Description
N/A	N/A

Defaults

No log message is printed recording user operation by default.

Command Mode

Global configuration mode

Usage Guide

This command is used to print the log message to remind the administrator of configuration change. The log message is in the format as follows:

```
Mar 22 14:10:40 %CLI-5-EXEC_CMD: Configured from vty0 (192.168.23.68) command-log: logging server
192.168.23.68.
```

Configuration Examples

The following example enables the logging function to record user operation.

```
FS(config)# logging user-info command-log
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.27 Service Log-fformat Rfc5424

Use this command to enable the RFC5424 format. Use the **no** form of this command to restore the default setting.

service log-format rfc5424

no service log-format rfc5424

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The RFC3164 format is used by default.

Command Mode

Global configuration mode

Usage Guide

After the RFC5424 format is enabled, the service sequence-numbers, service sysname, **service timestamps**, **service private-syslog** and **service standard-syslog** commands become invalid and hidden.

After switching back to the RFC3164 format, the **logging delay-send**, **logging policy** and **logging statistic** commands become invalid and hidden.

After switching the log format, the results of running the **show logging** and **show logging config** commands change,

Configuration Examples

The following example enables the RFC5424 format.

```
FS(config)# service log-format rfc5424
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.28 Service Private-syslog

Use this command to set the syslog format to the private syslog format. Use the **no** form of this command to restore the default setting.

service private-syslog

no service private-syslog

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The syslog is displayed in the default format.

Command Mode

Global configuration mode

Usage Guide

By default, the syslog is displayed in the format as follows:

*timestamp: %facility-severity-mnemonic: description

Here is an example:

```
*May 31 23:25:21: %SYS-5-CONFIG_I: Configured from console by console
```

With this function enabled, the syslog is displayed in the format as follows:

timestamp facility-severity-mnemonic: description

Here is an example:

```
May 31 23:31:28 SYS-5-CONFIG_I: Configured from console by console
```

The difference between the private syslog format and the default syslog format lies in the following marks:

The private syslog does not have "*" before the timestamp, ":" after the timestamp and "%" before the identifying string.

Configuration Examples

The following example sets the private syslog format.

```
FS(config)# service private-syslog
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.29 Service Sequence-numbers

Use this command to attach serial numbers into the logs in global configuration mode. Use the **no** form of this command to restore the default setting.

service sequence-numbers

no service sequence-numbers

Parameter Description

Parameter	Description
N/A	N/A

Defaults

No serial number is contained in the logs by default.

Command Mode

Global configuration mode

Usage Guide

In addition to the timestamp, you can add serial numbers to the logs, numbering from 1. Then, it is clearly known whether the logs are lost or not and their sequence.

Configuration Examples

The following example adds serial numbers to the logs.

```
FS(config)# service sequence-numbers
```

Related

Command	Description

logging on	Turns on the log switch.
service timestamps	Attaches timestamps to the logs.

Platform Description

N/A

8.30 Service Standard-syslog

Use this command to set the syslog format to the standard syslog format defined in RFC3164. Use the **no** form of this command to restore the default setting.

service standard-syslog

no service standard-syslog

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The syslog is displayed in the default format.

Command Mode

Global configuration mode

Usage Guide

By default, the syslog is displayed in the format as follows:

*timestamp: %facility-severity-mnemonic: description

Here is an example:

```
*May 31 23:25:21: %SYS-5-CONFIG_I: Configured from console by console
```

With this function enabled, the syslog is displayed in the format as follows:

timestamp %facility-severity-mnemonic: description

Here is an example:

```
May 31 23:31:28 %SYS-5-CONFIG_I: Configured from console by console
```

The difference between the standard syslog format and the default syslog format lies in the following marks:

The standard syslog does not have "*" before the timestamp and ":" after the timestamp.

Configuration Examples

The following example sets the standard syslog format.

```
FS(config)# service standard-syslog
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.31 Service Sysname

Use this command to attach system name to logs in global configuration mode. Use the **no** form of this command to restore the default setting.

service sysname

no service sysname

Parameter Description

Parameter	Description
N/A	N/A

Defaults

No system name is attached to logs by default.

Command Mode

Global configuration mode

Usage Guide

This command allows you to decide whether to add system name in the log information.

Configuration Examples

The following example adds a system name in the log information:

```
Mar 22 15:28:02 %SYS-5-CONFIG: Configured from console by console
FS #config terminal
Enter configuration commands, one per line. End with CNTL/Z.
FS (config)#service sysname
FS (config)#end
FS #
```

Related Commands

Command	Function
show logging	Displays basic configuration of log modules and log information in the buffer.

Platform Description

N/A

8.32 Service Timestamps

Use this command to attach timestamp into logs in global configuration mode. Use the **no** form of this command to remove the timestamp from the logs. Use the **default** form of this command to restore the default setting.

service timestamps [*message-type* [**uptime | datetime** [**msec** | **year**]]]

no service timestamps [*message-type*]

default service timestamps [*message-type*]

Parameter Description

Parameter	Description
message-type	The log type, including **Log** and **Debug**. The **log** type indicates the log information with severity levels of 0 to 6. The **debug** type indicates that with severity level 7.
uptime	Device start time in the format of *Day*Hour*Minute*Second, for example, 07:00:10:41.
datetime	Current time of the device in the format of

	Month*Date*Hour*Minute*Second, for example, Jul 27 16:53:07.
msec	Current time of the device in the format of Month*Date*Hour*Minute*Second*milisecond, for example, Jul 27 16:53:07.299
year	Current time of the device in the format of Year*Month*Date*Hour*Minute*Second, for example, 2007 Jul 27 16:53:07

Defaults

The time stamp in the log information is the current time of the device. If the device has no RTC, the time stamp is automatically set to the device start time.

Command Mode

Global configuration mode

Usage Guide

When the **uptime** option is used, the time format is the running period from the last start of the device to the present time, in seconds. When the **datetime** option is used, the time format is the date of the current device, in the format of YY-MM-DD, HH:MM:SS.

Configuration Examples

The following example enables the timestamp for **log** and **debug** information, in format of Datetime, supporting millisecond display.

FS(config)# **service timestamps debug datetime msec**
FS(config)# **service timestamps log datetime msec**
FS(config)# **end**
FS(config)# **Oct** *8 23:04:58.301 %SYS-5-CONFIG I:* configured from console by console

Related Commands

Command	Description
logging on	Turns on the log switch.
service sequence-numbers	Enables serial numbers of logs.

Platform Description

N/A

8.33 Show Logging

Use this command to display configured parameters and statistics of logs and log messages in the memory buffer at privileged user layer. The log messages are sorted by the timestamp from before to now.

show logging

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following command displays the result of the **show logging** command with RFC5424 format disabled.

```
FS# show logging
Syslog logging: enabled
  Console logging: level debugging, 15495 messages logged
  Monitor logging: level debugging, 0 messages logged
  Buffer logging: level debugging, 15496 messages logged
  Standard format: false
  Timestamp debug messages: datetime
  Timestamp log messages: datetime
  Sequence-number log messages: enable
  Sysname log messages: enable
  Count log messages: enable
  Trap logging: level informational, 15242 message lines logged,0 fail
    logging to   202.101.11.22
    logging to   192.168.200.112
Log Buffer (Total 131072 Bytes): have written 1336,
015487: *Sep 19 02:46:13: FS %LINK-3-UPDOWN: Interface FastEthernet 0/24, changed state to up.
015488: *Sep 19 02:46:13: FS %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet 0/24, changed state to up.
015489: *Sep 19 02:46:26: FS %LINK-3-UPDOWN: Interface FastEthernet 0/24, changed state to down.
015490: *Sep 19 02:46:26: FS %LINEPROTON/A5N/AUPDOWN: Line protocol on Interface FastEthernet 0/24, changed state to down.
015491: *Sep 19 02:46:28: FS %LINKN/A3N/AUPDOWN: Interface FastEthernet 0/24, changed state to up.
015492: *Sep 19 02:46:28: FS %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet 0/24, changed state to up.
```

Log information description:

Field	Description
Syslog logging	Logging flag: enabled or disabled
Console logging	Level of the logs printed on the console, and statistics
Monitor logging	Level of the logs printed on the VTY window, and statistics
Buffer logging	Level of the logs recorded in the memory buffer, and statistics.
Standard format	Standard log format.

Timestamp debug messages	Timestamp format of the Debug messages
Timestamp log messages	Timestamp format of the Log messages
Sequence-number log messages	Serial number switch
Sequence log messages	Attaches system names to the logs.
Count log messages	Log statistics function
Trap logging	Level of the logs sent to the syslog server, and statistics
Log Buffer	Log files recorded in the memory buffer

The following example displays the result of the **show logging** command with RFC5424 format enabled.

```
FS# show logging
Syslog logging: enabled
  Console logging: level debugging, 4740 messages logged
  Monitor logging: level debugging, 0 messages logged
  Buffer logging: level debugging, 4745 messages logged
  Statistic log messages: disable
  Statistic log messages to terminal: disable
  Delay-send file name:syslog_ftp_server, Current write index:3, Current send index:3, Cycle:10 seconds
   Count log messages: enable
  Trap logging: level informational, 2641 message lines logged,4155 fail
    logging to    192.168.23.89
    logging to    2000::1
  Delay-send logging: 2641 message lines logged
    logging to    192.168.23.89    by tftp
Log Buffer (Total 4096 Bytes): have written 4096, Overwritten 3292
<135>1 2013-07-24T12:19:33.130290Z FS - 7 - - Please config the IP address for capwap.
<132>1 2013-07-24T12:20:02.80313Z FS CAPWAP 4 NO_IP_ADDR - No ip address for capwap.
<135>1 2013-07-24T12:20:02.80343Z FS - 7 - - Please config the IP address for capwap.
<132>1 2013-07-24T12:20:32.250265Z FS CAPWAP 4 NO_IP_ADDR - No ip address for capwap.
<134>1 2013-07-24T12:29:33.410123Z FS SYS 6 SHELL_LOGIN [USER@4881 name="" type="" from="console"]
user login success.
<134>1 2013-07-24T12:29:34.343763Z FS SYS 6 SHELL_CMD [USER@4881 name=""][CMD@4881 task="rl_con"
cmd="enable"]
```

Field	Description
Syslog logging	Logging flag: enabled or disabled
Console logging	Level of the logs printed on the console, and statistics
Monitor logging	Level of the logs printed on the VTY window, and statistics
Buffer logging	Level of the logs recorded in the memory buffer, and statistics.
Count log messages	Log statistics function
Statistic log messages	Enables/disables log sending periodically
Statistic log messages to terminal	Enables/ disables log sending to console and remote terminal

Delay-send file name	Local filename of log delay-sending cache, index of write file and delay interval
Trap logging	Level of the logs sent to the syslog server and statistics
Delay-send logging	The server address, log sending mode and statistics
Log Buffer	Log files recorded in the memory buffer

Related Commands

Command	Function
logging on	Turns on the log switch.
clear logging	Clears the log messages in the buffer.

Platform Description

N/A

8.34 Show Logging Config

Use this command to display log configuration and statistics.

show logging config

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the outcome of running the **show logging config** command with RFC5424 disabled.

```
FS# show logging config
Syslog logging: enabled
  Console logging: level debugging, 15495 messages logged
  Monitor logging: level debugging, 0 messages logged
  Buffer logging: level debugging, 15496 messages logged
  Standard format: false
  Timestamp debug messages: datetime
  Timestamp log messages: datetime
  Sequence-number log messages: enable
  Sysname log messages: enable
  Count log messages: enable
  Trap logging: level informational, 15242 message lines logged,0 fail
    logging to   202.101.11.22
```

```
    logging to    192.168.200.112
```

Field	Description
Syslog logging	Whether the logging function is enabled or disabled.
Console logging	The level and statistics of the log message printed on the console.
Monitor logging	The level and statistics of the log message printed on the VTY window.
Buffer logging	The level and statistics of the log message recorded in the memory buffer.
Standard format	Standard log format.
Timestamp debug messages	Timestamp format of debugging message.
Timestamp log messages	Timestamp format of log message.
Sequence-number log messages	Whether the sequence number function is enabled or disabled.
Sysname log messages	Adds the system name to the log message.
Count log messages	Log-counting function
Trap logging	The level and statistics of the log message sent to the syslog server.

The following example displays the outcome of running the **show logging config** command with RFC5424 enabled.

```
FS# show logging
Syslog logging: enabled
  Console logging: level debugging, 4740 messages logged
  Monitor logging: level debugging, 0 messages logged
  Buffer logging: level debugging, 4745 messages logged
  Statistic log messages: disable
  Statistic log messages to terminal: disable
  Delay-send file name:syslog_ftp_server, Current write index:3, Current send index:3, Cycle:10 seconds
   Count log messages: enable
  Trap logging: level informational, 2641 message lines logged,4155 fail
     logging to    192.168.23.89
     logging to    2000::1
  Delay-send logging: 2641 message lines logged
      logging to    192.168.23.89    by tftp
```

Field	Description
Syslog logging	Logging flag: enabled or disabled
Console logging	Level of the logs printed on the console, and statistics
Monitor logging	Level of the logs printed on the VTY window, and statistics
Buffer logging	Level of the logs recorded in the memory buffer, and statistics.
Count log messages	Log statistics function
Statistic log messages	Enables/disables log sending periodically
Statistic log messages to terminal	Enables/ disables log sending to output console and remove terminal

Delay-send file name	Local filename of log delay-sending cache, index of write file and delay interval
Trap logging	Level of the logs sent to the syslog server and statistics
Delay-send logging	The server address, log sending way and statistics

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.35 Show Logging Count

Use this command to display the statistics about occurrence times, and the last occurrence time of each module log in the system in privileged mode.

show logging count

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

To use the log packet statistics function, run the **logging count** command in global configuration mode. The **show logging count** command can show the information of a specific log, occurrence times, and the last occurrence time.

You can use the **show logging** command to check whether the log statistics function is enabled.

Configuration Examples

The following example displays the result of the **show logging count** command:

```
FS# show logging count
Module Name     Message Name Sev Occur        Last Time
SYS             CONFIG_I     5   1            Jul 6 10:29:57
SYS TOTAL                                 1
```

Related Commands

Command	Function
logging count	Enables the log statistics function.
show logging	Displays basic configuration of log modules and log information in the buffer.

clear logging	Clears the logs in the buffer.

Platform Description

N/A

8.36 Show Logging Reverse

Use this command to display configured parameters and statistics of logs and log messages in the memory buffer at privileged user layer. The log messages are sorted by the timestamp from now to before.

show logging reverse

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

Configuration Examples

The following command displays the result of the **show logging reverse** command with RFC5424 format disabled.

```
FS# show logging reverse
Syslog logging: enabled
   Console logging: level debugging, 15495 messages logged
   Monitor logging: level debugging, 0 messages logged
   Buffer logging: level debugging, 15496 messages logged
   Standard format: false
   Timestamp debug messages: datetime
   Timestamp log messages: datetime
   Sequence-number log messages: enable
   Sysname log messages: enable
   Count log messages: enable
   Trap logging: level informational, 15242 message lines logged,0 fail
      logging to    202.101.11.22
      logging to    192.168.200.112
Log Buffer (Total 131072 Bytes): have written 1336,
015492: *Sep 19 02:46:28: FS %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet 0/24, changed
state to up.
015491: *Sep 19 02:46:28: FS %LINK-3-UPDOWN: Interface FastEthernet 0/24, changed state to up.
015490: *Sep 19 02:46:26: FS %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet 0/24, changed
state to down.
015489: *Sep 19 02:46:26: FS %LINK-3-UPDOWN: Interface FastEthernet 0/24, changed state to down.
```

```
015488: *Sep 19 02:46:13: FS %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet 0/24, changed state to up.
015487: *Sep 19 02:46:13: FS %LINK-3-UPDOWN: Interface FastEthernet 0/24, changed state to up.
```

Field	Description
Syslog logging	Logging flag: enabled or disabled
Console logging	Level of the logs printed on the console, and statistics
Monitor logging	Level of the logs printed on the VTY window, and statistics
Buffer logging	Level of the logs recorded in the memory buffer, and statistics.
Standard format	Standard log format.
Timestamp debug messages	Timestamp format of the Debug messages
Timestamp log messages	Timestamp format of the Log messages
Sequence-number log messages	Serial number switch
Sequence log messages	Attaches system names to the logs.
Count log messages	Log statistics function
Trap logging	Level of the logs sent to the syslog server, and statistics
Log Buffer	Log files recorded in the memory buffer

The following example displays the result of the **show logging reverse** command with RFC5424 format enabled.

```
FS# show logging reverse
Syslog logging: enabled
   Console logging: level debugging, 4740 messages logged
   Monitor logging: level debugging, 0 messages logged
   Buffer logging: level debugging, 4745 messages logged
   Statistic log messages: disable
   Statistic log messages to terminal: disable
   Delay-send file name:syslog_ftp_server, Current write index:3, Current send index:3, Cycle:10 seconds
    Count log messages: enable
   Trap logging: level informational, 2641 message lines logged,4155 fail
      logging to    192.168.23.89
      logging to    2000::1
   Delay-send logging: 2641 message lines logged
      logging to    192.168.23.89    by tftp
Log Buffer (Total 4096 Bytes): have written 4096, Overwritten 3292
<134>1 2013-07-24T12:29:34.343763Z FS SYS 6 SHELL_CMD [USER@4881 name=""][CMD@4881 task="rl_con" cmd="enable"]
<134>1 2013-07-24T12:29:33.410123Z FS SYS 6 SHELL_LOGIN [USER@4881 name="" type="" from="console"]
```

```
user login success.
<132>1 2013-07-24T12:20:32.250265Z FS CAPWAP 4 NO_IP_ADDR - No ip address for capwap.
<135>1 2013-07-24T12:20:02.80343Z FS - 7 - - Please config the IP address for capwap.
<132>1 2013-07-24T12:20:02.80313Z FS CAPWAP 4 NO_IP_ADDR - No ip address for capwap.
<135>1 2013-07-24T12:19:33.130290Z FS - 7 - - Please config the IP address for capwap.
```

Field	Description
Syslog logging	Logging flag: enabled or disabled
Console logging	Level of the logs printed on the console, and statistics
Monitor logging	Level of the logs printed on the VTY window, and statistics
Buffer logging	Level of the logs recorded in the memory buffer, and statistics.
Count log messages	Log statistics function
Statistic log messages	Enables/disables log sending periodically
Statistic log messages to terminal	Enables/ disables log sending to console and remote terminal
Delay-send file name	Local filename of log delay-sending cache, index of write file and delay interval
Trap logging	Level of the logs sent to the syslog server and statistics
Delay-send logging	The server address, log sending mode and statistics
Log Buffer	Log files recorded in the memory buffer

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.37 Terminal Monitor

Use this command to show logs on the current VTY window. Use the **no** form of this command to restore the default setting.

terminal monitor

terminal no monitor

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Log information is not allowed to be displayed on the VTY window by default.

Command Mode

Privileged EXEC mode

Usage Guide

This command only sets the temporary attributes of the current VTY. As the temporary attribute, it is not stored permanently. At the end of the VTY terminal session, the system will use the default setting, and the temporary setting is invalid. This command can be also executed on the console, but it does not take effect.

Configuration Examples

The following example allows log information to be printed on the current VTY window:

FS# **terminal monitor**

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

Command History

Version	Description
N/A	N/A

9. CWMP Commands

9.1 Acs Password

Use this command to configure the ACS password to be authenticated for the CPE to connect to the ACS. Use the **no** form of this command to cancel the configuration.

acs password { *password* | *encryption-type encrypted-password* }

no acs password

Parameter Description

Parameter	Description
password	Configures the ACS user password to be authenticated for the CPE to connect to the ACS.
encryption-type	Specifies the encryption type, which can be set to 0 (indicating that no encryption is used) or 7 (indicating that simple encryption is used).
encrypted-password	Specifies the password in encrypted form.

Defaults

encryption-type: 0

encrypted-password: N/A

Command Mode

CWMP configuration mode

Usage Guide

Use this command to configure the ACS user password to be authenticated for the CPE to connect to the ACS. In general, the encryption type does not need to be specified. The encryption type needs to be specified only when copying and pasting the encrypted password of this command. A valid password should meet the following format requirements:

- The command contains English letters in upper or lower case and numeric characters.
- Blanks are allowed at the beginning of the password but will be ignored. Intermediate and ending blanks, however, are regarded as a part of the password.

Configuration Examples

The following example configures the ACS password to be authenticated for the CPE to connect to the ACS to 123.

```
FS#config terminal
Enter configuration commands, one per line.   End with CNTL/Z.
FS(config)#cwmp
FS(config-cwmp)#acs password 123
FS(config-cwmp)#
```

Related Commands

Command	Description
show cwmp configuration	Displays the current configuration of CWMP.
show cwmp status	Displays the running status of CWMP.
acs username	Configures the ACS username to be authenticated for

	the CPE to connect to the ACS.

Platform Description

N/A

9.2 Acs Url

Use this command to configure the URL of the ACS to which the CPE will connect.

Use the **no** form of this command to restore the default setting.

acs url { *url* | **macc** }

no acs url

Parameter Description

Parameter	Description
url	Specifies the URL of the ACS.
macc	Connects to MACC.

Defaults

N/A

Command Mode

CWMP configuration mode

Usage Guide

Use this command to configure the URL of the ACS to which the CPE will connect. If no ACS URL is manually specified but a dynamic ACS URL is obtained through DHCP, the CPE initiates a connection to the ACS using the dynamically obtained ACS URL. The URL of the ACS should meet the following format requirements:

- The URL of the ACS is formatted as http://host[:port]/path or https://host[:port]/path.
- The URL of the ACS consists of at most 256 characters.

cpe inform interval 30

Configuration Examples

The following example specifies the URL of the ACS to http://10.10.10.1:8080/acs.

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#cwmp
FS(config-cwmp)#acs url http://10.10.10.1:8080/acs
FS(config-cwmp)#
```

The following example specifies the URL of the ACS to http://www.test.com/service/tr069servlet.

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#cwmp
FS(config-cwmp)#acs url http://www.test.com/service/tr069servlet
FS(config-cwmp)#
```

Related Commands

Command	Description
show cwmp configuration	Displays the current configuration of CWMP.

show cwmp status	Displays the running status of CWMP.

Platform Description N/A

9.3 Acs Username

Use this command to configure the ACS username to be authenticated for the CPE to connect to the ACS. Use the **no** form of this command to restore the default setting.

acs username *username*

no acs username

Parameter Description

Parameter	Description
username	Configures the ACS username to be authenticated for the CPE to connect to the ACS.

Defaults N/A

Command Mode CWMP configuration mode

Usage Guide Configures the ACS username to be authenticated for the CPE to connect to the ACS.

Configuration Examples The following example configures the ACS username to be authenticated for the CPE to connect to the ACS to admin.

```
FS#config terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#cwmp
FS(config-cwmp)#acs username admin
FS(config-cwmp)#
```

Related Commands

Command	Description
show cwmp configuration	Displays the current configuration of CWMP.
show cwmp status	Displays the running status of CWMP.
acs password	Configures the ACS password to be authenticated for the CPE to connect to the ACS.

Platform Description N/A

9.4 Cpe Back-up

Use this command to enable the CPE backup function.

Use the **no** form of this command to restore the default setting.

cpe back-up [**delay-time** *seconds*]

no cpe back-up

Parameter Description

Parameter	Description
seconds	Sets the backup delay time (30-10,000 seconds).

Defaults The default is 60 seconds.

Command Mode CWMP configuration mode

Usage Guide After updrading main programs or configurations, CPE cannot communicate with ACS for wrong configuration delivery. Use this command to recover the previous programs and configurations.

Configuration Examples The following example disables the CPE backup function.

```
FS#config terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#cwmp
FS(config-cwmp)#no cpe back-up
FS(config-cwmp)#
```

Platform Description N/A

9.5 Cpe Inform

Use this command to configure the periodic notification function of the CPE.

Use the **no** form of this command to restore the default setting

cpe inform [**interval** *seconds*] [**start-time** *time*]

no cpe inform

Parameter Description

Parameter	Description
seconds	Specifies the periodical notification interval of the CPE in the range from 30 to 3,600 in the unit of seconds.
time	Specifies the date and time for starting periodical notification in yyyy-mm-ddThh:mm:ss format.

Defaults The default is 600 seconds.

Command Mode CWMP configuration mode

Usage Guide

Use this command to configure the periodic notification function of the CPE.

- If the time for starting periodical notification is not specified, periodical notification starts after the periodical notification function is enabled. The notification is performed once within every notification interval.
- If the time for starting periodical notification is specified, periodical notification starts at the specified start time. For instance, if the periodical notification interval is set to 60 seconds and the start time is 12:00 am next day, periodical notification will start at 12:00 am next day and once every 60 seconds.

The narrower periodical notification interval allows the ACS to track the latest CPE status more accurately. However, narrower periodical notification interval brings about more sessions between the CPE and the ACS, consuming more resources of them. So the user should specify the periodical notification interval of the CPE to a reasonable value according to the network performance and the ACS performance.

Configuration Examples

The following example specifies the periodical notification interval of the CPE to 60 seconds.

```
FS#config terminal
Enter configuration commands, one per line.   End with CNTL/Z.
FS(config)#cwmp
FS(config-cwmp)#cpe inform interval 60
FS(config-cwmp)#
```

Related Commands

Command	Description
show cwmp configuration	Displays the current configuration of CWMP.
show cwmp status	Displays the running status of CWMP.

Platform Description

N/A

9.6 Cpe Password

Use this command to configure the CPE password to be authenticated for the ACS to connect to the CPE. Use the **no** form of this command to cancel the configuration.

cpe password { *password* | *encryption-type encrypted-password* }

no cpe password

Parameter Description

Parameter	Description
password	Configures the CPE user password to be authenticated for the ACS to connect to the CPE.
encryption-type	Specifies the encryption type, which can be set to 0 (indicating that no encryption is used) or 7 (indicating that simple encryption is used).
encrypted-password	Specifies the password in encrypted form.

Defaults

encryption-type: 0

encrypted-password: N/A

Command Mode CWMP configuration mode

Usage Guide Use this command to configure the CPE user password to be authenticated for the ACS to connect to the CPE. In general, the encryption type does not need to be specified. The encryption type needs to be specified only when copying and pasting the encrypted password of this command. A valid password should meet the following format requirements:

- The command contains English letters and numeric characters.
- Blanks are allowed at the beginning of the password but will be ignored. Intermediate and ending blanks, however, are regarded as a part of the password.

Configuration Examples The following example configures the CPE password to be authenticated for the ACS to connect to the CPE to 123.

```
FS#config terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#cwmp
FS(config-cwmp)#cpe password 123
FS(config-cwmp)#
```

Related Commands

Command	Description
show cwmp configuration	Displays the current configuration of CWMP.
show cwmp status	Displays the running status of CWMP.
acs username	Configures the CPE username to be authenticated for the ACS to connect to the CPE.

Platform Description N/A

9.7 Cpe Url

Use this command to configure the URL of the CPE to which the ACS will connect.

Use the **no** form of this command to restore default setting.

cpe url *url*

no cpe url

Parameter Description

Parameter	Description
url	Specifies the URL of the CPE.

Defaults N/A

Command Mode CWMP configuration mode

Usage Guide

Use this command to configure the URL of the CPE to which the ACS will connect. If no CPE URL is manually specified but a dynamic CPE URL is obtained through DHCP, the ACS initiates a connection to the CPE using the dynamically obtained CPE URL. The URL of the CPE should meet the following format requirements:

- The URL of the CPE is formatted as http://ip [: port]/ path.
- The URL of the CPE consists of at most 256 characters.

Configuration Examples

The following example specifies the URL of the CPE to http://10.10.10.1:7547/acs.

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#cwmp
FS(config-cwmp)#cpe url Hhttp://10.10.10.1:7547/
FS(config-cwmp)#
```

Related Commands

Command	Description
show cwmp configuration	Displays the current configuration of CWMP.
show cwmp status	Displays the running status of CWMP.

Platform Description

N/A

9.8 Cpe Username

Use this command to configure the ACS username to be authenticated for the CPE to connect to the ACS.

Use the **no** form of this command to restore the default setting.

cpe username *username*

no cpe username

Parameter Description

Parameter	Description
username	Configures the CPE username to be authenticated for the ACS to connect to the CPE.

Defaults

N/A

Command Mode

CWMP configuration mode

Usage Guide

Configures the CPE username to be authenticated for the ACS to connect to the CPE.

Configuration Examples

The following example configures the CPE username to be authenticated for the ACS to connect to the CPE to admin.

```
FS#config terminal
Enter configuration commands, one per line.    End with CNTL/Z.
```

```
FS(config)#cwmp
FS(config-cwmp)#cpe username admin
FS(config-cwmp)#
```

Related Commands

Command	Description
show cwmp configuration	Displays the current configuration of CWMP.
show cwmp status	Displays the running status of CWMP.
cpe password	Configures the CPE password to be authenticated for the ACS to connect to the CPE.

Platform Description

N/A

9.9 Cwmp

Use this command to enable the CWMP function.

Use the **no** form of this command to disable this function.

cwmp

no cwmp

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Command Mode

Global configuration mode

Usage Guide

Use this command to enable or disable the CWMP function.

Configuration Examples

The following example disables the CWMP function.

```
FS#config terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#no cwmp
FS(config)#
```

Related Commands

Command	Description
show cwmp configuration	Displays the current configuration of CWMP.
show cwmp status	Displays the running status of CWMP.

Platform Description

N/A

9.10 Disable Download

Use this command to disable the function of downloading main program and configuration files from the ACS.

Use the **no** form of this command to restore the default setting.

disable download

no disable download

Parameter Description

Parameter	Description
N/A	N/A

Defaults

By default, the CPE can download main program and configuration files from the ACS.

Command Mode

CWMP configuration mode

Usage Guide

N/A

Configuration Examples

The following example disables the function of downloading main program and configuration files from the ACS.

```
FS#config terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#cwmp
FS(config-cwmp)#disable download
FS(config-cwmp)#
```

Related Commands

Command	Description
show cwmp configuration	Displays the current configuration of CWMP.
show cwmp status	Displays the running status of CWMP.

Platform Description

N/A

9.11 Disable Upload

Use this command to disable the function of uploading configuration and log files to the ACS.

Use the **no** form of this command to restore the default setting.

disable upload

no disable upload

Parameter Description

Parameter	Description
N/A	N/A

Defaults

By default, the CPE can upload its configuration and log files to the ACS.

Command Mode CWMP configuration mode

Usage Guide Disables the function of uploading configuration and log files to the ACS.

Configuration Examples The following example disables the function of uploading configuration and log file to the ACS.

```
FS#config terminal
Enter configuration commands, one per line.   End with CNTL/Z.
FS(config)#cwmp
FS(config-cwmp)#disable upload
FS(config-cwmp)#
```

Related Commands

Command	Description
show cwmp configuration	Displays the current configuration of CWMP.
show cwmp status	Displays the running status of CWMP.

Platform Description N/A

9.12 Show Cwmp Configuration

Use this command to display the current configuration of CWMP.

show cwmp configuration

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privilege EXEC mode

Usage Guide

Configuration Examples The following example displays the current configuration of CWMP.

```
FS(config-cwmp)#show cwmp configuration
CWMP Status                    : enable
ACS URL                        : http://www.fs.com.cn/acs
ACS username                   : admin
ACS password                   : ******
CPE URL                        : http://10.10.10.2:7547/
CPE username                   : FS
CPE password                   : ******
```

```
CPE inform status                : disable
CPE inform interval              : 60s
CPE inform start time            : 0:0:0 0 0 0
CPE wait timeout                 : 50s
CPE download status              : enable
CPE upload status                : enable
CPE back up status               : enable
CPE back up delay time           : 60s
```

The descriptions to the fields shown after executing the command **show cwmp configuration**.

Field	Description
CWMP Status	Running status of CWMP.
ACS URL	URL of the ACS。
ACS username	ACS username to be authenticated for the CPE to connect to the ACS.
ACS password	ACS password to be authenticated for the CPE to connect to the ACS.
CPE URL	URL of the CPE。
CPE username	CPE username to be authenticated for the ACS to connect to the CPE.
CPE passord	CPE password to be authenticated for the ACS to connect to the CPE.
CPE inform status	Status of CPE periodical notification function.
CPE inform interval	CPE periodical notification interval.
CPE wait timeout	Timeout period of CPE sessions.
CPE inform start time	The start time of periodical notification.
CPE download status	Indicates whether to download main program and configuration files from the ACS.
CPE upload status	Indicates whether to upload configuration files and log files to the ACS.
CPE back up status	Indicates whether backup and restoration of the main program and configuration file is enabled.
CPE back up delay time	Delay time of the backup and restoration of the main program and configuration files.

Related Commands

Command	Description
show cwmp status	Displays the running status of CWMP.

Platform Description N/A

9.13 Show Cwmp Status

Uses this command to display the running status of CWMP

show cwmp status

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the running status of CWMP.

```
FS#show cwmp status
CWMP Status                          : enable
Session status                       : Close
Last success session                 : Unknown
Last success session time            : Thu Jan    1 00:00:00 1970
Last fail session                    : Unknown
Last fail session time               : Thu Jan    1 00:00:00 1970
Session retry times                  : 0
```

The descriptions to the fields shown after executing the command **show cwmp configuration**.

Field	Description
CWMP Status	The running status of CWMP
Session status	The current status of the session between the CPE and the ACS
Last success session	The last success session type
Last success session time	The last success session time
Last fail session	The last failed session type
Last fail session time	The last failed session time
Session retry times	The number of session retransmission attempts

Related Commands

Command	Description
show cwmp configuration	Displays the current configuration of CWMP.

Platform Description N/A

9.14 Timer Cpe-timeout

Uses this command to configure the session timeout period of the CPE.

timer cpe- timeout *seconds*

no timer cpe-timeout

Parameter Description

Parameter	Description
seconds	Sets the session timeout, in the range from 10 to 600 in the unit of seconds.

Defaults

By default, the session timeout period is 30 seconds.

Command Mode

CWMP configuration mode

Usage Guide

Use this command to configure the session timeout period of the CPE.

The maximum waiting period that the CPE has when the CPE failed to receive the ACS reply.

Configuration Examples

The following example configures the session timeout period of the CPE to 50 seconds.

```
FS#config terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#cwmp
FS(config-cwmp)#timer cpe-timeout 50
FS(config-cwmp)#
```

Related Commands

Command	Description
show cwmp configuration	Displays the current configuration of CWMP.
show cwmp status	Displays the running status of CWMP.

Platform Description

N/A

10. Monitoring Commands

10.1 Show Power

Use this command to display power information including that of its basic condition, redundancy, allocation and version and etc.

show power

Parameter Description

Parameter	Description
-	-

Command Mode Privileged EXEC mode

Level 14

Usage Guide This command is used to display power information

Configuration Examples N/A

Prompt Messages N/A

Platforms N/A

10.2 Show Fan

Use this command to display the fan information in the slave chassis including the model number, serial number, operating status of every fan as well as the speed regulation pattern, actual rotating speed and other information.

show fan [speed]

Parameter Description

Parameter	Description
-	-

Command Mode Privileged EXEC mode

Level 14

Usage Guide Use the show fan command to display the module number, serial number, operating status and speed adjustment mode of all the fan trays.

Configuration The following example displays the fan information in S3910.

Examples

```
FS#show fan
Fan-id Fan-type                          Status
------ -------------------------------- ----------
1      FS_FAN                            ok
2      FS_FAN                            ok
3      FS_FAN                            ok
FS#show fan speed
Fan-id Fan-type                          Status     Speed(R/m) Speed-level
------ -------------------------------- ---------- ---------- -----------
1      FS_FAN                            ok         7965       2
2      FS_FAN                            ok         8145       2
3      FS_FAN                            ok         8175       2
```

Prompt Messages N/A

Platforms N/A

10.3 Show Temperature

Use this command to display board temperature, threshold configuration and other information.

show temperature

Parameter Description

Parameter	Description
N/A	N/A

Command Mode Privileged EXEC mode

Level 14

Usage Guide Use the command to display the current temperature and threshold configuration of each board.

Configuration Examples N/A

Prompt Messages N/A

Platforms N/A

11. Module Hot-plugging/ unplugging Commands

11.1 Remove Configure Device Device-id

Use this command to remove the configuration on a stacking device, which validates in stacking mode after restart.

remove configure device *device-id*

Parameter Description

Parameter	Description
device-id	The chassis number.

Defaults N/A

Command Mode Global configuration mode

Usage Guide This command is used to remove the configuration on a stacking device. It validates after the device is restarted.

Configuration Examples The following example clears the configuration on device 1.

```
FS(config)# remove configure device 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.2 Show Manuinfo

Use this command to display asset information about all independent components in the system for asset management, including the chassis, fan, power, management board, and line card. The information covers the ID, slot number, name, serial number (SN), software and hardware version, and MAC address. Not all devices support display of the same information and only supported information is printed.

show manuinfo

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to display asset information about all independent components in the system

Configuration Examples N/A

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.3 Show Sysmac

Use this command to display the MAC address of the current system.

show sysmac

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays the MAC address of the current system.

```
FS#show sysmac
00d0.f822.33e2
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.4 Show Version Module Detail

Use this command to display the details of the module.

show version module detail [*slot-num*]

show version module detail [*device-id / slot-num*]

Parameter Description

Parameter	Description
device-id	(Optional) Device ID.
slot-num	(Optional) Slot ID.

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide Use this command to display details of the module

Configuration Examples

```
FS# show version module detail 2
Device    : 1
Slot      : 2
User Status :        none
Software Status: none
Online Module :
Type    :
Ports     : 0
Version :
Configured Module :
Type    :
Ports     :
Version :
FS#
```

Related Commands

Command	Description
show version slots	Displays slot details.

Platform Description N/A

11.5 Show Version Slots

Use this command to display the details of the slot.

show version slots [*slot-num*]

show version slots [*device-id* / *slot-num*]

Parameter Description

Parameter	Description
slot-num	(Optional) Slot number.
device-id	(Optional) Device ID.

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples N/A

Related Commands

Command	Description
show version moduel detail	Displays the details of the module.

Platform Description N/A

11.6 Sysmac

Use this command to configure a MAC address for the system. Use the **no** form of this command to remove the setting.

Sysmac *mac-address*

no sysmac

Parameter Description

Parameter	Description
mac-address	Configures a MAC address for the system.

Defaults N/A

Command Mode Global configuration mode

Usage Guide

1. In general, the MAC address is programmed on the management board or the chassis flash. In stacking mode, the system saves the MAC address in use in the configuration file to avoid flow interruption caused by MAC address change. The valid MAC address saved in the configuration file validates in preference after the device is restarted,
2. The MAC address of the gateway may be bound on some downstream devices. If the system is configured with the **auth-mode gateway** command, you can use the **sysmac** command to replace the MAC address of the gateway without changing the MAC address configuration on the downstream devices.
3. The configuration takes effect after the device is restarted.

Configuration Examples The following example deletes the MAC address saved in the configuration file.

```
FS#no sysmac
```

The following example configures MAC address 00d0.f822.33e2 for the system.

```
FS#sysmac 00d0.f822.33e2
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

12. Supervisor Module Redundancy Commands

12.1 Auto-sync Time-period

Use this command to configure the auto-sync time-period of runing-config and startup-config when the dual supervisor module is redundant. Use the **no** form of this command to disable automatic synchronization for the dual supervisor modules. Use the **default** form of this command to restore the default automatic synchronization time period for the dual supervisor modules.

auto-sync time-period *value*

no auto-sync time-period

default auto-sync time-period

Parameter Description

Parameter	Description
value	Automatic synchronization time interval measured in seconds, in the range from one second to one month (2,678,400 seconds).

Defaults

The default is one hour (3600 seconds) by default.

Command Mode

Redundancy configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the automatic synchronization interval to 60 seconds.

```
FS(config)# redundancy
FS(config-red)# auto-sync time-period 60
Redundancy auto-sync time-period: enabled (60 seconds).
FS(config-red)# exit
```

The following example disables automatic synchronization.

```
FS(config)# redundancy
FS(config-red)# no auto-sync time-period
Redundancy auto-sync time-period: disabled.
FS(config-red)# exit
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

12.2 Redundancy

Use this command to enter redundancy configuration mode.

redundancy

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example enters redundancy configuration mode.

```
FS# config terminal
FS(config)# redundancy
FS(config-red)# exit
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.3 Redundancy Forceswitch

Use this command to perform active/standby supervisor module switchover.

redundancy forceswitch

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide If this command is executed on the active supervisor module, the module will be reset and the standby supervisor module will act as an active supervisor module.

The following conditions are required to perform hot backup switchover:

- This command is executed on the active supervisor module. There is a standby supervisor module.
- Hot backups on all virtual switch devices (VSDs) are in real-time status.
- Hot backup switchovers on VSDs are not prevented temporarily by any service entity.

When there are multiple VSDs, the system judges whether the hot backup on each VSD allows active/standby

switchover; If any VSD does not allow the switchover, the command fails. Otherwise, active/standby switchovers are enforced on all VSDs.

Configuration Examples

The following example performs active/standby supervisor module switchover.

```
FS# redundancy forceswitch
This operation will reload the master unit and force switchover to the slave unit. Are you sure to continue? [N/y] y
```

Related Commands

Command	Description
reload	Resets the active supervisor module.

Platform Description

N/A

12.4 Redundancy Reload

Use this command to reset the supervisor module.

redundancy reload { **peer** | **shelf** [*switchid*] }

Parameter Description

Parameter	Description
peer	Resets the standby supervisor module.
shelf	Resets both the active and standby supervisor modules on the device which works as a single physical device. The device ID should be specified on the device which works as a stacking device.
switchid	stacking device ID, supported on a stacking device. This parameter is not supported in stand-alone mode. It must be contained in the **redundancy reload shelf** command in stacking mode.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

Resetting the supervisor module does not affect data forwarding. Data forwarding will not be interrupted and the user session information will not be missing.

The **redundancy reload shelf** command is used to reset the device which works as a single physical device. The **redundancy reload shelf** *switchid* command is used to reset the specified device which works as a stacking device.

Configuration Examples

The following example resets the standby supervisor module.

```
FS# redundancy reload peer
This operation will reload the current slave unit. Are you sure to continue? [N/y] y
Preparing to reload peer!
```

The following example resets device 2 which works as a stacking device.

```
FS# redundancy reload shelf 2
This operation will reload the device 2. Are you sure to continue? [N/y] y
Preparing to reload device 2!
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

12.5 Show Redundancy States

Use this command to display the current redundancy state.

show redundancy states

Parameter Description

Parameter	Description
-	-

Defaults

N/A

Command Mode

User EXEC mode / Privileged EXEC mode

Usage Guide

Currently, only 1:1 hot backup (for the global active module and standby module) is supported in the stacking mode. Therefore, only the hot backup state of the local and peer device is displayed.

Configuration Examples

The following example displays the redundancy states of active supervisor module.

```
FS> enable
FS# show redundancy states
Redundancy role: master
Redundancy state: realtime
Auto-sync time-period: 3600 s
```

The following example displays the redundancy state of the standby supervisor module.

```
FS> enable
FS# show redundancy states
Redundancy role: slave
Redundancy state: realtime
```

The following example displays the redundancy state of the candidate supervisor module.

```
FS> enable
FS# show redundancy states
```

```
Redundancy role: candidate
Redundancy state: none
```

Field	Description
role	The role of the supervisor module.
state	The state of the supervisor module.
Auto-sync time-period	Displayed on the active supervisor module. The configuration file synchronizes the time interval automatically. "disabled" indicates no automatic synchronization.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

13. PoE Management Commands

13.1 Poe Alloc-power

Use this command to set the allocation power for the port. Use the no or default form of this command to restore the default allocation power.

poe alloc-power int

no poe alloc-power

default poe alloc-power

Parameter Description

Parameter	Description
int	The maximum power, in the range from 0 to 30W.

Defaults

The default is 0.

Command Mode

Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the allocation power for port GigabitEthernet 0/1 to 20W.

```
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# poe alloc-power 20
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

13.2 Poe Enable

Use this command to set the allocation power for the port. Use the no or default form of this command to restore the default allocation power.

poe alloc-power int

no poe alloc-power

default poe alloc-power

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default,

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example disables the PoE function on port GigabitEthernet 0/1,

```
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# no poe enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.3 Poe Legacy

Use this command to enable non-standard PD compatibility. Use the no or default form of this command to restore the default setting.

poe legacy

no poe legacy

default poe legacy

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default,

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example disables the PoE function on port GigabitEthernet 0/1,

```
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# no poe enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.4 Poe Max-power

Use this command to enable non-standard PD compatibility. Use the no or default form of this command to restore the default setting.

poe max-power int

no poe max-power

default poe max-power

Parameter Description

Parameter	Description
int	The maximum power, in the range from 0 to 30W. Note that this parameter is in the range from 0 to 15.4W on the system supporting 802.3af only. HPoE port ID is in the range from 0 to 90.

Defaults

The maximum power is not set by default.

Command Mode

Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the maximum power for port GigabitEthernet 0/1 to 20W.

```
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# poe max-power 20
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

13.5 Poe Mode

Use this command to set the PoE management mode. Use the no or default form of this command to restore the default setting.

poe mode { auto | energy-saving | static }

no poe mode

default poe mode

Parameter Description

Parameter	Description
auto	Sets the power management mode to auto mode, the default mode.
energy-saving	Sets the power management mode to energy-saving mode, the optional mode,
static	Sets the power management mode to static mode,

Defaults The default mode is auto.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example sets the PoE management mode to energy-saving mode.

```
FS# configure
FS(config)# poe mode auto
FS(config)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.6 Poe Notification-control Enable

Use this command to enable Trap notification in PoE MIB(RFC3621). Use the no or default form of this command to restore the default setting.

poe notification-control enable

no poe notification-control enable

default poe notification-control enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example enables Trap notification in PoE MIB(RFC3621).

```
FS(config)# poe notification-control enable
FS(config)# end
FS#write
```

Related

Command	Description

Commands

N/A	N/A

Platform Description N/A

13.7 Poe Pd-description

Use this command to set the PD descriptor for the port. Use the no or default form of this command to restore the default setting.

poe pd-description pd-name

no poe pd-description

default poe pd-description

Parameter Description

Parameter	Description
pd-name	N/APD descriptor name, a string no more than 32 characters.

Defaults N/A

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example sets the PD descriptor for port GigabitEthernet 0/1.

```
FS# configure
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# poe pd-description ap220
FS(config-if-GigabitEthernet 0/1)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.8 Poe Power-off time-range Name

Use this command to set the PD descriptor for the port. Use the no or default form of this command to restore the default setting.

poe power-off time-range name

no poe power-off time-range

default poe power-off time-range

Parameter Description

Parameter	Description
name	Time-range name.

Defaults N/A

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example sets the port GigabitEthernet 0/1 to be disabled from 8:30 to 17:30 on workday.

```
FS# configure
FS(config)# time-range poe-time
FS(config-time-range)# periodic weekdays 8:30 to 17:30
FS(config-time-range)# exit
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# poe power-off time-range poe-time
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.9 Poe Priority

Use this command to set the PoE priority for the port. Use the no or default form of this command to restore the default setting.

poe priority { low | high | critical }

no poe priority

default poe priority

Parameter Description

Parameter	Description
{ low | high | critical }	Priority level.

Defaults The default is low.

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples

The following example sets the PoE priority for port GigabitEthernet 0/1 to critical.

```
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# poe priority critical
FS(config-if-GigabitEthernet 0/1)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

13.10 Poe Reserve-power

Use this command to set the reserve power for the system in energy-saving mode. Use the no or default form of this command to restore the default setting,

poe reserve-power int

no poe reserve-power

default poe reserve-power

Parameter Description

Parameter	Description
int	Reserve power percentage, in the range from 0 to 50.

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the reserve power for the system to 10%.

```
FS(config)# poe reserve-power 10
FS(config)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

13.11 Poe Uninterruptible-power

Use this command to configure uninterruptible warm start, Use the no or default form of this command to restore the default setting.

poe uninterruptible-power
no poe uninterruptible-power
default no poe uninterruptible-power

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide This function takes effect when the device is started after the configuration is saved.

Configuration Examples The following example enables uninterruptible PoE for warm start and saves configuration.

```
FS(config)# poe uninterruptible-power
FS(config)# end
FS#write
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.12 Poe Warning-power

Use this command to set the power alarm threshold for the system. Use the no or default form of this command to restore the default setting,
poe warning-power int
no poe warning-power
default poe warning-power

Parameter Description

Parameter	Description
int	Power alarm threshold (percentage), in the range from 0 to 99.

Defaults The default is 99.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples

The following example sets the power alarm threshold for the system to 80%.

```
FS(config)# poe waring-power 80
FS(config)# end
FS#write
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

13.13 Show Poe Warning-power

Use this command to display PoE configuration and status of the specified port.

show poe interface interface-name

Parameter Description

Parameter	Description
interface-name	Interface name

Defaults

N/A

Command Mode

Privileged EXEC mode.

Usage Guide

N/A

Configuration Examples

The following example displays the PoE configuration and status in interface GigabitEthernet 0/1.

```
FS#show poe interface GigabitEthernet 0/1
Interface      : Gi0/1
Power enabled     : enable
Power status       : on
Max power : N/A
Allocate power     : N/A
Current power      : 14.8 W
Average power     : 14.8 W
Peak power: 14.8 W
Voltage       : 53.5 V
Current       : 278 mA
PD class      : 4
Trouble cause       : None
Priority       : critical
Legacy       : off
```

```
Power-off time-range          : N/A
Power management     : auto
4pair status : normal
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

13.14 Show Poe Interfaces

Use this command to display PoE status or configuration of all ports.

show poe interfaces status

show poe interfaces configuration

Parameter Description

Parameter	Description
status	Displays PoE status of all ports.
configuration	Displays PoE configuration of all ports.

Defaults

N/A

Command Mode

Privileged EXEC mode.

Usage Guide

This command is used to display PoE status or configuration of all ports.

Configuration Examples

The following example displays PoE status of all ports.

```
FS#show poe interfaces status
Interface Power    Power Curr Avg    Peak Curr    Trouble PD Port
                Control    Status    Power Power Power Current    Cause          Class        Voltage
-----------------------------------------------------------------------------------------------------------
Gi0/1          enable      on          14.8W 14.8W 14.8W 278mA        0          4           53.5V
Gi0/2          enable      on           28.4W 28.4W 28.4W 531mA       0          4           53.5V
Gi0/3          enable      on           14.9W 14.9W 14.9W 279mA       0          4           53.5V
Gi0/4          enable      off          0.0W 0.0W 0.0W 0mA          6       N/A       0.0V
Gi0/5          enable      on           14.8W 14.8W 14.8W 278mA        0          4           53.5V
Gi0/6          enable      on           15.0W 15.0W 15.0W 281mA        0          4           53.5V
Gi0/7          enable      on           6.1W 6.1W 6.1W 115mA           0          4           53.5V
Gi0/8          enable      on           14.8W 14.8W 14.8W 277mA        0          4           53.5V
Gi0/9          enable      on           14.7W 14.7W 14.7W 276mA        0          4           53.5V
Gi0/10         enable      on           14.8W 14.8W 14.8W 278mA        0          4           53.5V
Gi0/11         enable      on           14.7W 14.7W 14.7W 275mA        0          4           53.5V
```

```
Gi0/12      enable    off       0.0W 0.0W 0.0W 0mA        6       N/A     0.0V
Gi0/13      enable    on        14.8W 14.8W 14.8W 278mA     0        4          53.5V
Gi0/14      enable    on        0.3W 0.3W 0.3W 7mA        0        4       53.5V
Gi0/15      enable    off       0.0W 0.0W 0.0W 0mA            6       N/A     0.0V
Gi0/16      enable    off       0.0W 0.0W 0.0W 0mA        6        N/A     0.0V
Gi0/17      enable    off       0.0W 0.0W 0.0W 0mA        6        N/A     0.0V
Gi0/18      enable    off       0.0W 0.0W 0.0W 0mA            6      N/A       0.0V
Gi0/19      enable    off       0.0W 0.0W 0.0W 0mA         6      N/A       0.0V
Gi0/20      enable    off       0.0W 0.0W 0.0W 0mA         6      N/A       0.0V
Gi0/21      enable    off       0.0W 0.0W 0.0W 0mA         6      N/A       0.0V
Gi0/22      enable    off       0.0W 0.0W 0.0W 0mA            6       N/A       0.0V
Gi0/23     enable    off       0.0W 0.0W 0.0W 0mA            6       N/A       0.0V
Gi0/24 0.0V   enable    off       0.0W 0.0W0.0W 0mA         6      N/A       0.0V
```

The following example displays PoE configuration of all ports.

```
FS#show poe interfaces configuration
Interface          Power    Power      Max   Alloc Port     Port Power-off
                   Control Status Power Power Priority Legacy Time-range

Gi0/1          enable     on     N/A   N/A     critical     off      N/A
Gi0/2          enable     on     N/A   N/A     critical     off      N/A
Gi0/3          enable     on     N/A   N/A     critical     off      N/A
Gi0/4          enable     off    N/A   N/A     critical     off     N/A
Gi0/5          enable    on     N/A   N/A     critical    off      N/A
Gi0/6          enable     on     N/A   N/A     high         off      N/A
Gi0/7         enable      on     N/A   N/A     high         off      N/A
Gi0/8          enable     on     N/A   N/A     high         off      N/A
Gi0/9          enable     on     N/A   N/A     high         off      N/A
Gi0/10         enable     on     N/A   N/A     high         off      N/A
Gi0/11         enable    on     N/A   N/A     high         off      N/A
Gi0/12         enable     off    N/A   N/A     high         off      N/A
Gi0/13         enable     on     N/A   N/A     low          off      N/A
Gi0/14         enable    on     N/A   N/A     low          off      N/A
Gi0/15         enable    off    N/A   N/A     low          off      N/A
Gi0/16         enable     off    N/A   N/A     low          off      N/A
Gi0/17         enable     off    N/A   N/A     low          off      N/A
Gi0/18         enable     off    N/A   N/A     low          off      N/A
Gi0/19         enable    off    N/A   N/A     low          off      N/A
Gi0/20         enable     off    N/A   N/A     low          off      N/A
Gi0/21         enable     off    N/A   N/A     low          off      N/A
Gi0/22         enable     off    N/A   N/A     low          off      N/A
Gi0/23         enable    off    N/A   N/A     low          off      N/A
Gi0/24         enable     off    N/A   N/A     low          off      N/A
```

Related

Command	Description

Commands

N/A	N/A

Platform Description N/A

13.15 Show Poe Powersupply

Use this command to display the PoE power supply status.

show poe powersupply

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays the PoE power supply status.

```
FS#show poe powersupply
Device member:      : 1
Power management  :  auto
PSE total power:  1000w
PSE total power consumption: 300w
PSE total remain power:  700w
PSE peak power: 0w
PSE average power:  0w
PSE total powered port  :  0
PSE disconnect mode    :  dc
PSE reserve power  :  0%
PSE available reserve power    :  0W
PSE warning power:    90%
PSE class lldp:    disable
PSE uninterruptible-power:    disable
```

Related Commands

Command	Description
N/A	N/A

Platform N/A

Description

14. Package Management Commands

14.1 Clear Storage

Use this command to remove an installation package on the local device.

clearstorage[*url*]

Parameter Description

Parameter	Description
url	A local *url* directory or full path name indicates where the installation package is stored

Command Mode

Privileged EXEC mode

Default Level

2

Usage Guide

This command is used to remove an installation package or all packages in a directory and all installation packages on the local device.

Configuration Examples

```
FS#clear storage
Remove the whole storage directory?[y/n]y
FS#clear storage usb0
Remove the file or directory usb0 from the storage?[y/n]y
FS#
```

Verification

Check specified *url*

Platforms

N/A

14.2 Show Component

Use this command to display all components already installed on current device and their information.

show component [*component _name*]

Parameter Description

Parameter	Description
component_name	Name of the components When this parameter value is N/A, the command is used to display all components already installed on the device and basic information of these components. When this parameter value is not N/A, the command is used to display detailed information of the corresponding component, check whether the component is intact, and check whether this component works properly.

Command Mode

Privileged EXEC mode

Default Level

2

Usage Guide

This command includes one with *component_name* and one without *component_name*. During upgrade, it requires users to understand all components installed on current device and their version information before components deletion. This needs to use the **show component** command without *component_name*. The **show component** command with *component_name* is used to obtain details of the corresponding component. The detailed information enables users to easily realize components' operation and damage. It is significant to insure their troubleshooting, security and reliability.

Some components in use will change their defaults files. Though this is more possibly normal than malicious, the **show component** command is used only to judge whether component files change in use. It is unable to distinguish natural damage from malicious one. It depends on users to make a further judgment.

Configuration Examples

The following example displays all components already installed on the box device and their information.

```
FS# show component
Package     :sysmonit
        Version:1.0.1.23cd34aa          Build time: Wed Dec    7 00:58:56 2013
        Size:12877  Install time :Wed  Mar 5 14:23:12 2012
        Description: this is a system monit package
        Required packages: None
-----------------------------------------------------------------
```

```
Package:bridge
        Version:2.0.1.37cd5cda          Build time: Wed Dec    7 00:54:56 2013
        Size:23245  Install time :Wed  Mar 5 14:30:12 2012
        Description: this is a bridge package
        Required packages: None
-------------------------------------------------------------------
```

This command is used to obtain all components already installed on the device and theirbasic information. The information offers a basis for users to decide whether to upgrade or delete components.

Field	Description
Package	Name of the component
Version	Version number of the component
Build time	Compilation time of the component on the server
Size	Content size of the component
Install time	Installation time of the component
Description	Simple functional description of the component
Required packages	Name of required packages

The following example displays the information of all feature components already installed on the chassis device.

```
FS#show component slot 8
FS#*
[Slot 8]:
Package : utils-system
        Version: 1.0.0.433ef8d                Build time: Sun May 19 19:22:54 2013
        Size: 823936      Install time: Sun May 19 19:27:04 2013
        Description: utils system compile
        Required packages: None
-----------------------------------
Package : tcl-expect
        Version: 1.0.0.433ef8d                Build time: Sun May 19 19:19:18 2013
        Size: 3474153                  Install time: Sun May 19 19:27:04 2013
        Description: tcl & expect packages
        Required packages: None
-----------------------------------
```

The following example displays the information of specified components already installed on the box device.

```
FS# show componentbridge
package:bridge
```

```
    Version: 2.3.1.1252ea          Build time: Wed Dec    7 00:54:56 2013
    Size:26945  Install time : Wed Mar 19:23:15 2012
    Description:this is a bridge package
    Required packages: None
    Package files:
        /lib64
        /lib64/libbridge.so
        /sbin
    /sbin/bridge

  Package file validate: [OK]
  Required relationship verify: [OK]
```

The other information except the basic information of components is listed as follows.

Field	Description
Package file validate	Checks whether the component filesare intact. "OK" is displayed when all component files work properly; "ERR" is displayed together with their names when some component files are lost or revised.
Required package	Lists all required packages of the component. "OK" is labeled if required components are already installed; "ERR" is labeled if not together with detailed description about their names and versions.
Package files	Lists all files contained in the package.

Prompt Messages

The execution is successful with all components information displayed.

```
Package     :sysmonit
    Version:1.0.1.23cd34aa          Build time: Wed Dec    7 00:58:56 2013
    Size:12877  Install time :Wed  Mar 5 14:23:12 2012
    Description: this is a system monit package
    Required packages: None
-----------------------------------------------------------------
Package:bridge
    Version:2.0.1.37cd5cda          Build time: Wed Dec    7 00:54:56 2013
    Size:23245  Install time :Wed  Mar 5 14:30:12 2012
    Description: this is a bridge package
    Required packages: None
-----------------------------------------------------------------
```

14.3 Show Upgrade Auto-sync

Use this command to display related auto-sync configuration on the device.

show upgrade auto-sync

Parameter Description

Parameter	Description
N/A	N/A

Command Mode Privileged EXEC mode

Default Level 2

Usage Guide This command is used to display the auto-sync upgrade configuration in the system including the policy, range and upgrade package's path.

Prompt Messages The auto-sync information of the system is displayed after running.

14.4 Show Upgrade File

Use this command to display the information of the installation package files in the device file system.

show upgrade file *url*

Parameter Description

Parameter	Description
url	The local *url* path indicates where an installation package file is stored.

Command Mode Privileged EXEC mode

Default Level 2

Usage Guide

This command is used to preview main messages of an installation package after it is downloaded into local file system.

Configuration Examples

This command is used to obtain the information in the package.

Field	Description
Name	Name of the package
Version	Version of the package
Package type	Type of the package
Support target	Supported product description
Size	Content size of the package
Build time	Compilation time of the package
Install date	Installation time of the package
Description	Description of the package
Package files	All contents in the package

Prompt Messages

14.5 Show Upgrade History

Use this command to display the upgrade history.

show upgrade history

Parameter Description

Parameter	Description
N/A	N/A

Command Mode

Privileged EXEC mode

Default Level 2

Configuration Examples N/A

Prompt Messages N/A

Platforms N/A

14.6 Upgrade

Use this command to install and upgrade an installation package in the local file system.

Upgrade *url*[**force**]

Parameter Description

Parameter	Description
url	The local path indicates where an installation package is stored. This command is used to upgrade an installation package on the device.
force	Mandatory upgrade

Command Mode Privileged EXEC mode

Default Level 2

Usage Guide This command is applicable to installation packages of all subsystem components, chassis devices, and feature components. Before its use, run the **copy** command to copy feature packages into the file system in the device.

When there is no specified range of parameters, the command is used to upgrade the matched system components according to the auto-sync configuration.

Configuration N/A

Examples

Verification

Run the **show version detail** command to check whether the upgrade of a subsystem component is successful.

Run the **show component** command to check whether the upgrade of a feature component is successful.

upgrading a feature component

Prompt Messages

The prompt message of successful running is displayed.

```
Upgrade info [OK]
```

The installation package is invalid or damaged and needs to be regained for upgrade command.

```
Invalid package file
```

The installation package is not available on the device and needs to be regained for upgrade command.

```
Device don't support
```

There is no need to upgrade the device.

```
The version in device is newer or the same
```

When there is insufficient space for upgrade, check USB flash disk attached on the device.

```
No enough space for decompress
```

Contact the service center to solve the system problem.

```
No enough space,rootfs been destroyed. Please upgrade in uboot
```

14.7 Upgrade Auto-sync Package

Use this command to configure the path for the auto-sync upgrade.

upgrade auto-sync package *url*

Parameter Description

Parameter	Description
url	The path of installation package.

Defaults

The default is the last upgrade path.

Command Mode Privileged EXEC mode

Default Level 2

Usage Guide It is recommended to use default settings.

Configuration Examples N/A

Verification Run the **show upgrade auto-sync** command to display current auto-sync policy.

If *url* provides normal path, run the **stat** command to check whether it can be accessed.

Prompt Messages N/A

14.8 Upgrade Auto-sync Policy

Use this command to set an auto-sync policy for the system.

upgrade auto-sync policy [**none** | **compatible** | **coordinate**]

Parameter Description

Parameter	Description
none	No auto-sync upgrade
compatible	Performs auto-synchronization based on the sequential order of versions.
coordinate	Synchronizes with the version based on the system upgrade patch stored on the supervisor module.

Defaults **coordinate**

Command Mode Privileged EXEC mode

Default Level 2

Usage Guide Check whether the upgrade package is ready before using the command.

Configuration Examples The following example sets the auto-sync policy of the device based on the version of supervisor modules.

```
FS# upgrade auto-sync policy coordinate
```

Verification Display the current policy for auto-sync upgrade by running the **show upgrade auto-sync** command.

Prompt Messages The prompt message of successful running is displayed.

```
Upgrade auto-sync policy is set as coordinate.
```

14.9 Upgrade Auto-sync Range

Use this command to set the range of auto-sync upgrade.

upgrade auto-sync range [**chassis** | **vsu**]

Parameter Description

Parameter	Description
chassis	Auto-sync version upgrade in the range of chassis
vsu	Auto-sync version upgrade in the range of the stacking system.

Defaults **vsu**

Command Mode Privileged EXEC mode

Default Level 2

Usage Guide It is recommended to set the parameter to stacking to ensure system version consistency to the most extent.

Configuration Examples The following example installs the auto-sync upgrade in the stacking system.

```
FS# upgrade auto-sync range vsu
```

Verification Run the **show upgrade auto-sync** command to display the range of current auto-sync upgrade.

Prompt Messages The prompt message of successful running is displayed.

```
Upgrade auto-sync range is set as stacking Device.
```

14.10 Upgrade Download Tftp

Use this command to download, install and upgrade installation packages from the tftp server.

upgrade download tftp:/*path* [**force**]

upgrade download oob_tftp:/*path* [**force**]

Parameter Description

Parameter	Description
path	The path of installation packages on the tftp server This command is downloaded and upgraded automatically from the server.
force	Enforces upgrade.

Command Mode Privileged EXEC mode

Default Level 2

Usage Guide This command is applicable to installation packages of all subsystem components, chassis devices, and feature components. This command is used to perform automatic installation, copy and upgrade of files.

Configuration -

Examples

Verification

Run the **show version detail** command to check whether the upgrade of a subsystem component is successful.

Run the **show component** command to check whether the upgrade of a feature component is successful.

Prompt Messages

The prompt message of successful running is displayed.

```
Upgrade info [OK];
```

The installation package is invalid or damaged and needs to be regained for upgrade command.

```
Invalid package file
```

The installation package is not available on the device and needs to be regained for upgrade command.

```
Device don't support
```

There is no need to upgrade the device.

```
The version in device is newer or the same
```

When there is insufficient space for upgrade, check USB flash disk attached on the device.

```
No enough space for decompress
```

Contact the service center to solve the system problem.

```
No enough space,rootfs been destroyed. Please upgrade in uboot
```

14.11 Upgrade Download Ftp

Use this command to download, install and upgrade installation packages from the ftp server.

upgrade download ftp:/*path* [**force**]

upgrade download oob_ftp:/*path* [**force**]

Parameter Description

Parameter	Description
path	The path of installation packages on the ftp server This command is downloaded and upgraded automatically from the server.
force	Enforces upgrade.

Command Mode

Privileged EXEC mode

Default Level

2

Usage Guide

This command is applicable to installation packages of all subsystem components, chassis devices, and feature components. This command is used to perform automatic installation, copy and upgrade of files.

Configuration Examples

-

Verification

Run the **show version detail** command to check whether the upgrade of a subsystem component is successful.

Run the **show component** command to check whether the upgrade of a feature component is successful.

Prompt Messages

The prompt message of successful running is displayed.

```
Upgrade info [OK];
```

The installation package is invalid or damaged and needs to be regained for upgrade command.

```
Invalid package file
```

The installation package is not available on the device and needs to be regained for upgrade command.

```
Device don't support
```

There is no need to upgrade the device.

```
The version in device is newer or the same
```

When there is insufficient space for upgrade, check USB flash disk attached on the device.

```
No enough space for decompress
```

Contact the service center to solve the system problem.

```
No enough space,rootfs been destroyed. Please upgrade in uboot
```

Chapter 2 Ethernet Configuration Commands

1. Interface Commands
2. MAC Address Commands
3. Aggregate Port Commands
4. VLAN Commands
5. Super VLAN
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1. Interface Commands

1.1 Bandwidth

Use this command to set the bandwidth on the interface. Use the **no** form of this command to restore the default setting.

bandwidth *kilobits*

no bandwidth

Parameter Description

Parameter	Description
kilobits	Bandwidth per second, in the unit of Kbps.

Defaults

If this command is not configured on the interface, use the show interface command to display the default setting in privileged EXEC mode.

Command Mode

Interface configuration mode

Usage Guide

This command does not affect the actual bandwidth on the interface. Instead, it is used to display the system the bandwidth specification. By default, the bandwidth is determined by the actual link rate on the interface. It can be set by the user as well.

Configuration Examples

The following example sets the bandwidth on the interface to 64 Kbps.

```
FS(config)#interface gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# bandwidth 64
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.2 Carrier-delay

Use this command to set the carrier delay on the interface. Use the no form of this command to restore the default value.

carrier-delay { [*milliseconds*] *num* | **up** [*milliseconds*] *num* **down** [*milliseconds*] *num*}

no carrier-delay

Parameter Description

Parameter	Description
num	(Optional) in the range from 0 to 60 in the unit of seconds.
milliseconds	(Optional) in the range from 0 to 60000 in the unit of milliseconds.
up	(Optional) Configures the delay after which DCD changes from Down to Up in

	status.
down	(Optional) Configures the delay after which DCD changes from Up to Down in status.

Defaults The default is 2 seconds.

Command Mode Interface configuration mode

Usage Guide This parameter refers to the delay after which the carrier detection signal DCD of the interface link changes from the Down status to the Up status or vice versa. If the DCD changes within the delay, the system will ignore such changes without disconnecting the upper data link layer for renegotiation.
If the DCD carrier is disconnected for a long time, the parameter should be set longer to accelerate route aggregation so that the routing table can be converged more quickly. On the contrary, if the DCD carrier interruption period is shorter than the time used for route aggregation, you should set the parameter to a higher value to avoid unnecessary route vibration.

Configuration Examples The following example sets the carrier delay of serial interface to 5 seconds.

```
FS(config)# interface gigabitethernet 1/1
FS(config)# carrier-delay 5
```

The following example sets the carrier delay of serial interface to 100 milliseconds.

```
FS(config)# interface GigabitEthernet 1/1
FS(config-if-GigabitEthernet 1/1)#carrier-delay milliseconds 100
```

The following example sets the DCD delay from Down to Up in status to 100 milliseconds and from Up to Down to 200 milliseconds.

```
FS(config)# interface GigabitEthernet 1/1
FS(config-if-GigabitEthernet 1/1)# carrier-delay up milliseconds 100 down milliseconds 200
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.3 Clear Counters

Use this command to clear the counters on the specified interface.

clear counters [*interface-type interface-number*]

Parameter Description

Parameter	Description
interface-type interface-number	Interface type and interface ID

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide In the privileged EXEC mode, use the **show interfaces** command to display the counters or the **clear counters** command to clear the counters. If the interface is not specified, the counters on all interfaces will be cleared.

Configuration Examples The following example clears the counters on interface gigabitethernet 1/1.

```
FS# clear counters gigabitethernet 1/1
```

Related Commands

Command	Description
show interfaces	Displays the interface information.

Platform Description N/A

1.4 Clear Interface

Use this command to reset the interface.

clear interface *interface-type interface-number*

Parameter Description

Parameter	Description
interface-type interface-number	Interface type and interface ID

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide This command is only used on the switch port, member port of the L2 Aggregate port, routing port, and member port of the L3 aggregate port. This command is equal to the **shutdown** and **no shutdown** commands.

Configuration Examples The following example resets the interface gigabitethernet 1/1.

```
FS# clear interface gigabitethernet 1/1
```

Related Commands

Command	Description
shutdown	Disables the interface.

Platform Description N/A

1.5 Description

Use this command to configure the alias of interface. Use the **no** form of this command to restore the default

setting.

description *string*

no description

Parameter Description

Parameter	Description
string	Interface alias

Defaults No alias is configured by default.

Command Mode Interface configuration mode.

Usage Guide Use **show interfaces** to display the interface information, including the alias.

Configuration Examples The following example configures the alias of interface.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if)# description GBIC-1
```

Related Commands

Command	Description
show interfaces	Displays the interface information.

Platform Description N/A

1.6 Duplex

Use this command to specify the duplex mode for the interface. Use the **no** form of this command to restore the default setting.

duplex { **auto** | **full** | **half** }

no duplex

Parameter Description

Parameter	Description
auto	Self-adaptive full duplex and half duplex
full	Full duplex
half	Half duplex

Defaults The default is **auto**,

Command Mode Interface configuration mode.

Usage Guide The duplex mode is associated with the interface type. Use **show interfaces** to display the duplex mode of the

interface

Configuration Examples

The following example specifies the duplex mode for the interface.

```
FS(config-if)# duplex full
```

Related Commands

Command	Description
show interfaces	Displays the interface information.

Platform Description

N/A

1.7 Eee Enable

Use this command to enable Energy Efficient Ethernet (EEE) on the interface.

eee enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

Use this command to achieve EEE on the interface in Low Power Idle(LPI) mode,

Configuration Examples

The following example enables EEE on GigabitEthernet 0/1.

```
FS(config)#interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# eee enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.8 Errdisable Recovery

Use this command to recover the interface in violation.

errdisable recovery [**interval** *time*]

Parameter Description

Parameter	Description

time	Time for the command to take effect. The range is from 30 to 86,400 seconds.

Defaults N/A

Command Mode Interface configuration mode.

Usage Guide Use the command to recover the port that triggers violation after being configured with the **violation shutdown** command.

Configuration Examples The following example recovers the violation interface gigabitethernet 1/1.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if)# errdisable recovery
```

Related Commands

Command	Description
switchport port-security violation shutdown	Configures the port security violation to shutdown.

Platform Description N/A.

1.9 Flowcontrol

Use this command to enable or disable the flow control. Use the **no** form of this command to restore the default setting.

flowcontrol { **auto** | **off** | **on**}

no flowcontrol

Parameter Description

Parameter	Description
auto	Self-negotiates the flow control.
off	Disables the flow control.
on	Enables the flow control.

Defaults This function is disabled by default.

Command Mode Interface configuration mode.

Usage Guide Use the **show interfaces** command to display the flow control configuration.

Configuration Examples The following example enables flow control on fastEthernet port 1/1.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if)# flowcontrol on
```

Related

Command	Description

Commands

show interfaces	Displays the interface information.

Platform Description N/A

1.10 Interface

Use this command to enter the interface configuration mode.

interface *interface-type interface-number*

Parameter Description

Parameter	Description
interface-type	The interface type.
interface-number	The interface ID.

Defaults N/A

Command Mode Interface configuration mode

Usage Guide This command is used to enter interface configuration mode. The user can modify the interface configuration next,

Configuration Examples The following example enters configuration mode on Aggregateport 1.

```
FS(config)# interface Aggregateport 1
FS(config-if-Aggregateport 1)#
```

The following example enters configuration mode on GigabitEthernet 1/2.

```
FS(config)# interface GigabitEthernet 1/2
FS(config-if-GigabitEthernet 1/2)#
```

The following example configuration mode on VLAN 1.

```
FS(config)# interface vlan 1
FS(config-if-VLAN 1)#
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.11 Interface Range

Use this command to enter interface configuration mode on multiple interfaces.

interface range { *port-range* | **macro** *macro_name* }

Use this command to define the macro name of the **interface range** command.

define interface-range *macro_name*

Parameter Description

Parameter	Description
port-range	The interface type and ID range, entered in the form of *interface-type slot-number/interface-number*. The interface can be either an Ethernet physical interface or a loopback interface.
macro *macro_name*	The macro name which represents the interface range.

Defaults The **interface range** command is disabled by default.

Command Mode Global configuration mode

Usage Guide Use the define interface-range command to define a range of interfaces as the macro name and then use the **interface** range macro macro_name command to enter interface configuration mode on multiple interfaces.

Configuration Examples The following example enters interface configuration mode on multiple interfaces by setting the interface range.

```
FS(config)# interface range gigabitEthernet 0/0, 0/2
FS(config-if-range)# bandwidth 100
```

The following example enters interface configuration mode on multiple interfaces by defining the macro name.

```
FS(config)# define interface-range route1 gigabitEthernet 0/0-2
FS(config)# interface range macro route1
FS(config-if-range)# bandwidth 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.12 Line-detect

Use this command to detect the cable connection status.

line-detect

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Interface configuration mode.

Usage Guide This command is used to detect the line status and locate the problem in case of a line failure, for example, the

line is torn down.

Configuration Examples

The following example detects the cable connection status on gigabitEthernet 0/1.

```
FS(config)#interface gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)#line-detect

Interface : GigabitEthernet 0/1
start cable-diagnoses,please wait...
cable-daignoses end!this is result:
4 pairs
pair state          length(meters)
---- ---------- --------------
A      Ok                1
pair state          length(meters)
---- ---------- --------------
B      Ok                2
pair state          length(meters)
---- ---------- --------------
C      Short           1
pair state          length(meters)
---- ---------- --------------
D      Short           1
```

Field	Description
pairs	Number of line pairs included. For example, the twisted pair includes four pairs of lines.
state	Status of the current line pair: OK, Short or Open. In general, the 100M twisted pairs A and B are OK, C and D are Short. The 1000M twisted pairs A, B, C and D are all OK.
length	Length of the line in meter. Only the length of the line pair whose status is OK takes effect. Since the length is calculated based on the transmission time of signal, there may have a certain difference. The length of the line pair whose status is Short or Open is the length from the port to the faulty point.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.13 Load-interval

Use this command to set the interval for calculating load on the interface. Use the **no** form of this command to restore the default setting.

load-interval *seconds*

no load-interval

Parameter Description

Parameter	Description
seconds	In the range from 5 to 600 in the unit of seconds.

Defaults

The default is 10.

Command Mode

Interface configuration mode

Usage Guide

This command is used to set the interval for calculating load on the interface. In general, the numbers of incoming and outgoing packets and bytes are calculated every 10 seconds. For example, if the parameter is set to 180 seconds, the following outcome is displayed when the **show interface gigabitEthernet 0/1** command is run.

```
3 minutes input rate 15 bits/sec, 0 packets/sec
3 minutes output rate 14 bits/sec, 0 packets/sec
```

Configuration Examples

The following example sets the interval for calculating load on interface GigabitEthernet 0/1 to 180 seconds.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# load-interval 180
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.14 Logging

Use this command to print information on the interface.

logging [**link-updown** | **error-frame** | **link-dither**]

Parameter Description

Parameter	Description
link-updown	Prints the status change information.
error-frame	Prints the error frame information.
link-dither	Prints the oscillation information.

Defaults

This function is enabled by default.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example prints information on the interface..

```
FS(config)# logging link-updown
FS(config)# logging error-frame
FS(config)# logging link-dither
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.15 Medium-type

Use this command to specify the medium type for an interface. Use the **no** form of this command to restore the default setting.

medium-type { **auto-select** [**prefer** [**fiber | copper**]] **| fiber** | **copper** }

no medium-type

Parameter Description

Parameter	Description
fiber	Optical interface.
prefer [**fiber** | **copper**]	The preferred medium type for the interface is selected.
auto-select	Auto-selects the medium type for the interface.
copper	Copper interface.

Defaults The default is **copper**.

Command Mode Interface configuration (physical interface)

Usage Guide If a port can be selected as an optical port or electrical port, you can only select one of them. Once the media type is selected, the attributes of the port, for example, status, duplex, flow control, and rate, all mean those of the currently selected media type. After the port type is changed, the attributes of the new port type take the default values, which can be modified as needed.

Configuration Examples The following example specifies the medium type for interface gigabitethernet 1/1.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if)# medium-type copeer
```

Related Commands

Command	Description
show interfaces	Displays the interface information.

Platform Description

1.16 Mtu

Use this command to set the MTU supported on the interface.

mtu *num*

Parameter Description

Parameter	Description
num	64 to 9216 (or 65536, which varies by products)

Defaults The default is 1500.

Command Mode Interface configuration mode.

Usage Guide This command is used to set the maximum transmission unit (MTU) supported on the interface.

Configuration Examples The following example sets the MTU supported on interface gigabitethernet 1/1 to 9000.

```
FS(config)# interface GigabitEthernet 1/1
FS(config-if-GigabitEthernet)# mtu 9000
```

Related Commands

Command	Description
show interfaces	Displays the interface information.

Platform Description N/A

1.17 Negotiation Mode

Use this command to enable or disable auto-negotiation mode. Use the **no** form of this command to restore the default setting.

negotiation mode { **on** | **off** }

no negotiation mode

Parameter Description

Parameter	Description

on	Enables auto-negotiation.
off	Disables auto-negotiation.

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide In general, the auto-negotiation status is determined by interface speed, duplex, flow control and auto-negotiation factor mode.

Configuration Examples The following example enables auto-negotiation mode on interface GigabitEthernet 1/1.

```
FS(config)# interface GigabitEthernet 1/1
FS(config-if-GigabitEthernet 1/1)# negotiation mode on
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.18 Physical-port Dither Protect

Use this command to enable oscillation protection on the port.

physical-port dither protect

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Global configuration mode

Usage Guide After you configure the **physical-port dither protect** command, the port will be shut down when the oscillation occurs for certain times.

If oscillation occurs on the port for 6 times within 2 seconds, a syslog will be printed. If syslog is printed for 10 consecutive times, the port will be shut down, If oscillation occurs on the port for over 10 times within 10 seconds, a syslog will be printed but the port will not be shut down.

Configuration Examples The following example enables oscillation protection on the port.

```
FS(config)# physical-port dither protect
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.19 Protected-ports Route-deny

Use this command to configure L3 routing between the protected ports.

protected-ports route-deny

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default..

Command Mode Global configuration mode.

Usage Guide The ports that are set as the protected ports can route on L3. Use this command to deny the L3 communication between protected ports. Use the **show running-config** command to display configuration.

Configuration Examples The following example configures L3 routing between the protected ports.

```
FS(config)# protected-ports route-deny
```

Related Commands

Command	Description
show running-config	Displays the protected ports route-deny configuration.

Platform Description N/A

1.20 Show Eee Interfaces Status

Use this command to display interface EEE status.

show eee interfaces { *interface-type interface-number* | *status* }

Parameter Description

Parameter	Description
interface-type interface-number	Interface type and ID.
status	All interface EEE status.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples

The following example displays EEE status of interface GigabitEthernet 0/1.

```
FS#show eee interface gigabitEthernet 0/1
Interface                    : Gi0/1
EEE Support                  : Yes
Admin Status                 : Enable
Oper Status                  : Disable
Remote Status                : Disable
Trouble Cause                : Remote Disable
```

Field	Description
EEE Support	Whether EEE is supported
Admin Status	Configuration status
Oper Status	Operation status
Trouble Cause	Trouble cause

The following example displays EEE status of all interfaces.

```
FS#show eee interface status
Interface EEE      Admin      Oper       Remote     Trouble
          Support Status     Status     Status     Cause
--------- ------- -------- -------- -------- --------------------
Gi0/1     Yes     Enable     Disable    Disable    Remote Disable
Gi0/2     Yes     Enable     Disable    Unknown    None
Gi0/3     Yes     Enable     Enable     Enable     None
Gi0/4     Yes     Enable     Enable     Enable     None
Gi0/5     Yes     Enable     Enable     Enable     None
Gi0/6     Yes     Enable     Enable     Enable     None
Gi0/7     Yes     Enable     Enable     Enable     None
Gi0/8     Yes     Enable     Enable     Enable     None
Gi0/9     Yes     Enable     Enable     Enable     None
Gi0/10    Yes     Enable     Enable     Enable     None
Gi0/11    Yes     Enable     Enable     Enable     None
Gi0/12    Yes     Enable     Enable     Enable     None
Gi0/13    Yes     Enable     Enable     Enable     None
Gi0/14    Yes     Enable     Enable     Enable     None
Gi0/15    Yes     Enable     Enable     Enable     None
Gi0/16    Yes     Enable     Enable     Enable     None
Gi0/17    Yes     Enable     Enable     Enable     None
```

Gi0/18	Yes	Enable	Enable	Enable	None
Gi0/19	Yes	Enable	Enable	Enable	None
Gi0/20	Yes	Enable	Enable	Enable	None
Gi0/21	Yes	Enable	Enable	Enable	None
Gi0/22	Yes	Enable	Enable	Enable	None
Gi0/23	Yes	Enable	Enable	Enable	None
Gi0/24	Yes	Enable	Enable	Enable	None
Gi0/25	No	-	-	-	-
Gi0/26	No	-	-	-	-
Gi0/27	No	-	-	-	-
Gi0/28	No	-	-	-	-

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.21 Show Interfaces

Use this command to display the interface information and optical module information.

show interfaces [*interface-type interface-number*] [**description | switchport | trunk**]

Parameter Description

Parameter	Description
interface-id *interface-number*	Interface (including Ethernet interface, aggregate port, SVI or loopback interface).
description	The description of the interface, including the link status.
switchport	Layer 2 interface information.
trunk	Trunk port, applicable for physical port and aggregate port.

Defaults

Command Mode Privileged EXEC mode.

Usage Guide This command is used to show all basic information if no parameter is specified.

Configuration Examples The following example displays the interface information when the Gi0/1 is a Trunk port.

```
SwitchA#show interfaces gigabitEthernet 0/1
Index(dec):1 (hex):1
GigabitEthernet 0/1 is DOWN    , line protocol is DOWN
Hardware is Broadcom 5464 GigabitEthernet
Interface address is: no ip address
```

```
  MTU 1500 bytes, BW 1000000 Kbit
  Encapsulation protocol is Bridge, loopback not set
  Keepalive interval is 10 sec , set
  Carrier delay is 2 sec
  RXload is 1 ,Txload is 1
  Queueing strategy: FIFO
    Output queue 0/0, 0 drops;
    Input queue 0/75, 0 drops
  Switchport attributes:
    interface's description:""
    medium-type is copper
    lastchange time:0 Day: 0 Hour: 0 Minute:13 Second
    Priority is 0
    admin duplex mode is AUTO, oper duplex is Unknown
    admin speed is AUTO, oper speed is Unknown
flow receive control admin status is OFF,flow send control admin status is OFF,flow receive control oper status is
Unknown,flow send control oper status is Unknown
broadcast Storm Control is OFF,multicast Storm Control is OFF,unicast Storm Control is OFF
 Port-type: trunk
   Native vlan:1
Allowed vlan lists:1-4094
Active vlan lists:1, 3-4
  5 minutes input rate 0 bits/sec, 0 packets/sec
  5 minutes output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer, 0 dropped
    Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 abort
    0 packets output, 0 bytes, 0 underruns , 0 dropped
0 output errors, 0 collisions, 0 interface resets
```

The following example displays the interface information when the Gi0/1 is an Access port.

```
SwitchA#show interfaces gigabitEthernet 0/1
Index(dec):1 (hex):1
GigabitEthernet 0/1 is DOWN    , line protocol is DOWN
Hardware is Broadcom 5464 GigabitEthernet
Interface address is: no ip address
  MTU 1500 bytes, BW 1000000 Kbit
  Encapsulation protocol is Bridge, loopback not set
  Keepalive interval is 10 sec , set
  Carrier delay is 2 sec
  RXload is 1 ,Txload is 1
  Queueing strategy: FIFO
    Output queue 0/0, 0 drops;
    Input queue 0/75, 0 drops
```

```
  Switchport attributes:
    interface's description:""
    medium-type is copper
    lastchange time:0 Day: 0 Hour: 0 Minute:13 Second
    Priority is 0
    admin duplex mode is AUTO, oper duplex is Unknown
    admin speed is AUTO, oper speed is Unknown
    flow receive control admin status is OFF,flow send control admin status is OFF,flow receive control oper status is
Unknown,flow send control oper status is Unknown
broadcast Storm Control is OFF,multicast Storm Control is OFF,unicast Storm Control is OFF
Port-type: access
Vlan id : 2
  5 minutes input rate 0 bits/sec, 0 packets/sec
  5 minutes output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer, 0 dropped
    Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 abort
    0 packets output, 0 bytes, 0 underruns , 0 dropped
0 output errors, 0 collisions, 0 interface resets
```

The following example displays the layer-2 interface information when the Gi0/1 is a Hybrid port.

```
SwitchA#show interfaces gigabitEthernet 0/1
Index(dec):1 (hex):1
GigabitEthernet 0/1 is DOWN    , line protocol is DOWN
Hardware is Broadcom 5464 GigabitEthernet
Interface address is: no ip address
  MTU 1500 bytes, BW 1000000 Kbit
  Encapsulation protocol is Bridge, loopback not set
  Keepalive interval is 10 sec , set
  Carrier delay is 2 sec
  RXload is 1 ,Txload is 1
  Queueing strategy: FIFO
    Output queue 0/0, 0 drops;
    Input queue 0/75, 0 drops
  Switchport attributes:
    interface's description:""
    medium-type is copper
    lastchange time:0 Day: 0 Hour: 0 Minute:13 Second
    Priority is 0
    admin duplex mode is AUTO, oper duplex is Unknown
    admin speed is AUTO, oper speed is Unknown
    flow receive control admin status is OFF,flow send control admin status is OFF,flow receive control oper status is
Unknown,flow send control oper status is Unknown
broadcast Storm Control is OFF,multicast Storm Control is OFF,unicast Storm Control is OFF
```

```
Port-type: hybrid
Tagged vlan id:2
Untagged vlan id:none
  5 minutes input rate 0 bits/sec, 0 packets/sec
  5 minutes output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer, 0 dropped
    Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 abort
    0 packets output, 0 bytes, 0 underruns , 0 dropped
0 output errors, 0 collisions, 0 interface resets
```

The following example displays the layer-2 information of the Gi0/1.

```
FS# show interfacesgigabitEthernet 0/1 switchport
Interface Switchport ModeAccess Native Protected VLAN lists
--------- ---------- --------- ------ ------ ---------
GigabitEthernet 0/1 enabled Access 11    Disabled    ALL
```

Related Commands

Command	Description
duplex	Duplex
flowcontrol	Flow control status.
interface gigabitEthernet	Selects the interface and enter the interface configuration mode.
interface aggregateport	Creates or accesses the aggregate port, and enters the interface configuration mode.
interface vlan	Creates or accesses the switch virtual interface (SVI), and enters the interface configuration mode.
shutdown	Disables the interface.
speed	Configures the speed on the port.
switchport priority	Configures the default 802.1q interface priority.
switchport protected	Configures the interface as a protected port.

Platform Description

N/A

1.22 Show Interfaces Counters

Use this command to display the received and transmitted packet statistics.

show interfaces [*interface-type interface-number*] **counters** [**increment** | **error** | **rate** | **summary**] [*up* | *down*]

Parameter Description

Parameter	Description
interface-type interface-number	(Optional) The interface type and ID.
increment	Displays the packet statistics increased during the last sample interval.
error	Displays error packet statistics.

rate	Displays packet receiving and transmitting rate.
summary	Displays packet statistics summary.
up	(Optional) Displays the port up statistics.
down	(Optional) Displays the port down statistics.

Defaults N/A

Command Mode Any CLI mode

Usage Guide If you do not specify an interface, the packet statistics on all interfaces are displayed.

Configuration Examples The following example displays packet statistics on interface GigabitEthernet 0/1.

```
FS#show interfaces GigabitEthernet 0/1 counters
Interface : GigabitEthernet 0/1
5 minute input rate    : 9144 bits/sec, 9 packets/sec
5 minute output rate : 1280 bits/sec, 1 packets/sec
Rxload                        : 1%
InOctets                      : 17310045
InPkts                        : 1000(Unicast: 10%, Multicast: 10%, Broadcast: 80%)
InUcastPkts                   : 100
InMulticastPkts               : 100
InBroadcastPkts               : 800
Txload                        : 1%
OutOctets                     : 1282535
OutPkts                       : 1000(Unicast: 10%, Multicast: 10%, Broadcast: 80%)
OutUcastPkts                  : 100
OutMulticastPkts              : 100
OutBroadcastPkts              : 800
Undersize packets             : 0
Oversize packets              : 0
collisions                    : 0
Fragments                     : 0
Jabbers                       : 0
CRC alignment errors : 0
AlignmentErrors               : 0
FCSErrors                     : 0
dropped packet events (due to lack of resources): 0
packets received of length (in octets):
   64:46264
   65-127: 47427
   128-255: 3478
   256-511: 658
   512-1023: 18016
```

```
  1024-1518: 125
Packet increment in last sampling interval(5 seconds):
  InOctets                  : 10000
  InPkts                    : 1000(Unicast: 10%, Multicast: 10%, Broadcast: 80%)
  InUcastPkts               : 100
  InMulticastPkts           : 100
  InBroadcastPkts           : 800
  OutOctets                 : 10000
  OutPkts                   : 1000(Unicast: 10%, Multicast: 10%, Broadcast: 80%)
  OutUcastPkts              : 100
  OutMulticastPkts          : 100
```

Rxload refers to the receive bandwidth usage and Txload refers to the Tx bandwidth usage. InPkts is the total number of receive unicast, multicast and broadcast packets. OutPkts is the total number of transmit unicast, multicast and broadcast packets.

Packet increment in last sampling interval (5 seconds) represents the packet statistics increased during the last sample interval (5 seconds).

The following example displays the packet statistics on interface GigabitEthernet 0/1 increased during the last sample interval.

```
FS#show interfaces GigabitEthernet 0/1 counters increment
Interface : GigabitEthernet 0/1
Packet increment in last sampling interval(5 seconds):
  InOctets                  : 10000
  InPkts                    : 1000(Unicast: 10%, Multicast: 10%, Broadcast: 80%)
  InUcastPkts               : 100
  InMulticastPkts           : 100
  InBroadcastPkts           : 800
  OutOctets                 : 10000
  OutPkts                   : 1000(Unicast: 10%, Multicast: 10%, Broadcast: 80%)
  OutUcastPkts              : 100
  OutMulticastPkts          : 100
```

The following example displays error packet statistics on interface GigabitEthernet 0/1.

```
FS#show interfaces GigabitEthernet 0/1 counters increment
Interface     UnderSize                OverSize                 Collisions               Fragments
------------ -------------------- -------------------- -------------------- --------------------
Gi0/1          0                        0                        0                        0
Interface     Jabbers                  CRC-Align-Err            Align-Err                FCS-Err
------------ -------------------- -------------------- -------------------- --------------------
Gi0/1          0                        0                        0                        0
```

UnderSize is the number of valid packets smaller than 64 bytes.

OverSize is the number of valid packets smaller than 1518 bytes.

Collisions is the number of colliding transmit packets.

Fragments is the number of packets with CRC error or frame alignment error which are smaller than 64 bytes.

Jabbers is the number of packets with CRC error or frame alignment error which are smaller than 1518 bytes.

CRC-Align-Err is the number of receive packets with CRC error.

Align_Err is the number of receive packets with frame alignment error.

FCS-Err is the number of receive packets with FCS error.

The following example displays packet receiving and transmitting rate on interface GigabitEthernet 0/1.

```
FS#show interface gigabitEthernet 0/1 counters rate
Interface       Sampling Time          Input Rate            Input Rate            Output Rate
Output Rate
                                         (bits/sec)            (packets/sec)         (bits/sec)
(packets/sec)
------------ -------------------- -------------------- -------------------- -------------------- --------------------
Gi0/1           5 seconds              23391                 23                    124
0
```

Sampling Time is the time when packets are sampled. Input rate is packet receiving rate and Output rate is packet transmitting rate.

The following example displays packet statistics summary on interface GigabitEthernet 0/1.

```
FS#show interface gigabitEthernet 0/1 counters summary
Interface       InOctets               InUcastPkts            InMulticastPkts        InBroadcastPkts
------------ -------------------- -------------------- -------------------- --------------------
Gi0/1           1475788005             1389                   45880503               11886621
Interface       OutOctets              OutUcastPkts           OutMulticastPkts       OutBroadcastPkts
------------ -------------------- -------------------- -------------------- --------------------
Gi0/1           6667915                6382                   31629                  13410
```

InOctets is the total number of packets received on the interface. InUcastPkts is the number of unicast packets received on the interface. InMulticastPkts is the number of multicast packets received on the interface. InBroadcastPkts is the number of broadcast packets received on the interface.

OutOctets is the total number of packets transmitted on the interface. OutUcastPkts is the number of unicast packets transmitted on the interface. OutMulticastPkts is the number of multicast packets transmitted on the interface. OutBroadcastPkts is the number of broadcast packets transmitted on the interface.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.23 Show Interfaces Ethernet Brief

Use this command to display brief information of interfaces, including interface status, output and input bandwidth usage, and the numbers of output and input packet errors.

show interfaces [*interface-type interface-number*] **ethernet brief [up | down]**

Parameter Description

Parameter	Description
interface-type interface-number	Specifies interface type and interface number. Information of all interfaces are displayed if this field is not specified.
up	Indicates connected interfaces.
down	Indicated disconnected interfaces.

Command Mode

All CLI user modes

Default Level

14

Usage Guide

If no interface is sipecified, information of all interfaces is displayed.

Physical ports, aggregation ports and management ports are supported.

Configuration Examples

The following example displays the brief information about Interface GigabitEthernet 0/1.

```
FS#show interfaces GigabitEthernet 0/1 ethernet brief
down: link down
*down: administratively down
disabled: err-disabled(Please reference to command [show interface status err-disabled] for detail.)
Interface    Link Stat    Vlan    Auto-Neg    Duplex    Speed    Input Usage    Output Usage    Description
---------    ---------    ----    --------    -------   -------  -----------    -------------   -----------
Gi0/1        down         1       OFF         Unknown   Unknown  0.00%          0.00%           10G port
```

Note: If an interface is disabled, you can run the command to find out why it is error disabled. 0.01% is displayed when the usage is lower than 0.01% and there is network traffic working.

The following example displays the brief information about connected interfaces.

```
FS#show interfaces ethernet brief up
down: link down
*down: administratively down
disabled: err-disabled(Please reference to command [show interface status err-disabled] for detail.)
Interface    Link Stat    Vlan    Auto-Neg    Duplex    Speed    Input Usage    Output Usage    Description
---------    ---------    ----    --------    -------   -------  -----------    -------------   -----------
Gi0/1        UP           1       OFF         Full      1000M    79.77%         79.77%          10G port
```

The following example displays the brief information of all interfaces.

```
FS#show interfaces ethernet brief
down: link down
```

```
*down: administratively down
disabled: err-disabled(Please reference to command [show interface status err-disabled] for detail.)
Interface    Link Stat    Vlan    Auto-Neg    Duplex    Speed    Input Usage    Output Usage    Description
---------    ---------    ----    --------    -------   -------  -----------    -------------   -----------
Gi0/1        *down        1       OFF         Unknown   Unknown  0.00%          0.00%           10G port
Gi0/2        down         1       OFF         Unknown   Unknown  0.00%          0.00%
Gi0/3        down         1       OFF         Unknown   Unknown  0.00%          0.00%
Ag1          up           1       OFF         Full      1000M    46.78%         46.77%
Mg0          up           routed  --          Full      1000M    --             --              IP management Console
```

1.24 Show Interfaces Link-State-change Statistics

Use this command to display the link state change statistics, including the time and count.

show interfaces [*interface-type interface-number*] **link-state-change statistics**

Parameter Description

Parameter	Description
interface-type interface-number	The interface type and ID.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

If you do not specify an interface, the link state statistics of all interfaces are displayed.

Configuration Examples

The following example displays the link state statistics of interface GigabitEthernet 0/1.

```
FS# show interfaces GigabitEthernet 0/1 link-state-change statistics
Interface      Link state      Link state change times      Last change time
------------   ---------       -----------------------      -------------------
Gi 0/1         down            100                          2012-12-24 15:00:00
```

Interface	Description
Link state	Current link state.
Link state change times	The count of link state change.

Last change time	The time when the last link state change occurs.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.25 Show Interfaces Status

Use this command to display interface status information.

show interfaces [*interface-type interface-number*] **status**

Parameter Description

Parameter	Description
interface-type interface-number	The interface type and ID.
status	Displays interface status information, including speed and duplex.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide If you do not specify an interface, the status information of all interfaces is displayed.

Configuration Examples The following example displays the status information of interface GigabitEthernet 0/1.

```
FS#show interfaces GigabitEthernet 0/1 status
Interface                    Status       Vlan     Duplex   Speed    Type
--------------------   ----------   ------   ------   ------   ------
GigabitEthernet 0/1     up              1          Full     1000M    copper
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.26 Show Interfaces Status Err-disable

Use this command to display the interface violation status.

show interfaces [*interface-type interface-number*] **status err-disable**

Parameter Description

Parameter	Description
interface-type interface-number	(Optional) The interface type and ID.

Defaults

Command Mode Any CLI mode

Usage Guide If you do not specify an interface, violation status of all interfaces is displayed.

Configuration Examples The following example displays the violation status of interface GigabitEthernet 0/1.

```
FS#show interface gigabitEthernet 0/1 status err-disabled
Interface                          Status          Reason
-------------------------------- ---------------- ----------------
GigabitEthernet 0/1                err-disabled     BPDU Guard
```

The violation status is displayed as **err-disabled**.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.27 Show Interfaces Transceiver

Use this command to display transceiver information of the interface.

show interfaces [*interface-type interface-number*] **transceiver** [**alarm** | **diagnosis**]

Parameter Description

Parameter	Description
interface-type interface-number	The interface type and ID.
transceiver	Displays the transceiver information.
alarm	Displays the alarm message of the transceiver. If there is no alarm message, it is displayed as None.
diagnosis	Displays the diagnostic parameters of the transceiver.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide If you do not specify an interface, the transceiver information of all interfaces is displayed.

Configuration Examples

The following example displays the transceiver information of interface Gigabitethernet 5/4.

```
FS#show interfaces GigabitEthernet 5/4 transceiver
Transceiver Type        :   1000BASE-SX-SFP
Connector Type          :   LC
Wavelength(nm)          :   850
Transfer Distance       :
    50/125 um OM2 fiber
        -- 550m
    62.5/125 um OM1 fiber
        -- 270m
Digital Diagnostic Monitoring    : YES
Vendor Serial Number             : 101680093602489
```

The following example displays the alarm message of the transceiver of interface Gigabitethernet 5/4.

```
FS#show interfaces GigabitEthernet 5/4 transceiver alarm
gigabitEthernet 5/4 transceiver current alarm information:
RX    loss of signal
```

The following example displays the diagnostic parameters of the transceiver of interface Gigabitethernet 5/4.

```
FS#show interfaces GigabitEthernet 5/4 transceiver diagnosis
Current diagnostic parameters[AP:Average Power]:
Temp(Celsius)    Voltage(V)    Bias(mA)    RX power(dBm)          TX power(dBm)
38(OK)           3.20(OK)      0.04(OK)    -40.00(alarm)[AP]      -40.00(alarm)
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.28 Show Interfaces Usage

Use this command to display bandwidth usage of the interface.

show interfaces [*interface-type interface-number*] **usage** [*up* | *down*]

Parameter Description

Parameter	Description
interface-type interface-number	(Optional) The interface type and ID.
up	(Optional) Displays the port up statistics.
down	(Optional) Displays the port down statistics.

Defaults

N/A

Command Mode

Any CLI mode

Usage Guide If you do not specify an interface, the bandwidth usage of all interfaces is displayed. Bandwidth refers to the actual link bandwidth rather than the *bandwidth* parameter configured on the interface.

Configuration Examples The following example displays bandwidth usage of interface GigabitEthernet 0/1.

```
Interface                    Bandwidth     Average Usage     Output Usage     Input Usage
---------------------------- ------------- ----------------- ---------------- -----------------
GigabitEthernet 0/0          1000 Mbit     0.002822759%      0.001183280%     0.004462237%
```

Bandwidth refers to the interface link bandwidth, the maximum speed of link. Average Usage refers to the current usage.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.29 Shutdown

Use this command to disable an interface. Use the **no** form of this command to enable a disabled port.

shutdown

no shutdown

Parameter Description

Parameter	Description
N/A	N/A

Defaults By default, the administrative status of an interface is Up.

Command Mode Interface configuration mode

Usage Guide Use this command to stop the forwarding on the interface (Gigabit Ethernet interface, Aggregate port or SVI). You can enable the port with the **no shutdown** command. If you shut down the interface, the configuration of the interface exists, but does not take effect. You can view the interface status by using the **show interfaces** command.

If you use the script to run no shutdown frequently and rapidly, the system may prompt the interface status reversal.

Configuration Examples The following example disables an interface.

```
FS(config)# interface aggregateport 1
FS(config-if)# shutdown
```

The following example enables an interface.

```
FS(config)# interface aggregateport 1
FS(config-if)# no shutdown
```

Related Commands

Command	Description
clear interface	Resets the hardware.
show interfaces	Displays the interface information.

Platform Description

N/A

1.30 Snmp Trap Link-status

Use this command to send LinkTrap on a port. Use the **no** form of this command to disable this function.

snmp trap link-status

no snmp trap link-status

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default

Command Mode

Interface configuration mode.

Usage Guide

For an interface (for instance, Ethernet interface, AP interface, and SVI interface), this command sets whether to send LinkTrap on the interface. If the function is enabled, the SNMP sends the LinkTrap when the link status of the interface changes.

Configuration Examples

The following example disables the interface from sending LinkTrap on the interface.

```
FS(config)# interface gigabitEthernet 1/1
FS(config-if)# no snmp trap link-status
```

The following example enables the interface to forward Link trap.

```
FS(config)# interface gigabitEthernet 1/1
FS(config-if)# snmp trap link-status
```

Related Commands

Command	Description
snmp trap link-status	Enables the interface to send LinkTrap on the interface.
no snmp trap link-status	Disables the interface from sending LinkTrap on the interface.

Platform Description N/A

1.31 Snmp-server If-index Persist

Use this command to set the interface index persistence. The interface index remains the same after the device is restarted.

snmp-server if-index persist

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide After this command is configured, all interface indexes are saved in the configuration file. After the device is restarted, interface indexes remain the same as before.

Configuration Examples The following example enables the interface index persistence.

```
FS(config)# snmp-server if-index persist
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.32 Speed

Use this command to configure the speed on the port.

speed [**10 | 100 | 1000 | auto**]

Parameter Description

Parameter	Description
10	The transmission rate of the interface is 10Mbps.
100	The transmission rate of the interface is 100Mbps.
1000	The transmission rate of the interface is 1000Mbps.
auto	Self-adaptive

Defaults The default is **auto**.

Command Interface configuration mode.

Mode

Usage Guide If an interface is the member of an aggregate port, the rate of the interface depends on the rate of the aggregate port. You can set the rate of the interface, but it does not take effect until the interface exits the aggregate port. Use **show interfaces** to display configuration. The rate varies by interface types. For example, you cannot set the rate of a SFP interface to 10M or 100M.

Configuration Examples The following example sets the speed on interface gigabitethernet 1/1 to 100Mbps.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if)# speed 100
```

Related Commands

Command	Description
show interfaces	Displays the interface information.

Platform Description N/A

1.33 Switchport

Use this command to configure a Layer 3 interface. Use the **no** form of this command to restore the default setting.

switchport

no switchport

Parameter Description

Parameter	Description
N/A	N/A

Defaults All the interfaces are in Layer 2 mode by default.

Command Mode Interface configuration mode.

Usage Guide This command is valid only for physical interfaces. The **switchport** command is used to disable the interface and re-enable it. In this status, the device will send the information to indicate the connect status. If the interface is changed to Layer 3 mode from Layer 2, all the attributes in Layer 2 mode will be cleared.

Configuration Examples The following example configures a Layer 3 interface.

```
FS(config-if)# switchport
```

Related Commands

Command	Description
show interfaces	Displays the interface information.

Platform Description N/A

1.34 Switchport Access

Use this command to configure an interface as a statics access port and add it to a VLAN. Use the **no** form of this command to restore the default setting.

switchport access vlan *vlan-id*

no switchport access vlan

Parameter Description

Parameter	Description
vlan-id	The VLAN ID at which the port to be added.

Defaults By default, the switch port is an access port and the VLAN is VLAN 1.

Command Mode Interface configuration mode.

Usage Guide Enter one VLAN ID. The system will create a new one and add the interface to the VLAN if you enter a new VLAN ID. If the VLAN ID already exists, the command adds the interface to the VLAN.

If the port is a trunk port, the operation does not take effect.

Configuration Examples The following example configures interface gigabitethernet 1/1 as a statistic access port and adds it to VLAN 2.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if)# switchport access vlan 2
```

Related Commands

Command	Description
switchport mode	Configures the interface as Layer 2 mode (switch port mode).
switchport trunk	Configures a native VLAN and the allowed-VLAN list for the trunkport.

Platform Description N/A

1.35 Switchport Mode

Use this command to specify a L2 interface (switch port) mode. You can specify this interface to be an access port or a trunk port or an 802.1Q tunnel. Use the **no** form of this command to restore the default setting.

switchport mode { **access** | **trunk** }

no switchport mode

Parameter Description

Parameter	Description

access	Configures the switch port as an access port.
trunk	Configures the switch port as a trunk port.

Defaults The default is **access**.

Command Mode Interface configuration mode.

Usage Guide If a switch port mode is access port, it can be the member port of only one VLAN. Use **switchport access vlan** to specify the member of the VLAN.
A trunk port can be the member port of various VLANs defined by the allowed-VLAN list. The allowed VLAN list of the interface determines the VLANs to which the interface may belong. The trunk port is the member of all the VLANs in the allowed VLAN list. Use **switchport trunk** to define the allowed-VLANs list.

Configuration Examples The following example specifies a L2 interface (switch port) mode.

```
FS(config-if)# switchport mode trunk
```

Related Commands

Command	Description
switchport access	Configures an interface as a statics access port and assigns it to a VLAN.
switchport trunk	Configures a native VLAN and the allowed-VLAN list for the trunk port.

Platform Description N/A

1.36 Switchport Protected

Use this command to configure the interface as the protected port.

switchport protected

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode.

Usage Guide The ports that are set as the protected ports cannot switch on L2, but can route on L3. A protected port can communicate with an unprotected port. Use the **show interfaces** command to display configuration.

Configuration The following example configures interface gigabitethernet 1/1 as a protected port.

Examples

```
FS(config)#interface gigabitethernet 1/1
FS(config-if)# switchport protected
```

Related Commands

Command	Description
show interfaces	Displays the interface information.

Platform Description

N/A

1.37 Switchport Trunk

Use this command to specify a native VLAN and the allowed-VLAN list for the trunk port. Use the **no** form of this command to restore the default setting.

switchport trunk { **allowed vlan** { **all** | [**add** | **remove** | **except**] *vlan-list* } | **native vlan** *vlan-id* }

no switchport trunk { **allowed vlan** | **native vlan** }

Parameter Description

Parameter	Description
allowed vlan *vlan-list*	Configures the list of VLANs allowed on the trunk port. *vlan-list* can be a VLAN or a range of VLANs starting with the smaller VLAN ID and ending with the larger VLAN ID and being separated by hyphen, for example, 10 to 20. The segments can be separated with a comma (,), for example, 1 to 10, 20 to 25, 30, 33. all means that the allowed VLAN list contains all the supported VLANs; add means to add the specified VLAN list to the allowed VLAN list; remove means to remove the specified VLAN list from the allowed VLAN list; except means to add all the VLANs other than those in the specified VLAN list to the allowed VLAN list;
native vlan *vlan-id*	Configures the native VLAN.

Defaults

The allowed VLAN list is all, the Native VLAN is VLAN1.

Command Mode

Interface configuration mode.

Usage Guide

Native VLAN:

A trunk port belongs to one native VLAN. A native VLAN means that the untagged packets received/sent on the trunk port belong to the VLAN. Obviously, the default VLAN ID of the interface (that is, the PVID in the IEEE 802.1Q) is the VLAN ID of the native VLAN. In addition, when frames belonging to the native VLAN are sent over the trunk port, they are untagged.

Allowed-VLAN List:

By default, a trunk port sends traffic to and received traffic from all VLANs (ID 1 to 4094). However, you can prevent the traffic from passing over the trunk by configuring allowed VLAN lists on a trunk.

Use show interfaces switchport to display configuration.

Configuration Examples

The following example removes port 1/15 from VLAN 2.

```
FS(config)# interface fastethernet 1/15
FS(config-if)# switchport trunk allowed vlan remove 2
FS(config-if)# end
FS# show interfaces fastethernet1/15 switchport
Switchport is enabled
Mode is trunk port
Access vlan is 1,Native vlan is 1
Protected is disabled
Vlan lists is
1,3-4094
```

Related Commands

Command	Description
show interfaces	Displays the interface information.
switchport access	Configures an interface as a statics access port and assigns it to a VLAN.

Platform Description

N/A

1.38 Port Dither Protect

Use this command to enable oscillation protection on the port.

port dither protect

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default.

Command Mode

Global configuration mode

Usage Guide

After you configure the **port dither protect** command, the port will be shut down when the oscillation occurs for certain times.

Oscillation detection is enabled every 30 seconds. A section of oscillation includes at least 60 oscillations within 30 seconds. Then, a syslog will be printed after three consecutive sections of oscillation occur. If oscillation protection is enabled, the port will be shut down. If not, the port will not be shut down.

Configuration

The following example enables oscillation protection on the port.

Examples

```
FS(config)# physical-port dither protect
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2. MAC Address Commands

2.1 Clear Mac-address-table Dynamic

Use this command to clear the dynamic MAC address.

clear mac-address-table dynamic [**address** *mac-addr* [**interface** *interface-id*] [**vlan** *vlan-id*] | { [**interface** *interface-id*] [**vlan** *vlan-id*] }]

Parameter Description

Parameter	Description
dynamic	Clears all the dynamic MAC addresses.
address *mac-addr*	Clears the specified dynamic MAC address.
interface *interface-id*	Clears all the dynamic MAC addresses of the specified interface.
vlan *vlan-id*	Clears all the dynamic MAC addresses of the specified VLAN, in the range from 1 to 4094.

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide Use the **show mac-address-table dynamic** command to display all the dynamic MAC addresses.

Configuration Examples The following command clears all the dynamic MAC addresses.

```
FS# clear mac-address-table dynamic
```

Related Commands

Command	Description
show mac-address-table dynamic	Displays dynamic MAC address.

Platform Description N/A

2.2 Mac-address-learning

Use this command to enable the port address learning. Use the **no** or **default** form of this command to restore the default setting.

mac-address-learning

no mac-address-learning

default mac-address-learning

Parameter Description

Parameter	Description
N/A	N/A

Defaults The address learning function is enabled.

Command Interface configuration mode.

Mode

Usage Guide MAC address learning cannot be disabled on the port where the security function is enabled. The security function cannot be configured on the port where address learning is disabled.

Configuration Examples The following example disables the port address learning function.

```
FS(config-if)# no mac-address-learning
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.3 Mac-address-learning (Global)

Use this command to enable MAC address learning globally. Use the **no** or **default** form of this command to restore the default setting.

mac-address-learning enable

Use this command to disable MAC address learning globally.

mac-address-learning disable

Use this command to restore MAC address learning globally.

default mac-address-learning

Parameter Description

Parameter	Description
enable	Enables MAC address learning globally.
disable	Disables MAC address learning globally.

Defaults The **mac-address-learning enable** command is enabled by default.

Command Mode Global configuration mode

Usage Guide When this function is enabled, the MAC address is learned in global configuration mode the same as learned in interface configuration mode.

Configuration Examples The following example disables MAC address learning globally.

```
FS(config)# mac-address-learning disable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.4 Mac-address-table aging-time

Use this command to specify the aging time of the dynamic MAC address. Use the **no** or **default** form of the command to restore the default setting.

mac-address-table aging-time *seconds*

no mac-address-table aging-time

default mac-address-table aging-time

Parameter Description

Parameter	Description
seconds	Aging time of the dynamic MAC address (in seconds). The time range depends on the switch.

Defaults

The default is 300.

Command Mode

Global configuration mode.

Usage Guide

Use **show mac-address-table aging-time** to display configuration.

Configuration Examples

The following example sets the aging time of the dynamic MAC address to 500 seconds.

```
FS(config)# mac-address-table aging-time 500
```

Related Commands

Command	Description
show mac-address-table aging-time	Displays the aging time of the dynamic MAC address.
show mac-address-table dynamic	Displays dynamic MAC address.

Platform Description

N/A

2.5 Mac-address-table Filtering

Use this command to configure the filtering MAC address. Use the **no** or **default** form of the command to restore the default setting.

mac-address-table filtering *mac-address* **vlan** *vlan-id*

no mac-address-table filtering *mac-address* **vlan** *vlan-id*

default mac-address-table filtering *mac-address* **vlan** *vlan-id*

Parameter Description

Parameter	Description
mac-address	Filtering Address
vlan-id	VLAN ID, in the range from 1 to 4094.

Defaults

No filtering address is configured by default.

Command Mode

Global configuration mode.

Usage Guide The filtering MAC address shall not be a multicast address.

Configuration Examples The following example configures the filtering MAC address for VLAN 1.

```
FS(config)#mac-address-table filtering 0000.0202.0303    vlan 3
```

Related Commands

Command	Description
clear mac-address-table filtering	Clears the filtering MAC address.

Platform Description N/A

2.6 Mac-address-table Notification

Use this command to enable the MAC address notification function. Use The **no** or **default** form of the command to restore the default setting.

mac-address-table notification [**interval** *value* | **history-size** *value*]

no mac-address-table notification [**interval** | **history-size**]

default mac-address-table notification [interval | history-size]

Parameter Description

Parameter	Description
interval *value*	Sets the interval of sending the MAC address trap message, 1 second by default.
history-size *value*	Sets the maximum number of the entries in the MAC address notification table, 50 entries by default.

Defaults By default, the interval is 1 and the maximum number of the entries in the MAC address notification table is 50.

Command Mode Global configuration mode.

Usage Guide The MAC address notification function is specific for only dynamic MAC address and secure MAC address. No MAC address trap message is generated for static MAC addresses. In the global configuration mode, you can use the **snmp-server enable traps mac-notification** command to enable or disable the switch to send the MAC address trap message.

Configuration Examples The following example enables the MAC address notification function.

```
FS(config)# mac-address-table notification
FS(config)# mac-address-table notification interval 40
FS(config)# mac-address-table notification history-size 100
```

Related Commands

Command	Description
snmp-server enable traps	Sets the method of handling the MAC address trap message..
show mac-address-table notification	Displays the MAC address notification configuration and the MAC address trap notification table.

snmp trap mac-notification	Enables the MAC address trap notification function on the specified interface.

Platform Description N/A

2.7 Mac-address-table Static

Use this command to configure a static MAC address. Use the **no** or **default** form of the command to restore the default setting.

mac-address-table static *mac-addr* **vlan** *vlan-id* **interface** *interface-id*

no mac-address-table static *mac-addr* **vlan** *vlan-id* **interface** *interface-id*

default mac-address-table static *mac-addr* **vlan** *vlan-id* **interface** *interface-id*

Parameter Description

Parameter	Description
mac-addr	Destination MAC address of the specified entry
vlan-id	VLAN ID of the specified entry, in the range from 1 to 4094.
interface-id	Interface (physical interface or aggregate port) that packets are forwarded to

Defaults No static MAC address is configured by default.

Command Mode Global configuration mode.

Usage Guide A static MAC address has the same function as the dynamic MAC address that the switch learns. Compared with the dynamic MAC address, the static MAC address will not be aged out. It can only be configured and removed by manual. Even if the switch is reset, the static MAC address will not be lost. A static MAC address shall not be configured as a multicast address. Use **show mac-address-table static** to display the static MAC address.

Configuration Examples N/A

Related Commands

Command	Description
show mac-address-table static	Displays the static MAC address.

Platform Description N/A

2.8 Max-dynamic-mac-count

Use this command to set the maximum number of MAC address learned dynamically on the VLAN or interface. Use the **no** or **default** form of this command to restore the default setting.

max-dynamic-mac-count *num*

no max-dynamic-mac-count

default max-dynamic-mac-count

Parameter Description

Parameter	Description
num	Sets the maximum number of MAC addresses.

Defaults

The maximum number is not set by default.

Command Mode

VLAN configuration mode / Interface configuration mode

Usage Guide

This command is used to set the maximum number of MAC addresses learned dynamically on the VLAN or interface.

If the number of MAC addresses dynamically learned on the VLAN or interface reaches the upper limit, MAC address learning is disabled on the VLAN or interface.

If the number of MAC addresses reaches the upper limit when this command is configured, the surplus MAC addresses are not cleared. Instead, they remain and then age. MAC address learning is disabled on the VLAN or interface.

Use the **show mac-address-table max-dynamic-mac-count** command to display the maximum number of MAC addresses learned dynamically on the VLAN or interface.

Configuration Examples

The following example sets the maximum number of MAC addresses dynamically learned on VLAN 1.

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#vlan 1
FS(config-vlan)#max-dynamic-mac-count 160
```

The following example sets the maximum number of MAC addresses dynamically learned on interface GigabitEthernet 0/1.

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)#max-dynamic-mac-count 160
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.9 Show Mac-address-learning

Use this command to display the MAC address learning.

show mac-address-learning

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays the MAC address learning.

```
FS# show mac-address-learning
GigabitEthernet 0/0        learning ability: disable
GigabitEthernet 0/1        learning ability: enable
GigabitEthernet 0/2        learning ability: enable
GigabitEthernet 0/3        learning ability: enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.10 Show Mac-address-table

Use this command to display all types of MAC addresses (including dynamic address, static address and filter address).

show mac-address-table [**address** *mac-addr*] [**interface** *interface-id*] [**vlan** *vlan-id*]

Parameter Description

Parameter	Description
address *mac-addr*	The MAC address.
interface *interface-id*	The Interface ID.
vlan *vlan-id*	The VLAN ID, in the range from 1 to 4094.

Defaults N/A

Command Mode All modes

Usage Guide N/A

Configuration Examples The following example displays the MAC address.

```
FS# show mac-address-table address 00d0.f800.1001
Vlan        MAC Address        Type       Interface
-------     ------------       --------   --------
1           00d0.f800.1001     STATIC     GigabitEthernet 1/1
FS# show mac-address-table
```

```
Vlan        MAC Address        Type       Interface
-------     ------------       --------   --------
1           00d0.f800.1001     STATIC     GigabitEthernet 1/1
1           00d0.f800.1002     DYNAMIC    GigabitEthernet 1/1
1           00d0.f800.1003     OTHER      GigabitEthernet 1/1
1           00d0.f800.1004     FILTER
```

Field	Description
Vlan	The interface address.
MAC Address	The MAC address.
Type	The MAC address type.
Interface	The interface corresponding to the MAC address.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.11 Show Mac-address-table Aging-time

Use this command to display the aging time of the dynamic MAC address.

show mac-address-table aging-time

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode All modes

Usage Guide N/A

Configuration Examples The following example displays the aging time of the dynamic MAC address.

```
FS# show mac-address-table aging-time
Aging time    : 300
```

Related Commands

Command	Description
mac-address-table aging-time	Sets the aging time of the dynamic MAC address.

Platform Description N/A

2.12 Show Mac-address-table Count

Use this command to display the number of address entries in the address table.

show mac-address-table count [**interface** *interface-id* **|** **vlan** *vlan-id*]

Parameter Description

Parameter	Description
interface *interface-id*	Interface ID
vlan *vlan-id*	VLAN ID, in the range from 1 to 4094.

Defaults

N/A

Command Mode

Privileged EXEC mode.

Usage Guide

The **show mac-address-table count** command is used to display the number of entries based on the type of MAC address entry.

The **show mac-address-table count interface** command is used to display the number of entries based on the interface associated with the MAC address entry.

The **show mac-address-table count vlan** command is used to display the number of entries based on the VLAN of MAC address entries.

Configuration Examples

The following example displays the number of MAC address entries.

```
FS# show mac-address-table count
Dynamic Address Count : 51
Static Address Count : 0
Filter Address Count : 0
Total Mac Addresses    : 51
Total Mac Address Space Available: 8139
```

The following example displays the number of MAC address in VLAN 1.

```
FS# show mac-address-table count vlan 1
Dynamic Address Count : 7
Static Address Count : 0
Filter Address Count : 0
Total Mac Addresses      : 7
```

The following example displays the number of MAC addresses on interface g0/1.

```
FS# show mac-address-table interface g0/1
Dynamic Address Count : 10
Static Address Count : 0
Filter Address Count : 0
Total Mac Addresses      : 10
```

Related Commands

Command	Description
show mac-address-table static	Displays the static address.
show mac-address-table filtering	Displays the filtering address.
show mac-address-table dynamic	Displays the dynamic address.
show mac-address-table address	Displays all the address information of the specified address.

show mac-address-table interface	Displays all the address information of the specified interface.
show mac-address-table vlan	Displays all the address information of the specified vlan.

Platform Description N/A

2.13 Show Mac-address-table Dynamic

Use this command to display the dynamic MAC address.

show mac-address-table dynamic [**address** *mac-add r*] [**interface** *interface-id*] [**vlan** *vlan-id*]

Parameter Description

Parameter	Description
mac-addr	Destination MAC address of the entry
vlan-id	VLAN of the entry, in the range from 1 to 4094.
interface-id	Interface that the packet is forwarded to. It may be a physical port or an aggregate port

Defaults

Command Mode All modes

Usage Guide N/A

Configuration Examples The following example displays the dynamic MAC address.

```
FS# show mac-address-table dynamic
Vlan    MAC Address        Type      Interface
------------------------- -------- -------------------
1    0000.0000.0001      DYNAMIC gigabitethernet 1/1
1    0001.960c.a740      DYNAMIC gigabitethernet 1/1
1    0007.95c7.dff9      DYNAMIC gigabitethernet 1/1
1    0007.95cf.eee0      DYNAMIC gigabitethernet 1/1
1    0007.95cf.f41f      DYNAMIC gigabitethernet 1/1
1    0009.b715.d400      DYNAMIC gigabitethernet 1/1
1    0050.bade.63c4      DYNAMIC gigabitethernet 1/1
```

Related Commands

Command	Description
clear mac-address-table dynamic	Clears the dynamic MAC address.

Platform Description N/A

2.14 Show Mac-address-table Filtering

Use this command to display the filtering MAC address.

show mac-address-table filtering [**ddr** *mac-addr*] [**vlan** *vlan-Id*]

Parameter Description

Parameter	Description
mac-addr	Destination MAC address of the entry
vlan-id	VLAN ID of the entry, in the range from 1 to 4094.

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays the filtering MAC address.

```
FS# show mac-address-table filtering
Vlan      MAC Address       Type      Interface
------- ---------------- ------- -----------
 1      0000.2222.2222     FILTER Not available
```

Related Commands

Command	Description
mac-address-table filtering	Configures the filtering MAC address.

Platform Description N/A

2.15 Show Mac-address-table Interface

Use this command to display all the MAC addresses on the specified interface including static and dynamic MAC address

show mac-address-table interface [*interface-id*] [**vlan** *vlan-id*]

Parameter Description

Parameter	Description
interface-id	Displays the MAC address information of the specified Interface (physical interface or aggregate port).
vlan-id	VLAN ID of the entry, in the range from 1 to 4094..

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays all the MAC addresses on interface gigabitethernet 1/1.

```
FS# show mac-address-table interface
gigabitethernet 1/1
```

```
Vlan    MAC Address    Type     Interface
----- ------------- -------- ----------------
1       00d0.f800.1001 STATIC   gigabitethernet 1/1
1       00d0.f800.1002 STATIC   gigabitethernet 1/1
1       00d0.f800.1003 STATIC   gigabitethernet 1/1
1       00d0.f800.1004 STATIC   gigabitethernet 1/1
```

Related Commands

Command	Description
show mac-address-table static	Displays the static MAC address.
show mac-address-table filtering	Displays the filtering MAC address.
show mac-address-table dynamic	Displays the dynamic MAC address.
show mac-address-table address	Displays all types of MAC addresses.
show mac-address-table vlan	Displays all types of MAC addresses of the specified VLAN.
show mac-address-table count	Displays the address counts in the MAC address table.

Platform Description N/A

2.16 Show Mac-address-table max-dynamic-mac-count

Use this command to display the maximum number of dynamic MAC addresses learned on the VLAN or interface.

show mac-address-table max-dynamic-mac-count { **vlan** [*vlan-id*] | **interface** [*interface-id*] }

Parameter Description

Parameter	Description
vlan	Displays the dynamic MAC address learned on all VLANs which are configured with the maximum number of dynamic MAC address learning.
vlan-id	Displays the dynamic MAC address learned on the specified VLAN.
interface	Displays the dynamic MAC address learned on all interfaces which are configured with the maximum number of dynamic MAC address learning.
interface-id	Displays the dynamic MAC address learned on the specified interface.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the MAC address learned on all VLANs which are configured with the maximum number of dynamic MAC addresses.

```
FS#show mac-address-table max-dynamic-mac-count vlan
```

```
Vlan Limit      MAC count Learning
---- ------- --------- --------
1       160             6                YES
```

The following example displays the MAC address learned dynamically on the specified VLAN.

```
FS#show mac-address-table max-dynamic-mac-count vlan 1
Vlan Limit      MAC count Learning
---- ------- --------- --------
1       160             6                YES
```

Field	Description
Vlan	The VLAN ID.
Limit	The maximum number of MAC addresses.
MAC count	The number of MAC address learned dynamically on the VLAN.
Learning	Whether MAC address learning is disabled on the VLAN.

The following example displays the MAC address learned on all interfaces which are configured with the maximum number of the dynamic MAC address.

```
FS#show mac-address-table max-dynamic-mac-count interface
Interface                          Limit      MAC count Learning
------------------------ ------- --------- --------
GigabitEthernet 0/1            160           6                YES
```

The following example displays the MAC address learned dynamically on the specified interface.

```
FS#show mac-address-table max-dynamic-mac-count interface GigabitEthernet 0/1
Interface                          Limit      MAC count Learning
------------------------ ------- --------- --------
GigabitEthernet 0/1            160           6                YES
```

Field	Description
Interface	The Interface ID
Limit	The maximum number of MAC addresses.
MAC count	The number of MAC address learned dynamically on the interface.
Learning	Whether MAC address learning is disabled on the interface

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.17 Show Mac-address-table Notification

Use this command to display the MAC address notification configuration and the MAC address notification table.

show mac-address-table notification [**interface** [*interface-id*] | **history**]

Parameter Description

Parameter	Description
interface	Displays the MAC address notification configuration on all interfaces.
interface-id	Displays the MAC address notification configuration on a specific interface.
history	Displays the MAC address notification history.

Defaults

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays the MAC address notification configuration and the MAC address notification table.

```
FS# show mac-address-table notification
MAC Notification Feature: Disabled
Interval between Notification Traps: 1 secs
Maximum Number of entries configured in History Table:1
Current History Table Length: 0
```

Related Commands

Command	Description
mac-address-table notification	Enables MAC address notification.
snmp trap mac-notification	Enables the MAC address trap notification function on the specified interface.

Platform Description N/A

2.18 Show Mac-address-table Static

Use this command to display the static MAC address.

show mac-address-table static [**addr** *mac-add r*] [**interface** *interface-Id*] [**vlan** *vlan-id*]

Parameter Description

Parameter	Description
mac-addr	Destination MAC address of the entry
vlan-id	VLAN ID of the entry, within the range from 1 to 4094.
interface-id	Interface of the entry physical interface or aggregate port

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples

The following example displays the static MAC addresses

```
FS# show mac-address-table static
Vlan      MAC Address         Type     Interface
---------- -------------------- -------- ---------
1   00d0.f800.1001   STATIC   gigabitethernet 1/1
1   00d0.f800.1002   STATIC   gigabitethernet 1/1
1   00d0.f800.1003   STATIC   gigabitethernet 1/1
```

Related Commands

Command	Description
mac-address-table static	Configures the static MAC address.

Platform Description

N/A

2.19 Show Mac-address-table Vlan

Use this command to display all addresses of the specified VLAN.

show mac-address-table vlan [*vlan-id*]

Parameter Description

Parameter	Description
vlan-id	VLAN ID of the entry, within the range from 1 to 4094.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays all addresses of the specified VLAN.

```
FS# show mac-address-table vlan 1
Vlan   MAC Address       Type       Interface
----- --------------    ------- -------------------
1     00d0.f800.1001   STATIC   gigabitethernet 1/1
1     00d0.f800.1002   STATIC   gigabitethernet 1/1
1     00d0.f800.1003   STATIC   gigabitethernet 1/1
```

Related Commands

Command	Description
show mac-address-table static	Displays static addresses.
show mac-address-table filtering	Displays filtered addresses.
show mac-address-table dynamic	Displays dynamic addresses.
show mac-address-table address	Displays all address information about the specified address.
show mac-address-table interface	Displays all address information about the specified interface.
show mac-address-table count	Displays the number of addresses in the address table.

Platform Description N/A

2.20 Snmp Trap Mac-notification

Use this command to enable the MAC address trap notification on the specified interface. Use The **no** or **default** form of the command to restore the default setting.

snmp trap mac-notification { **added** | **removed** }

no snmp trap mac-notification { **added** | **removed** }

default snmp trap mac-notification { added | removed }

Parameter Description

Parameter	Description
added	Notifies when a MAC address is added.
removed	Notifies when a MAC address is removed

Defaults

Command Mode Interface configuration mode.

Usage Guide Use **show mac-address-table notification interface** to display configuration.

Configuration Examples The following example enables the MAC address trap notification on interface gigabitethernet 1/1.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if)# snmp trap mac-notification added
```

Related Commands

Command	Description
mac-address-table notification	Enables MAC address notification.
show mac-address-table notification	Displays the MAC address notification configuration and the MAC address notification table.

Platform Description N/A

3. Aggregate Port Commands

3.1 Aggregateport Load-balance

Use this command to configure a global load-balance algorithm for aggregate ports or a load-balance algorithm for an aggregate port . Use the **no** form of this command to return the default setting.

aggregateport load-balance { **dst-mac** | **src-mac** | **src-dst-mac** | **dst-ip** | **src-ip** | **src-dst ip** }

no aggregateport load-balance

Parameter Description

Parameter	Description
dst-mac	Load balance based on the destination MAC addresses of the incoming packets. For all the links of an aggregate port, the messages with the same destination MAC addresses are sent to the same port, and those with different destination MAC addresses are sent to different ports.
src-mac	Load balance based on the source MAC addresses of the incoming packets. For all the links of an aggregate port, the messages from different addresses are distributed to different ports, and those from the same addresses are distributed to the same port.
src-dst-ip	Load balance based on the source IP address and destination IP address. Packets with different source and destination IP address pairs are forwarded through different ports. The packets with the same source and destination IP address pairs are forwarded through the same links. At layer 3, this load balancing style is recommended.
dst-ip	Load balance based on the destination IP addresses of the incoming packets. For all the links of an aggregate port, the messages with the same destination IP addresses are sent to the same port, and those with different destination IP addresses are sent to different ports.
src-ip	Load balance based on the source IP addresses of the incoming packets. For all the links of an aggregate port, the messages from different addresses are distributed to different ports, and those from the same addresses are distributed to the same port.
src-dst-mac	Load balance based on the source and destination MAC addresses. Packets with different source and destination MAC address pairs are forwarded through different ports. The packets with the same source and destination MAC address pairs are forwarded through the same port.
src-dst-ip-l4port (Not supported in interface mode, supported in global mode)	According to the source IP and destination IP, source L4 port number and destination L4 port number for traffic distribution.
enhanced profile	Set the corresponding packet type field according to the profile-name for traffic distribution.

Defaults

The default load balance mode is **src-dst-mac** for the L2 AP port and **src-dst-ip** for the L3 AP port .

Both src-dst-ip-l4port and src-dst-ip-src-dst-l4port represent a traffic balancing method based on the source and destination IP+L4 layer source and destination port numbers of the message, where src-dst-ip- The l4port command is applicable to all products that support this flow balancing mode, and the src-dst-ip-src-dst-l4port

command is only applicable to some products.

Command Mode Global configuration mode/Interface configuration mode

Usage Guide You can run aggregateport load-balance in interface configuration mode of an AP port on devices that support load balancing configuration on a specific AP port. The configuration in interface configuration mode prevails. To disable the load balancing algorithm, run no aggregateport load-balance in interface configuration mode of the AP port. After that, the load balancing algorithm configured in global configuration mode takes effect.

Configuration Examples The following example configures a load-balance algorithm globally based on the destination MAC address.

```
FS(config)# aggregateport load-balance dst-mac
```

Related Commands

Command	Description
show aggregateport load-balance	Displays aggregate port configuration.

Platform Description N/A

3.2 Aggregateport Member Linktrap

Use this command to send LinkTrap to aggregate port members. Use the **no** form of this command to restore the default setting.

aggregateport member linktrap

no aggregateport member linktrap

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide This function cannot be enabled by running the **snmp trap link-status** command in interface configuration mode.

Configuration Examples The following example enables the LinkTrap function on the aggregate port members.

```
FS# configure terminal
FS(config)# aggregateport member linktrap
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.3 Interface Aggregateport

Use this command to create the aggregate port or enter interface configuration mode of the aggregate port. Use the **no** form of this command to restore the default setting.

interface aggregateport *ap-number*

no interface aggregateport *ap-number*

Parameter Description

Parameter	Description
ap-number	Aggregate port number.

Defaults The aggregate port is not created by default.

Command Mode Global configuration mode

Usage Guide If the aggregate port is created, this command is used to enter the interface configuration mode. Otherwise, this command is used to create the aggregate port and then enter its interface configuration mode.

Configuration Examples The following example creates AP 5 and enters its interface configuration mode.

```
FS# configure terminal
FS(config)# interface aggregateport 5
FS(config-if-Aggregateport 5)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.4 Lacp Port-priority

Use this command to set the priority of the LACP AP member port. Use the **no** form of this command to restore the default setting.

lacp port-priority *port-priority*

no lacp port-priority

Parameter Description

Parameter	Description
port-priority	The LACP port priority, in the range from 0 to 65535.

Defaults The default is 32768.

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples This example sets the LACP port priority of interface Gi0/1 to 4096.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# lacp port-priority 4096
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.5 Lacp Short-timeout

Use this command to configure the short-timeout mode for the LACP AP member port. Use the no form of this command to restore the default setting.

lacp short-timeout

no lacp short-timeout

Parameter Description

Parameter	Description
N/A	N/A

Defaults The default is long-timeout mode.

Command Mode Interface configuration mode

Usage Guide In long-timeout mode, the port sends an LACP packet every 30 seconds. If the packet is not received in 90 seconds, the connection times out.

In short-timeout mode, the port sends an LACP packet every 1 second. If the packet is not received in 3 seconds, the connection times out.

Configuration Examples The following example configures the short-timeout mode for the LACP AP member port.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# lacp short-timeout
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.6 Lacp System-priority

Use this command to set the LACP system priority. Use the **no** form of this command to restore the default setting.

lacp system-priority *system-priority*

no lacp system-priority

Parameter Description

Parameter	Description
system-priority	The LACP system priority, in the range from 0 to 65535.

Defaults The default is 32768.

Command Mode Global configuration mode.

Usage Guide

Configuration Examples The following example sets the LACP system priority to 4096.

```
FS(config)# lacp system-priority 4096
```

Related Commands

Command	Description
port-group *key* **mode** { **active** | **passive** }	Enables the LACP on the port and specifies the aggregation group ID and operation mode.
lacp port-priority	Sets the LACP port priority.

Platform Description N/A

3.7 Port-group

Use this command to assign a physical interface to be a member port of a static aggregate port or an LACP aggregate port. Use the **no** form of this command to restore the default setting.

port-group *port-group-number*

port-group *key-number* **mode** { **active** | **passive** }

no port-group

Parameter Description

Parameter	Description
port-group-number	Member group ID of an aggregate port, the interface number of the aggregate port.
key-number	Member group ID of an LACP aggregate port, the interface number of the LACP

	aggregate port.
active	Places a port into an active negotiating state, in which the port initiates negotiations with remote ports by sending LACP packets.
passive	Places a port into a passive negotiating state, in which the port responds to LACP packets it receives but does not initiate LACP negotiation.

Defaults By default, the physical port does not belong to any aggregate port.

Command Mode Interface configuration mode.

Usage Guide All the members of an aggregate port belong to a VLAN or configured to be trunk ports. The ports belonging to different native VLANs cannot form an aggregate port.

Configuration Examples The following example specifies the Ethernet interface 1/3 as a member of the static AP 3.

```
FS(config)# interface gigabitethernet 1/3
FS(config-if-GigabitEthernet 1/3)# port-group 3
```

The following example specifies the Ethernet interface 2/3 as a member of the LACP AP4 and set the aggregation mode to active.

```
FS(config)# interface gigabitethernet 2/3
FS(config-if-GigabitEthernet 2/3)# port-group 4 mode active
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.8 Show Aggregateport

Use this command to display the aggregate port configuration.

show aggregateport { [*aggregate-port-number*] **summary** | **load-balance** }

Parameter Description

Parameter	Description
aggregate-port-number	Number of the aggregate port.
load-balance	Displays the load-balance algorithm on the aggregate port.
summary	Displays the summary of the aggregate port.

Defaults N/A

Command Mode Any mode

Usage Guide If the aggregate port number is not specified, all the aggregate port information will be displayed.

Configuration Examples

The following example displays the AP1 configuration of the switch.

```
FS# show aggregateport 1 summary
AggregatePort   MaxPorts        SwitchPort Mode     Load balance                    Ports
-------------   --------------- ---------- ------   ---------------------------- -------------------------
Ag1             8               Enabled    ACCESS   dst-mac                         Gi0/2
```

Related Commands

Command	Description
aggregateport load-balance	Configures a load-balance algorithm of AP.

Platform Description

N/A

3.9 Show Lacp Summary

Use this command to display the LACP aggregation information.

show lacp summary [*key-number*]

Parameter Description

Parameter	Description
key-number	Specifies the aggregation group id to show.

Defaults

N/A

Command Mode

Any mode.

Usage Guide

N/A

Configuration Examples

The following example displays the LACP aggregation information.

```
FS(config)# show lacp summary 3
System Id:32768, 00d0.f8fb.0002
Flags:  S - Device is requesting Slow LACPDUs
F - Device is requesting Fast LACPDUs.
A - Device is in active mode.        P - Device is in passive mode.
Aggregate port 3:
Local information:
LACP port          Oper    Port    Port
Port      Flags    State   Priority    Key     Number  State
--------------------------------------------------------------
Gi0/1     SA       bndl    4096        0x3     0x1     0x3d
Gi0/2     SA       bndl    4096        0x3     0x2     0x3d
Gi0/3     SA       bndl    4096        0x3     0x3     0x3d
Partner information:
                   LACP port                    Oper    Port    Port
Port      Flags    Priority    Dev ID      Key     Number  State
```

```
-----------------------------------------------------------------------
Gi0/1      SA        61440     00d0.f800.0002   0x3      0x1      0x3d
Gi0/2      SA        61440     00d0.f800.0002   0x3      0x2      0x3d
Gi0/3      SA        61440     00d0.f800.0002   0x3      0x3      0x3d
```

Related Commands

Command	Description
port-group *key* **mode**	Enables the LACP on the port and specifies the aggregation group ID and operation mode.

Platform Description

N/A

4. VLAN Commands

4.1 Add

Use this command to add one or a group Access interface into current VLAN. Use the **no** or **default** form of the command to remove the Access interface.

add interface { *interface-id* | **range** *interface-range* }

no add interface { *interface-id* | **range** *interface-range* }

default add interface { *interface-id* | **range** *interface-range* }

Parameter Description

Parameter	Description
interface-id	Layer-2 Ethernet interface or layer-2 AP port.
range *interface-range*	Range of the Layer-2 Ethernet interface or layer-2 AP port.

Defaults

All layer-2 Ethernet interfaces are in the VLAN1.

Command mode

VLAN configuration mode.

Usage Guide

This command is only valid for the access port.

The configuration of this command is the same as specifying the VLAN to which interface belongs in the interface configuration mode (that is the **switchport access vlan** *vlan-id* command). For the two commands of adding the interface to the VLAN, the command configured later will overwrite the one configured before and take effect.

The configuration of adding the layer-2 AP into current VLAN through this command will only take effect for the layer-2 AP port, but not for the member port of the layer-2 AP port.

Configuration Examples

The following example adds the interface GigabitEthernet 0/10 to VLAN20.

```
FS# configure terminal
SwitchA(config)#vlan 20
SwitchA(config-vlan)#add interface GigabitEthernet 0/10
FS# show interface GigabitEthernet 0/10 switchport
Interface    Switchport     Mode    Access    Native Protected    VLAN lists
----------    --------            -----    -----    ---- ---------- -------
GigabitEthernet 0/10 enabled    ACCESS    20      1      Disabled    ALL
```

The following example adds the interface range GigabitEthernet 0/1-10 to VLAN200.

```
FS# configure terminal
SwitchA(config)#vlan 200
SwitchA(config-vlan)#add interface range GigabitEthernet 0/1-10
FS# show vlan
SwitchA#show vlan
VLAN Name                Status                                    Ports
---- -------        ------------        ----------------------------
1 VLAN0001        STATIC      Gi0/11,Gi0/12,Gi0/13,Gi0/14,Gi0/15, Gi0/16,Gi0/17,Gi0/18,Gi0/19,Gi0/20,Gi0/21,
```

```
Gi0/22, Gi0/23, Gi0/24
200 VLAN0200 STATIC    Gi0/1,Gi0/2,Gi0/3,Gi0/4,Gi0/5, Gi0/6,Gi0/7,Gi0/8,Gi0/9,Gi0/10
```

The following example adds the AggregatePort10 to VLAN20.

```
FS# configure terminal
SwitchA(config)#vlan 20
SwitchA(config-vlan)#add interface aggregateport 10
FS# show interface aggregateport 10 switchport
Interface    Switchport     Mode    Access    Native Protected    VLAN lists
----------    --------            -----    -----    ---- ---------- -------
AggregatePort 10 enabled    ACCESS    20      1      Disabled    ALL
```

Related Commands

Command	Description
show interface *interface-id* **switchport**	Displays the layer-2 interfaces.

Platform Description

N/A

4.2 Name

Use this command to specify the name of a VLAN. Use the **no** or **default** form of this command to restore the default setting.

name *vlan-name*

no name

default name

Parameter Description

Parameter	Description
vlan-name	VLAN name

Defaults

The default name of a VLAN is the combination of “VLAN” and VLAN ID, for example, the default name of the VLAN 2 is “VLAN0002”.

Command mode

VLAN configuration Mode.

Usage Guide

N/A

Configuration Examples

The following example sets the name of VLAN to 10.

```
FS(config)# vlan 10
FS(config-vlan)# name vlan10
```

Related Commands

Command	Description
show vlan	Displays member ports of the VLAN.

Platform Description N/A

4.3 Show Vlan

Use this command to display member ports of the VLAN.

show vlan [**id** *vlan-id*]

Parameter Description

Parameter	Description
vlan-id	VLAN ID

Defaults N/A

Command mode All modes

Usage Guide N/A

Configuration Examples The following command displays the status of VLAN 1.

```
FS(config-vlan)#show vlan id 20
VLAN Name                                Status    Ports
---- -------------------------------- --------- -----------------------------------
  20 VLAN0020                          STATIC    Gi0/1
```

Related Commands

Command	Description
name	VLAN name.
switchport access	Adds the interface to a VLAN.

Platform Description N/A

4.4 Switchport Access

Use this command to configure an interface as a static access port and assign it to a VLAN. Use the **no** or **default** form of the command to assign the port to the default VLAN.

switchport access vlan *vlan-id*

no switchport access vlan

default switchport access vlan

Parameter Description

Parameter	Description
vlan-id	The VLAN ID at which the port to be added.

Defaults By default, the switch port is an access port and the VLAN is VLAN 1.

Command mode Interface configuration mode.

Usage Guide Enter one VLAN ID. The system will create a new one and add the interface to the VLAN if you enter a new VLAN ID. If the VLAN ID already exists, the command adds the port to the VLAN.
If the port is a trunk port, the operation does not take effect.

Configuration Examples

```
FS(config)# interface gigabitethernet 1/1
FS(config-if)# switchport access vlan 2
```

Related Commands

Command	Description
switchport mode	Specifies the interface as Layer 2 mode (switch port mode).
switchport trunk	Specifies a native VLAN and the allowed-VLAN list for the trunkport.

Platform Description N/A

4.5 Switchport Hybrid Allowed

Use this command to add the port to the VLAN or remove the port from the VLAN, Use the **no** or **default** form of this command to restore the default setting.

switchport hybrid allowed vlan { { [**add** | **only**] **tagged** *vlist* | [**add**] **untagged** *vlist* } | **remove** *vlist* }
no switchport hybrid allowed vlan
default switchport hybrid allowed vlan

Parameter Description

Parameter	Description
add	Adds the port to the VLAN.
only	Adds the port to the VLAN and removes the port from the VLANs not on the VLAN list.
tagged	Adds the port to the VLAN and the VLAN packets going out on the port are tagged with VLAN ID.
untagged	Adds the port to the VLAN and the VLAN packets going out on the port are not tagged with VLAN ID.
remove	Removes the port from the VLAN.
vlist	Specifies the VLAN.

Defaults By default, the hybrid port is in all VLANs. All VLAN packets (except native VLAN packets) going out on the port are tagged with VLAN ID. Native VLAN packets are not tagged with VLAN ID.

Command mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example adds the hybrid port to VLAN 20 and VLAN 30 and the VLAN packets going out on the port are not tagged with VLAN ID.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# switchport mode hybrid
FS(config-if-GigabitEthernet 0/1)#switchport hybrid allowed vlan untagged 20
FS(config-if-GigabitEthernet 0/1)#switchport hybrid allowed vlan add untagged 30
```

The following example adds the hybrid port to VLAN 40 and VLAN 50 and the VLAN packets going out on the port are tagged with VLAN ID,

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)#switchport mode hybrid
FS(config-if-GigabitEthernet 0/1)#switchport hybrid allowed vlan tagged 40
FS(config-if-GigabitEthernet 0/1)#switchport hybrid allowed vlan tagged 50
```

The following example removes the hybrid port from VLAN 20.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)#switchport mode hybrid
FS(config-if-GigabitEthernet 0/1)#switchport hybrid allowed vlan remove 20
```

The following example adds the hybrid port to VLAN 20 and deletes all the other VLANs. The VLAN packets going out on the port are tagged with VLAN ID.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)#switchport mode hybrid
FS(config-if-GigabitEthernet 0/1)#switchport hybrid allowed vlan only tagged 20
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.6 Switchport Hybrid Native

Use this command to configure the native VLAN for the hybrid port. Use the **no** or **default** form of this command to restore the default setting.

switchport hybrid native vlan *vlan-id*

no switchport hybrid native vlan

default switchport hybrid native vlan

Parameter Description

Parameter	Description
vlan-id	Configures the native VLAN for the hybrid port.

Defaults

The default is VLAN 1.

Command mode

Interface configuration mode

Usage Guide

Native VLAN packets going out on the hybrid port are not tagged with VLAN ID. Packets not tagged with VLAN ID coming in on the hybrid port are taken as native VLAN packets.

Configuration Examples

The following example configures VLAN 20 as the native VLAN for hybrid port GigabitEthernet 0/1.

```
FS(config-if-GigabitEthernet 0/1)#interface gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)#switchport mode hybrid
FS(config-if-GigabitEthernet 0/1)#switchport hybrid native vlan 20
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.7 Switchport Mode

Use this command to specify a L2 interface (switch port) mode. You can specify this interface to be an access port or a trunk port. Use the **no** or **default** form of this command to restore the default setting.

switchport mode { **access** | **trunk** | **hybrid** | **uplink** }

no switchport mode

default switchport mode

Parameter Description

Parameter	Description
access	Configures the switch port as an access port.
trunk	Configures the switch port as a trunk port.
hybrid	Configures the switch port as a hybrid port.
uplink	Configures the switch port as an uplink port.

Defaults

By default, the switch port is an access port.

Command mode

Interface configuration mode.

Usage Guide

If a switch port is an access port, the port can be added only to one VLAN. You can run the **switchport access vlan** command to specify the VLAN to which the port belongs.

If a switch port is a trunk port, the port is added to all VLANs by default. You can also run the **switchport trunk allowed** command to add the port to or remove the port from a specified VLAN.

If a switch port is an uplink port, the port is added to all VLANs by default. Different from the trunk port, the uplink port sends packets with a tag carried, that is, the tag of packets from default VLANs will not be deleted. You can run the **switchport trunk allowed** command to add the port to or remove the port from a specified VLAN.

If a switch port is a hybrid port, the port is added to all VLANs by default. Different from a trunk port, a hybrid port can be added to a VLAN in tag or untag mode by running the **switchport hybrid allowed** command.

If the mode of a switch port is servicechain, this is a special interface that does not learn MAC addresses, and the interface can forward any VLAN packets. Note that before configuring the interface to servicechain mode, please clear other configurations under the interface and switch the interface to access mode.

Configuration Examples

The following example configures port 1 as an access port.

```
FS(config)#int g 0/1
FS(config-if-GigabitEthernet 0/1)#switchport mode access
```

The following example configures port 1 as a trunk port.

```
FS(config)#int g 0/1
FS(config-if-GigabitEthernet 0/1)# switchport mode trunk
```

The following example configures port 1 as an uplink port.

```
FS(config)#int g 0/1
FS(config-if-GigabitEthernet 0/1)# switchport mode uplink
```

The following example configures port 1 as a hybrid port.

```
FS(config)#int g 0/1
FS(config-if-GigabitEthernet 0/1)# switchport mode hybrid
```

The following example configures port 1 as a servicechain port.

```
FS(config)#default int g 0/1
FS(config)#int g 0/1
FS(config-if-GigabitEthernet 0/1)# switchport mode servicechain
```

Related Commands

Command	Description
switchport access	Configures an interface as a statics access port and assigns it to a VLAN.
switchport trunk	Specifies a native VLAN and the allowed-VLAN list for the trunkport.

Platform Description

N/A

4.8 Switchport Trunk Allowed Vlan

Use this command to add the trunk/uplink port to the VLAN or remove a trunk/uplink port from the VLAN. Use the **no** or **default** form of the command to restore the default setting.

switchport trunk allowed vlan { **all** | { **add** *vlan-list* | **remove** *vlan-list* | **except** *vlan-list* | **only** *vlan-list* } }
no switchport trunk allowed vlan
default switchport trunk allowed vlan

Parameter Description

Parameter	Description
all	Adds the trunk/uplink port to all VLANs.
add	Adds the trunk/uplink port to the VLAN.
remove	Removes the trunk/uplink port from the VLAN port.
except	Removes the trunk/uplink port from the VLAN and adds the port to all the other VLANs.
only	Adds the trunk/uplink port to the specified VLAN and removes the port from the VLANs not on the VLAN list.
vlan-list	Specifies the VLAN.

Defaults

The trunk/unlink port is in all VLANs by default.

Command mode

Interface configuration mode.

Usage Guide

A trunk/uplink port transmits all VLAN (1-4094) data by default. You can block some VLAN data by configuring this command. Use the **show interfaces** command to display configuration.

Configuration Examples

The following example removes trunk port GigabitEthernet 0/10 from VLAN 2.

```
FS(config)# interface gigabitEthernet 0/10
FS(config-if-GigabitEthernet 0/10)# switchport mode trunk
FS(config-if-GigabitEthernet 0/10)# switchport trunk allowed vlan remove 2
```

The following example removes trunk port GigabitEthernet 0/10 from VLAN 2.

```
FS(config)# interface gigabitEthernet 0/10
FS(config-if-GigabitEthernet 0/10)# switchport trunk allowed vlan except 10
```

The following example removes uplink port GigabitEthernet 0/10 from VLAN 10.

```
FS(config)# interface gigabitEthernet 0/10
FS(config-if-GigabitEthernet 0/10)# switchport mode uplink
FS(config-if-GigabitEthernet 0/10)# switchport trunk allowed vlan remove 10
```

The following example adds uplink port GigabitEthernet 0/10 to all VLANs except VLAN10.

```
FS(config)# interface gigabitEthernet 0/10
FS(config-if-GigabitEthernet 0/10)# switchport trunk allowed vlan except 10
```

Related Commands

Command	Description

N/A	N/A

Platform Description N/A

4.9 Switchport Trunk Native Vlan

Use this command to configure the native VLAN for the trunk/uplink port. Use the **no** or **default** form of this command to restore the default setting.

switchport trunk native vlan *vlan-id*
no switchport trunk native vlan
default switchport trunk native vlan

Parameter Description

Parameter	Description
vlan-id	Native VLAN ID.

Defaults

By default, the native VLAN for the trunk/uplink port is VLAN 1.

Command mode

Interface configuration mode

Usage Guide

After this function is enabled, packets not tagged with VLAN ID are taken as native VLAN packets. Tags are removed from native VLAN packets going out on the trunk port.

Configuration Examples

The following example configures VLAN 10 as the native VLAN for trunk port GigabitEthernet 0/10.

```
FS(config)#interface gigabitEthernet 0/10
FS(config-if-GigabitEthernet 0/10)# switchport mode trunk
FS(config-if-GigabitEthernet 0/10)# switch trunk native vlan 10
```

The following example configures VLAN 10 as the native VLAN for unlink port GigabitEthernet 0/10.

```
FS(config)#interface gigabitEthernet 0/10
FS(config-if-GigabitEthernet 0/10)# switchport mode uplink
FS(config-if-GigabitEthernet 0/10)# switch trunk native vlan 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.10 Vlan

Use this command to enter the VLAN configuration mode. Use the **no** or **default** form of this command to restore the default setting.

vlan { *vlan-id* | **range** *vlan-range* }
no vlan { *vlan-id* | **range** *vlan-range* }
default vlan { *vlan-id* | **range** *vlan-range* }

Parameter Description

Parameter	Description
vlan-id	VLAN ID Default VLAN (VLAN 1) cannot be removed.
vlan-range	VLAN ID range.

Defaults

The default is static VLAN.

Command mode

Global configuration mode.

Usage Guide

N/A

Configuration Examples

The following example creates VLAN 10.

```
FS(config)# vlan 10
FS(config-vlan)#
```

Related Commands

Command	Description
show vlan	Displays member ports of the VLAN.

Platform Description

N/A

5. Super-VLAN Commands

5.1 Proxy-arp

Use this command to enable the proxy ARP function for a VLAN. Use the **no** form of this command to disable this function. Use the **defaul**t form of this command torestore the default setting.

proxy-arp

no proxy-arp

default proxy-arp

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default.

Command mode

VLAN configuration Mode.

Usage Guide

Super VLAN and sub VLAN must be both enabled with proxy ARP.

Configuration Examples

The following example enables the proxy ARP function for VLAN 3.

```
FS(config)# vlan 3
FS(config-vlan)# proxy-arp
```

The following example disables the proxy ARP function for VLAN 3.

```
FS(config)# vlan 3
FS(config-vlan)# no proxy-arp
```

Related Commands

Command	Description
show supervlan	Displays the super VLAN information.

Platform Description

N/A

5.2 Show Supervlan

Use this command to display the configuration of the super VLAN and its sub VLANs.

show supervlan

show supervlan *vlan-id*

Parameter Description

Parameter	Description
vlan-id	VLAN ID

Defaults N/A

Command mode Any mode

Usage Guide N/A

Configuration Examples The following example displays the configuration of super VLAN 2.

```
SwitchA(config-if-range)# show supervlan 2
supervlan id    supervlan arp-proxy    subvlan id    subvlan arp-proxy    subvlan ip range
------------    --------------------   ----------    -----------------    ---------
           2                ON               10                ON          192.168.196.10 - 192.168.196.50
                                             20                ON          192.168.196.60 - 192.168.196.100
                                             30                ON          192.168.196.110 - 192.168.196.150
```

The following example displays the configuration of all super VLANs.

```
SwitchA(config-if-range)# show supervlan
supervlan id    supervlan arp-proxy    subvlan id    subvlan arp-proxy    subvlan ip range
------------    --------------------   ----------    -----------------    ---------
           2                ON               10                ON          192.168.196.10 - 192.168.196.50
                                             20                ON          192.168.196.60 - 192.168.196.100
                                             30                ON          192.168.196.110 - 192.168.196.150
           6                ON                7                ON
                                              8                ON
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.3 Subvlan

Use this command to set the sub VLAN for the super VLAN. Use the **no** form of this command to disbale this function. Use the **default** form of this command to restore the default setting.

subvlan *vlan-id-list*

no subvlan [*vlan-id-list*]

default subvlan [*vlan-id-list*]

Parameter Description

Parameter	Description
vlan-id-list	Sub VLAN ID of the VLAN. Multiple VLANs are supported.

Defaults No super VLAN is set by default.

Command mode VLAN configuration Mode.

Usage Guide Use the **no subvlan** command to delete all sub VLANs of this super VLAN.

Configuration Examples The following example sets the sub VLAN.

```
SwitchA(config)#vlan 2
SwitchA(config-vlan)#supervlan
SwitchA(config-vlan)#subvlan 10,20,30
```

Related Commands

Command	Description
show supervlan	Displays the super VLAN information.

Platform Description N/A

5.4 Subvlan-address-range

Use this command to set the IP address range of the sub VLAN. Use the **no** form of this command to disbale this function. Use the **default** form of this command to restore the default setting.

subvlan-address-range *start-ip end-ip*

no subvlan-address-range

default subvlan-address-range

Parameter Description

Parameter	Description
start-ip	The start IP address of this sub VLAN
end-ip	The end IP address of this sub VLAN

Defaults No IP address range is set by default.

Command mode VLAN configuration Mode.

Usage Guide N/A

Configuration Examples The following example sets the IP address range for the sub VLAN.

```
FS(config)# vlan 2
FS(config-vlan)#subvlan-address-range 192.168.23.1 192.168.23.5
```

Related Commands

Command	Description
show supervlan	Displays the super VLAN information.

Platform Description N/A

5.5 Supervlan

Use this command to set the VLAN as a super VLAN. Use the **no** form of this command to disbale this function. Use the **default** form of this command to restore the default setting.

supervlan

no supervlan

default supervlan

Parameter Description

Parameter	Description
N/A	N/A

Defaults No super VLAN is set by default.

Command mode VLAN configuration Mode.

Usage Guide No physical port can be added to a super VLAN.

Configuration Examples The following example configures a Sub VLAN.

```
FS(config)# vlan 2
FS(config-vlan)#supervlan
```

Related Commands

Command	Description
show supervlan	Displays the super VLAN information.

Platform Description N/A

6. MAC VLAN Commands

6.1 Mac-vlan Enable

Use this command to enable the MAC VLAN function on the port.

Use the **no** form or **default** form of this command to restore the default setting.

mac-vlan enable

no mac-vlan enable

default mac-vlan enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

By default, MAC VLAN is disabled.

Command mode

Interface configuration mode

Usage Guide

The MAC VLAN entries configured globally will not take effect on the port unless the MAC VLAN function is enabled on this port.

The MAC VLAN function can be enabled on the hybrid port only.

Configuration Examples

The following example enables MAC VLAN.

```
FS(config-if-interface-id)# mac-vlan enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.2 Mac-vlan Mac-address

Use this command to configure the static MAC VLAN entries.

Use the **no** form or **default** form of this command to restore the default setting.

mac-vlan mac-address *mac-address* [**mask** *mac-mask*] **vlan** *vlan-id* [**priority** *pri_val*]

no mac-vlan mac-address *mac-address* [**mask** *mac-mask*] **vlan** *vlan-id* [**priority** *pri_val*]

default mac-vlan mac-address *mac-address* [**mask** *mac-mask*] **vlan** *vlan-id* [**priority** *pri_val*]

Parameter Description

Parameter	Description
mac-address	Specifies the MAC address.
mac-mask	Specifies the MAC address mask, with the high bits being all 1 in binary. This field is full of F by default.

vlan-id	Specifies the VLAN corresponding to the MAC address. The range is from 1 to 4,094.
pri_val	Specifies the 802.1p priority of the VLAN corresponding to the MAC address. The range is from 0 to 7. The default value is 0.

Defaults No static MAC VLAN entry is configured by default.

Command mode Global configuration mode

Usage Guide Use this command to configure a static MAC VLAN entry including the MAC address, VLAN ID and VLAN priority. Use the **no** form of this command to remove the static MAC VLAN entry.

Configuration Examples The following example configures a static MAC VLAN entry.

```
FS(config)# mac-vlan mac-address 0001.0001.0001 vlan 100 priority 3
FS(config)# mac-vlan mac-address 0002.0002.0000 mask ffff.ffff.0000 vlan 200 priority 5
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

6.3 Show Mac-vlan

Use this command to display the MAC VLAN entries.

show mac-vlan { **all** | **dynamic** | **static** | **vlan** *vlan-id* | **mac-address** *mac-address* [**mask** *mac-mask*] }

Parameter Description

Parameter	Description
all	Displays all MAC VLAN entries.
dynamic	Displays the dynamic MAC VLAN entries.
static	Displays the static MAC VLAN entries.
mac-address mac-address	Displays the MAC VLAN entry of the specified MAC address.
mask mac-mask	Displays the MAC VLAN entry of the specified MAC address range.
vlan vlan-id	Displays the MAC VLAN entries of the specified VLAN.

Defaults N/A

Command mode All modes

Usage Guide If the **mac-address** parameter is specified without the **mask** parameter, the MAC-VLAN entry of the single MAC address is displayed.

If parameters both of **mac-address** and **mask** are specified, the MAC-VLAN entries in the specified MAC address range are displayed.

Configuration Examples

The following example displays all MAC VLAN entries.

```
FS# show mac-vlan all
The following MAC VLAN addresses exist:
S: Static      D: Dynamic
MAC ADDR                MASK                VLAN ID     PRIO     STATE
-------------------------------------------------------
0011.1100.0000     ffff.ff00.0000     100          1          S
0022.2222.0000     ffff.ffff.0000     200          2          S
0000.0000.0003     ffff.ffff.ffff     300          3          D
0000.0000.0004     ffff.ffff.ffff     400          4          D
0000.0000.0005     ffff.ffff.ffff     500          5          S&D
0000.0000.0006     ffff.ffff.ffff     600          6          S
0000.0000.0007     ffff.ffff.ffff     700          7          S&D
Total MAC VLAN address count: 7
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.4 Show Mac-vlan Interface

Use this command to display the interfaces which are enabled with MAC VLAN.

show mac-vlan interface

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command mode

All modes

Usage Guide

Use this command to verify whether the MAC VLAN function is enabled on the interface.

Configuration Examples

The following example displays the interfaces which are enabled with MAC VLAN.

```
FS# show mac-vlan interface
MAC VLAN is enabled on following interface:
  ----------------------------------------
```

```
fastethernet 0/3
fastethernet 0/10
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7. Protocol VLAN Commands

7.1 Protocol-vlan Ipv4 (in interface configuration mode)

Use this command to enable subnet VLAN. Use the **no** form of this command to restore the default setting.

protocol vlan ipv4

no protocol vlan ipv4

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command mode Interface configuration mode.

Usage Guide An interface must work in Trunk/Hybrid mode.

Configuration Examples The following example enables the subnet VLAN.

```
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# switchport
FS(config-if-GigabitEthernet 0/1)# switchport mode hybrid
FS(config-if-GigabitEthernet 0/1)# protocol-vlan ipv4
```

Related Commands

Command	Description
no protocol-vlan ipv4	N/A

Platform Description N/A

7.2 Protocol-vlan Ipv4 (in global configuration mode)

Use this command to configure VLAN for the specified subnet.

protocol-vlan ipv4 *addr* **mask** *addr* **vlan** *id*

Use this command to remove VLAN configuration for the specified subnet.

no protocol-vlan ipv4 *addr* **mask** *addr*

Use this command to remove VLAN configuration for all subnets.

no protocol-vlan ipv4

Parameter Description

Parameter	Description
addr	IP address in the x.x.x.x format.
id	VLAN ID, the maximal VLAN the product supports

Defaults It is disabled by default.

Command mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example configures VLAN 100 for the specified subnet.

```
FS(config)# protocol-vlan ipv4 192.168.100.3 mask 255. 255.255.0 vlan 100
```

Related Commands

Command	Description
show protocol-vlan ipv4	N/A
no protocol-vlan ipv4 *addr* **mask** *addr*	N/A
no protocol-vlan ipv4	N/A

Platform Description N/A

7.3 Protocol-vlan Profile (in interface configuration mode)

Use this command to apply some profile to an interface.

protocol-vlan profile *num* **vlan** *id*

Use this command to clear the specified profile on the port.

no protocol-vlan profile *id*

Use this command to clear all profiles on the port.

no protocol-vlan profile

Parameter Description

Parameter	Description
num	Profile indexes
id	VLAN ID, the maximal VLAN the product supports.

Defaults This function is disabled by default.

Command mode Interface EXEC mode.

Usage Guide N/A

Configuration Examples The following example applies profile 1 to VLAN 101.

```
FS(config-if)# protocol-vlan profile 1 vlan 101
```

Related Commands

Command	Description
show protocol-vlan profile	N/A
show protocol-vlan profile *num*	N/A
no protocol-vlan profile	N/A
no protocol-vlan profile *num*	N/A

Platform Description N/A

7.4 Protocol-vlan Profile (in global configuration mode)

Use this command to configure the profile for the VLAN.

protocol-vlan profile *num* **frame-type** *type* **ether-type** *type*

protocol-vlan profile *num* **frame-type LLC DSAP** *value* **SSAP** *value*

Use this command to delete the specified profile.

no protocol-vlan profile *num*

Use this command to delete all profiles.

no protocol-vlan profile

Parameter Description

Parameter	Description
num	Profile indexes
type	Type of message and Ethernet
value	Service access point type.

Defaults It is disabled by default.

Command mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example configures the profile for the VLAN.

```
FS(config)# protocol-vlan    profile 1 frame-type ETHERII ether-type aarp
FS(config)# protocol-vlan    profile 2 frame-type LLC DSAP 255 SSAP 255
```

Related Commands

Command	Description
show protocol-vlan profile	N/A
show protocol-vlan profile *num*	N/A
no protocol-vlan profile	N/A
no protocol-vlan profile *num*	N/A

Platform N/A

Description

7.5 Show Protocol-vlan

Use this command to display a protocol VLAN.

show protocol-vlan [**profile** [*id*] | **ipv4**]

Parameter Description

Parameter	Description
id	Profile index.

Defaults N/A

Command mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays the configuration of protocol VLAN.

```
FS#show protocol-vlan

ip                      mask                    vlan
--------------- --------------- ----
1.2.1.0                 255.255.255.0           5

interface                   ipv4 status
-------------------- -----------
Gi0/1                       enable

profile frame-type          ether-type/DSAP+SSAP    interface           vlan
------- ---------------- ---------------------- ---------------- ----
1           ETHERII                 0x5fa
                                                                    Gi0/1                   12
```

Related Commands

Command	Description
N/A	N/A

Platform Description

8. Private VLAN Commands

8.1 Debug Bridge Pvlan

Use this command to enable private VLAN debugging. Use the **no** or **default** form of this command to restore the default setting.

debug bridge pvlan

no debug bridge pvlan

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Debugging is disabled by default.

Command mode

Privileged EXEC mode

Usage Guide

Debugging information includes error and prompt messages appearing during private VLAN configuration. This command can be used to troubleshoot VLAN and interface configuration failure.

With private VLAN debugging enabled, all super VLAN configuration and packet processing on SVI is displayed.

Debugging information helps troubleshooting and fault location.

Configuration Examples

The following example enables private VLAN debugging.

```
FS# debug bridge pvlan
```

The following example disables private VLAN debugging.

```
FS# no debug bridge pvlan
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.2 Private-vlan

Use this command to configure the private VLAN feature. Use the **no** or **default** form of this command to restore the default setting.

private-vlan { **community** | **isolated** | **primary** }

no private-vlan { **community** | **isolated** | **primary** }

default private-vlan { **community** | **isolated** | **primary** }

Parameter Description

Parameter	Description
community	Sets the community VLAN.
isolated	Sets the isolated VLAN.
primary	Sets the primary VLAN.

Defaults

No private VLAN feature is configured by default.

Command mode

VLAN configuration mode

Usage Guide

N/A

Configuration Examples

The following example configures the private VLAN feature.

```
FS(config)#vlan 90
FS(config-vlan)#private-vlan primary
FS(config-vlan)#vlan 91
FS(config-vlan)#private-vlan isolated
FS(config-vlan)#vlan 92
FS(config-vlan)#private-vlan community
```

The following example disables the private VLAN feature using the **no private-vlan** command.

```
FS(config)#vlan 90
FS(config-vlan)#no private-vlan primary
FS(config-vlan)#vlan 91
FS(config-vlan)#no private-vlan isolated
FS(config-vlan)#vlan 92
FS(config-vlan)#no private-vlan community
```

The following example disables the private VLAN feature using the **default private-vlan** command.

```
FS(config)#vlan 90
FS(config-vlan)#default private-vlan primary
FS(config-vlan)#vlan 91
FS(config-vlan)#default private-vlan isolated
FS(config-vlan)#vlan 92
FS(config-vlan)#default private-vlan community
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.3 Private-vlan Association

Use this command to associate the secondary VLAN with the primary VLAN on layer 2. Use the **no** or **default** form

of this command to restore the default setting.

private-vlan association { *svlist* | **add** *svlist* | **remove** *svlist* }

no private-vlan association

default private-vlan association

Parameter Description

Parameter	Description
svlist	The secondary VLAN list
add *svlist*	Adds the associated secondary VLAN.
remove *svlist*	Removes the associated secondary VLAN.

Defaults This function is disabled by default.

Command mode VLAN configuration Mode.

Usage Guide N/A

Configuration Examples The following example associates the secondary VLAN with the primary VLAN on layer 2.

```
FS(config)# vlan 22
FS(config-vlan)# private-vlan association add 24-26
```

The following example removes the association between the secondary VLAN with the primary VLAN.

```
FS(config)# vlan 22
FS(config-vlan)# private-vlan association remove 24
```

Related Commands

Command	Description
show vlan private-vlan	N/A

Platform Description N/A

8.4 Private-vlan Mapping

Use this command to associate the secondary VLAN with the primary VLAN on layer 3. Use the **no** or **default** form of this command to restore the default setting.

private-vlan mapping { *svlist* | **add** *svlist* | **remove** *svlist* }

no private-vlan mapping

default private-vlan mapping

Parameter Description

Parameter	Description
svlist	Secondary VLAN list.
add *svlist*	Adds the associated secondary VLAN.

remove *svlist*	Removes the associated secondary VLAN.

Defaults This function is disabled by default.

Command mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example associates the secondary VLAN with the primary VLAN on layer 3.

```
FS(config)# interface vlan 22
FS(config-if)# private-vlan mapping add 24-26
```

Related Commands

Command	Description
show vlan private-vlan	N/A

Platform Description N/A

8.5 Show Vlan Private-vlan

Use this command to display the private VLAN configuration.

show vlan private-vlan [**community** | **primary** | **isolated**]

Use this command to display all the private VLANs configuration.

show vlan private-vlan

Parameter Description

Parameter	Description
primary	Displays the primary VLAN information.
community	Displays the community VLAN information.
isolated	Displays the isolated VLAN information.

Defaults N/A

Command mode All modes

Usage Guide N/A

Configuration Examples The following example displays the private VLAN configuration.

```
FS# show vlan private-vlan
VLAN   Type        Status   Routed   Ports                          Associated VLANs
----- ---------- -------- -------- ------------------------------ ------------------
```

```
30      primary      inactive Enabled
31      isolated     inactive Disabled                    No Association
90      primary      active   Disabled                    91-92
91      isolated     active   Disabled                    90
92      community    active   Disabled Gi0/1              90
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

8.6 Switchport Mode Private-vlan

Use this command to declare the private VLAN mode of the interface. Use the **no** or **default** form of this command to restore the default setting.

switchport mode private-vlan { **host** | **promiscuous** }

no switchport mode

default switchport mode

Parameter Description

Parameter	Description
host	Host mode of the private VLAN
promiscuous	Promiscuous mode of the private VLAN

Defaults The port is an access port by default.

Command mode Interface configuration mode.

Usage Guide

Before a port is configured as an isolated port or promiscuous port, and the port mode must be configured as the host port mode.

The port mode must be configured as the promiscuous mode.

Configuration Examples

The following example applies the private host mode to the interface.

```
FS(config)# interface gigabitEthernet0/2
FS(config-if)# switchport mode private-vlan host
```

The following example applies the promiscuous mode to the interface.

```
FS(config)# interface gigabitEthernet 0/2
FS(config-if-GigabitEthernet 0/2)#sw mode private-vlan promiscuous
```

Related Commands

Command	Description
show vlan private-vlan	N/A

Platform Description N/A

8.7 Switchport Private-vlan Host-association

Use this command to associate the primary VLAN, which is associated with the private VLAN mode of the interface, with the secondary VLAN. Use the **no** or **default** form of this command to restore the default setting.

switchport private-vlan host-association *p_vid s_vid*

no switchport private-vlan host-association

default switchport private-vlan host-association

Parameter Description

Parameter	Description
p_vid	Primary VID.
s_vid	Secondary VID

Defaults This function is disabled by default.

Command mode Interface configuration mode.

Usage Guide Before a port is configured as an isolated port or promiscuous port, and the port mode must be configured as the host port mode.

Whether a port is configured as an isolated port or community port depends on the s_vid parameter.

p_vid and s_vid must be respectively the IDs of the primary VLAN and secondary VLAN in a PVLAN pair, on which Layer-2 association is performed.

One host port can be associated with only one PVLAN pair.

Configuration Examples The following example associates the secondary VLAN with the primary VLAN on the host port.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# switchport mode private-vlan host
FS(config-if)# switchport private-vlan host-association 22 23
FS(config-if)# default switchport private-vlan host-asscioation
FS(config-if)# switchport private-vlan host-association 22 25
```

Related Commands

Command	Description
show vlan private-vlan	N/A

Platform Description N/A

8.8 Switchport Private-vlan Mapping

Use this command to configure the secondary VLAN for the promiscuous port. Use the **no** or **default** form of this command to restore the default setting.

switchport private-vlan mapping *p_vid* { *svlist* | **add** *svist* | **remove** *svlist* }

no switchport private-vlan mapping

default switchport private-vlan mapping

Parameter Description

Parameter	Description
p_vid	Indicates the primary VLAN ID in a PVLAN pair.
svlist	Indicates the secondary VLAN associated with a promiscuous port. Layer-2 association must be performed between it and *p_vid*.
add	Adds a secondary VLAN to be associated with a port.
remove	Cancels the secondary VLAN associated with a port.

Defaults

This function is disabled by default.

Command mode

Interface configuration mode

Usage Guide

The port mode must be configured as the promiscuous mode.

Layer-2 association must be performed between the primary and secondary VLAN.

Configuration Examples

The following example configures the secondary VLAN for the promiscuous port.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# switchport mode private-vlan
promiscuous
FS(config-if)# switchport private-vlan mapping 22 add 23-25
```

Related Commands

Command	Description
show vlan private-vlan	N/A

Platform Description

N/A

9. Voice VLAN Commands

9.1 Show Voice Vlan

Use this command to display the Voice VLAN configurations and the current state, including the working mode of the port with Voice VLAN enabled.

show voice vlan

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the Voice VLAN configurations and the current state.

```
FS(config)# show voice vlan
Voice VLAN status: ENABLE                    //Voice VLAN is enabled
Voice VLAN ID: 2                             //Voice VLAN ID
Voice VLAN security mode: Security      //Security Mode
Voice VLAN aging time: 5 minutes          //Aging Time
Voice VLAN cos: 6                            //Voice VLAN CoS
Voice VLAN dscp: 46                          //Voice VLAN DSCP
Current voice vlan enabled port mode: // Voice VLAN    Enabled Port & Mode
PORT                                MODE
-----------------------------------------------------
Fa0/1                               Auto
```

Related Commands

Command	Description
voice vlan *vlan-id*	Set a voice vlan.
voice vlan aging *minutes*	Set the Voice VLAN aging time.
voice vlan cos *cos-value*	Set the CoS value for the Voice VLAN.
voice vlan dscp *dscp-value*	Set the DSCP value for the Voice VLAN.
voice vlan enable	Enable the Voice VLAN.
voice vlan mode auto	Set the Voice VLAN working mode.
voice vlan security enable	Enable the Voice VLAN security mode.

Platform Description N/A

9.2 Show Voice Vlan Oui

Use this command to display the OUI address, OUI mask and the description information.

show voice vlan oui

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Command mode

All modes.

Usage Guide

N/A

Configuration Examples

The following example displays the OUI address.

```
FS(config)# show voice vlan oui
OUI                Mask               Description
---------------- ---------------- ----------------
0001.e300.0000    ffff.ff00.0000    Siemens phone
0003.6b00.0000    ffff.ff00.0000    Cisco phone
0004.0d00.0000    ffff.ff00.0000    Avaya phone
0060.b900.0000    ffff.ff00.0000    Philips/NEC phone
00d0.1e00.0000    ffff.ff00.0000    Pingtel phone
00e0.7500.0000    ffff.ff00.0000    Polycom phone
00e0.bb00.0000    ffff.ff00.0000    3com phone
```

The following lists the field description .

Field	Description
OUI	The OUI address, the source MAC address for the voice packet.
Mask	The OUI mask. The valid length for the OUI address.
Description	The description information for the OUI address.

Related Commands

Command	Description
voice vlan mac-address *mac-addr* **mask** *oui-mask* [**description** *text*]	Set the OUI address for the voice packet recognized by the Voice VLAN.

Platform Description

N/A

9.3 Voice Vlan

Use this command to enable Voice VLAN in the global configuration mode. Use the **no** form of this command to restore the default setting.

voice vlan *vlan-id*

no voice vlan

Parameter Description

Parameter	Description
vlan-id	The Voice VLAN ID.

Defaults

This function is disabled by default.

Command mode

Global configuration mode

Usage Guide

Use this command to enable the Voice VLAN and specify the Voice VLAN ID.

1. The corresponding VLAN shall be created before configuring the Voice VLAN;
2. The default VLAN is VLAN1 and cannot be set as the Voice VLAN;
3. A VLAN is not allowed to be set as the Voice VLAN and the Super VLAN at the same time;
4. With 802.1x VLAN auto-switching function enabled, the assigned VID shall not be set as the Voice VLAN ID;
5. RSPAN Remote VLAN and Voice VLAN cannot be the same VLAN, or it influences the remote port mirror and the Voice VLAN function.

Configuration Examples

The following example sets the VLAN2 as the Voice VLAN.

```
FS(config)# vlan 2
FS(config-vlan)# exit
FS(config)# voice vlan 2
```

Related Commands

Command	Description
show voice vlan	Display Voice VLAN configurations and the current state.

Platform Description

N/A

9.4 Voice Vlan Aging

Use this command to set the Voice VLAN aging time in the global configuration mode. Use the **no** form of this command to restore the default setting.

voice vlan aging *minutes*

no voice vlan aging

Parameter Description

Parameter	Description
minutes	The Voice VLAN aging time. Range: 5 to 10,000. Unit: minute.

Defaults

The default is 1440 minutes.

Command mode

Global configuration mode

Usage Guide

If the device has not received any voice packets from the port within the aging time, this Voice VLAN will be removed from this port.

The aging time is valid for the auto-mode only.

Configuration Examples

The following example sets the Voice VLAN aging time to 10 minutes.

```
FS(config)# voice vlan aging 10
```

Related Commands

Command	Description
show voice vlan	Display Voice VLAN configurations and the current state.

Platform Description

N/A

9.5 Voice Vlan Cos

Use this command to set the Voice VLAN CoS value in the global configuration mode. Use the **no** form of this command to restore the default setting.

voice vlan cos *cos-value*

no voice vlan cos

Parameter Description

Parameter	Description
cos-value	The Voice VLAN CoS value. Range: 0 to 7.

Defaults

The default is 6.

Command mode

Global configuration mode

Usage Guide

You can improve the Voice VLAN priority level and the session quality, by modifying the Voice VLAN CoS and DSCP value.

Configuration Examples

The following example sets the Voice VLAN CoS value to 5.

```
FS(config)# voice vlan cos 5
```

Related Commands

Command	Description
show voice vlan	Display Voice VLAN configurations and the current state.

Platform Description

N/A

9.6 Voice Vlan Dscp

Use this command to set the Voice VLAN DSCP value in the global configuration mode. Use the **no** form of this command to restore the default setting.

voice vlan dscp *dscp-value*

no voice vlan dscp

Parameter Description

Parameter	Description
dscp-value	The Voice VLAN DSCP value. Range: 0 to 63.

Defaults

The default is 46.

Command mode

Global configuration mode

Usage Guide

You can improve the Voice VLAN priority level and the session quality, by modifying the Voice VLAN CoS and DHCP value.

Configuration Examples

The following example sets the Voice VLAN DSCP value to 40.

```
FS(config)# voice vlan dscp 40
```

Related Commands

Command	Description
show voice vlan	Display Voice VLAN configurations and the current state.

Platform Description

N/A

9.7 Voice Vlan Enable

Use this command to enable the Voice VLAN DSCP value in the interface configuration mode. Use the **no** form of this command to restore the default setting.

voice vlan enable

no voice vlan enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command mode

Interface configuration mode

Usage Guide

Use this command to enable the Voice VLAN on the physical port only. The Voice VLAN can be enabled on the Access Port、Trunk Port、Hybrid Port、Private VLAN host port、Private VLAN promiscuous port and Uplink port on the FS products.

With the global Voice VLAN disabled, although the Voice VLAN can be enabled on the port, it is invalid.

Configuration Examples

The following example enables the Voice VLAN function on the interface FastEthernet 0/1.

```
FS(config)# interface fastEthernet 0/1
FS(config-if)# voice vlan enable
```

Related Commands

Command	Description
show voice vlan	Display Voice VLAN configurations and the current state.

Platform Description

N/A

9.8 Voice Vlan Mac-address

Use this command to set the recognizable Voice VLAN OUI address. Use the **no** form of this command to restore the default setting.

voice vlan mac-address *mac-addr* **mask** *oui-mask* [**description** *text*]

no voice vlan mac-address *mac-addr*

Parameter Description

Parameter	Description
mac-addr	In the format of *H.H.H.* The source MAC address for the voice packets.
oui-mask	In the format of *H.H.H.* The valid length for the OUI address.
text	The description for the OUI address.

Defaults

By default, no OUI has been configured.

Command mode Global configuration mode

Usage Guide Use this command to identify the voice packets from different manufacturers. The first three bytes of the MAC address for the voice device are used to identify the manufacture. Voice VLAN determines whether the packets are voice packets or not through the OUI address obtained from the source MAC address and the OUI mask for the received packets.

The Voice VLAN OUI address cannot be the multicast address and the configured mask shall be continuous.

Configuration Examples The following example sets the OUI address 0012.3400.0000 as the valid address for the Voice VLAN.

```
FS(config)# voice vlan mac-address 0012.3400.0000 mask ffff.ff00.0000 description Company A
```

Related Commands

Command	Description
show voice vlan oui	Display the OUI address, OUI address mask and the descriptions.

Platform Description N/A

9.9 Voice Vlan Mode Auto

Use this command to set the Voice VLAN auto mode. Use the **no** form of this command to disable this function.

voice vlan mode auto

no voice vlan mode auto

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is in auto mode by default.

Command mode Interface configuration mode

Usage Guide The Voice VLAN working mode can be classified into the auto-mode and the manual-mode, and configured on the port. The working modes for the Voice VLAN on each port are independent, and different ports can work in different working modes. In different working modes, the methods of enabling the Voice VLAN function on the port are different. The working mode can be set according to the IP phone type connected downward the port or the port type.

1. With the Voice VLAN enabled on the port and in the manual mode, this port must be added to the Voice VLAN manually to ensure the function validity.

2. When the port works in the auto-mode, note that the native VLAN of the port cannot be set as the Voice

VLAN for the normal function performance.

3. The Trunk Port/Hybrid Port on the FS product can transmit the packets in all VLANs by default. First remove the Voice VLAN from the allowed VLAN list for the port, then enable the Voice VLAN to ensure that the port disconnecting with the voice device cannot be added to the Voice VLAN, or the port not used for a long time can be still in the Voice VLAN.

1. With the Voice VLAN enabled on the port, the auto and manual modes switchover is disallowed. Disable the Voice VLAN first if it is necessary to switch the modes.

2. In the auto mode, it fails to add/remove the port to/from the Voice Vlan by using the command.

Configuration Examples

The following example sets the Voice VLAN on the interface FastEthernet 0/1 to work in the auto mode.

```
FS(config)# interface fastEthernet 0/1
FS(config-vlan)# voice vlan mode auto
```

Related Commands

Command	Description
show voice vlan	Display Voice VLAN configurations and the current state.

Platform Description

N/A

9.10 Voice Vlan Security Enable

Use this command to enable the Voice VLAN security mode in the global configuration mode. Use the **no** form of this command to disable this function.

voice vlan security enable

no voice vlan security enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default.

Command mode

Global configuration mode

Usage Guide

The Voice VLAN working mode can be classified into the auto-mode and the manual-mode, and configured on the port. The working modes for the Voice VLAN on each port are independent, and different ports can work in different working modes. In different working modes, the methods of enabling the Voice VLAN function on the port are different. The working mode can be set according to the IP phone type connected downward the port or the port type.

You are not recommended to transmit the voice and service data in the Voice VLAN at the same time. But if it is necessary for you, you shall ensure that the Voice VLAN security mode has been disabled.

In the security mode, only the source MAC addresses for the untagged packets and the packets carried with Voice VLAN tag are checked. For other packets carried with non-voice vlan tag that free from the Voice VLAN security/normal mode, the devices forward or discard those packets according to the VLAN rule.

Configuration Examples

The following example enables the Voice VLAN security mode.

```
FS(config)# voice vlan security enable
```

Related Commands

Command	Description
show voice vlan	Display Voice VLAN configurations and the current state.

Platform Description

N/A

10. MSTP Commands

10.1 Bpdu Src-mac-check

Use this command to enable the BPDU source MAC address check function on the interface. Use the **no** form of this command to restore the default setting.

bpdu src-mac-check *H.H.H*

no bpdu src-mac-check

Parameter Description

Parameter	Description
H.H.H	Indicates that only the BPDU messages from this MAC address are received.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode.

Usage Guide

BPDU source MAC address check prevents BPDU packets from maliciously attacking switches and causing MSTP abnormal. When the switch connected to a port on a point-to-point link is determined, you can enable BPDU source MAC address check to receive BPDU packets sent only by the peer switch and discard all other BPDU packets, thereby preventing malicious attacks. You can enable the BPDU source MAC address check in interface configuration mode for a specific port. One port can only filter one MAC address.

Configuration Examples

The following example indicates only the BPDU with 00d0.f800.1e2f as the source MAC address will be received by interface Gi 1/1 .

```
FS(config)# interface gigabitethernet 1/1
FS(config-if-interface-id-interface-id)# bpdu src-mac-check 00d0.f800.1e2f
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

10.2 Bridge-frame Forwarding Protocol Bpdu

Use this command to enable BPDU transparent transmission. Use the **no** form of this command to restore the default setting.

bridge-frame forwarding protocol bpdu

no bridge-frame forwarding protocol bpdu

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide In the IEEE 802.1Q standard, 01-80-C2-00-00-00, the destination MAC address of BPDU frames, is reserved. Devices following the IEEE 802.1Q standard don't forward BPDU frames. In real network deployment, devices may be required to support BPDU transparent transmission. For example, when a device is not enabled with STP, BPDU transparent transmission can help implement STP calculation.

BPDU transparent transmission works only when STP is disabled.

Configuration Examples The following example enables BPDU transparent transmission.

```
FS(config)# bridge-frame forwarding protocol bpdu
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

10.3 Clear Spanning-tree Counters

Use this command to clear the statistics of the sent and received STP packets.

clear spanning-tree detected-protocols [**interface** *interface-id*]

Parameter Description

Parameter	Description
interface-id	ID of the interface

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide It is used to clear the statistics of the sent and received STP packets.

Configuration Examples The following example clears the statistics of the sent and received STP packets.

```
FS# clear spanning-tree counters
```

The following example clears the statistics of the sent and received packets on interface Gi 0/1.

```
FS# clear spanning-tree counters interface gigabitethernet 0/1
```

Related Commands

Command	Description
show spanning-tree counters	**Displays the statistics of STP transceived packets.**

Platform Description N/A

10.4 Clear Spanning-tree Detected-protocols

Use this command to force the interface to send the RSTP BPDU message and check the BPDU messages.

clear spanning-tree detected-protocols [**interface** *interface-id*]

Parameter Description

Parameter	Description
interface-id	ID of the interface

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to force the interface to send the RSTP BPDU message.

Configuration Examples Forces to check the version of all interfaces.

```
FS# clear spanning-tree detected-protocols
```

Related Commands

Command	Description
show spanning-tree interface	**Displays the STP configuration of the interface.**

Platform Description N/A

10.5 clear spanning-tree mst topochange record

Use this command to clear STP topology change record.

clear spanning-tree mst *instance-id* **topochange record**

Parameter Description

Parameter	Description
instance-id	Instance ID. For STP and RSTP protocols, only instance 0 is valid.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example clears STP topology change record.

```
FS# show spanning-tree mst 0 topochange record
Topology change information on mst 0:
 Time                    Interface              Old status    New status    Type
 ------------------- -------------------- ------------ ------------ ----------------
 2013.5.1 4:18:46     GI0/6                  Learning      Forwarding    Normal
FS# clear spanning-tree mst 0 topochange record
FS# show spanning-tree mst 0 topochange record
%There's no topology change information has been record on mst 0.
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

10.6 Instance Instance-id Vlan Vlan-range

Use this command to set instance and VLAN mapping relations. Use the **no** form of the command to restore the default setting.

instance *instance-id* **vlan** *vlan-range*

no instance *instance-id* { **vlan** *vlan-range* }

Parameter Description

Parameter	Description
instance-id	Instance ID, in the range from 0 to 64
vlan-range	VLAN range, in the range from 1 to 4094.

Defaults The default is instance 0.

Command Mode MST configuration mode

Usage Guide **instance** *instance-id* **vlan** *vlan-range*： Add VLAN to MST instance. Instance-ID is in the range from 0 to 64 and VLAN is in the range from 1 to 4094. Use commas to separate VLAN IDs and use hyphen to indicate VLAN range, e.g., instance 10 vlan 2,3,6-9, which adds VLAN 2, 3, 4, 5, 6, 7, 8, 9 to instance 10. By default, all VLANs are in instance 0. Use the **no** form of this command to remove VLAN from instance 1-64.

If you create 64 instances by stacking on a FS device with a small memory (e.g., 64M), the memory may be undersized. It is recommended to limit stacking instance number.

Configuration This example enters MST mode and maps VLAN 3 and 5-10 to MST instance1.

Examples

```
FS(config)# spanning-tree mst configuration
FS(config-mst)# instance 1 vlan 3，5-10
FS(config-mst)# show spanning-tree mst configuration
Multi spanning tree protocol : Enable
Name        :
Revision : 0
Instance    Vlans Mapped
----------  ---------------------
0           1-2,4,11-4094
1           3,5-10
-----------------------------------
FS(config-mst)# exit
FS(config)#
```

The following example removes VLAN3 from instance 1.

```
FS(config-mst)# no instance 1 vlan 3
```

The following example removes instance 1.

```
FS(config-mst)# no instance 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

10.7 L2protocol-tunnel Stp

Use this command to enable BPDU TUNNEL globally. Use the **no** form of this command to disable this function.

l2protocol-tunnel stp

no l2protocol-tunnel stp

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

If you want to BPDU TUNNEL globally, enable BPDU TUNNEL on the interface first.

Configuration Examples

The following example enables BPDU TUNNEL globally.

```
FS(config)# l2protocol-tunnel stp
FS(config)# show l2protocol-tunnel stp
```

```
L2protocol-tunnel: stp Enable
L2protocol-tunnel destination mac address: 01d0.f800.0005
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

10.8 l2protocol-tunnel Stp Enable

Use this command to enable BPDU TUNNEL on the interface. Use the **no** form of this command to disable this function.

l2protocol-tunnel stp enable

no l2protocol-tunnel stp enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Interface configuration mode

Usage Guide

If you want to BPDU TUNNEL globally, enable BPDU TUNNEL on the interface first.

Configuration Examples

The following example enables BPDU TUNNEL on the interface.

```
FS(config-if-interface-id)# l2protocol-tunnel stp enable
FS(config-if-interface-id)# show l2protocol-tunnel stp

L2protocol-tunnel: stp Enable
L2protocol-tunnel destination mac address: 01d0.f800.0005
GigabitEthernet 0/1 l2protocol-tunnel stp enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

10.9 L2protocol-tunnel Stp Tunnel-dmac

Use this command to configure the STP address for transparent transmission through BPDU TUNNEL. Use the **no** form of this command to restore the default setting.

l2protocol-tunnel stp tunnel-dmac *mac-address*

no l2protocol-tunnel stp tunnel-dmac

Parameter Description

Parameter	Description
mac-address	The STP address for transparent transmission.

Defaults

Command Mode

Global configuration mode

Usage Guide

The available STP address includes 01d0.f800.0005, 011a.a900.0005, 010f.e200.0003, 0100.0ccd.cdd0, 0100.0ccd.cdd1, and 0100.0ccd.cdd2.

Configuration Examples

The following example configures the STP address for transparent transmission through BPDU TUNNEL.

```
FS(config)# l2protocol-tunnel stp tunnel-dmac 011a.a900.0005
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

10.10 Name

Use this command to set MST name. Use the **no** form of the command to restore the default setting.

name *name*

no name

Parameter Description

Parameter	Description
name	MST name, up to 32 characters.

Defaults

The default is NULL.

Command Mode

MST configuration mode

Usage Guide

name *name*: Sets the MST name, up to 32 characters.

show spanning-tree mst configuration: Displays MST region information.

Configuration Examples

This example sets MST name to region1.

```
FS(config)# spanning-tree mst configuration
FS(config-mst)# name region1
FS(config-mst)# show spanning-tree mst configuration
Multi spanning tree protocol : Enable
Name        : region1
Revision : 0
Instance    Vlans Mapped
-------- ---------------------------------------------
0           : ALL
FS(config-mst)# exit
FS(config)#
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

10.11 Revision

Use this command to set revision number of MSTP region. Use the **no** form of the command to restore the default setting.

revision *version*

no revision

Parameter Description

Parameter	Description
version	MST revision number, in the range from 0 to 65535.

Defaults

The default is 0.

Command Mode

MST configuration mode

Usage Guide

revision *version*: Sets the MST version, in the range from 0 to 65535.

show spanning-tree mst configuration: Displays MST region information.

Configuration Examples

This example sets revision number to1.

```
FS(config)# spanning-tree mst configuration
```

```
FS(config-mst)# revision 1
FS(config-mst)# show spanning-tree mst configuration
Multi spanning tree protocol : Enable
Name        :
Revision : 1
Instance    Vlans Mapped
-------- ---------------------------------------------
0               : ALL
FS(config-mst)# exit
FS(config)#
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

10.12 Show L2protocol-tunnel Stp

Use this command to display BPDU TUNNEL configuration.

show l2protocol-tunnel stp

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode / Global configuration mode / Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays BPDU TUNNEL configuration.

```
FS# show l2protocol-tunnel stp

L2protocol-tunnel: stp Enable
L2protocol-tunnel destination mac address:011a.a900.0005
GigabitEthernet 0/1 l2protocol-tunnel stp enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

10.13 Show Spanning-tree

Use this command to display the global spanning-tree configuration.

show spanning-tree [summary | forward-time | hello-time | max-age | inconsistentports| tx-hold-count | pathcost method | max_hops | counters]

Parameter Description

Parameter	Description
summary	Displays the information of MSTP instances and forwarding status of the interfaces.
inconsistentports	Displays the block port due to root guard or loop guard.
forward-time	Displays BridgeForwardDelay.
hello-time	Displays BridgeHelloTime.
max-age	Displays BridgeMaxAge.
max-hops	Displays the maximum hops of an instance.
tx-hold-count	Displays TxHoldCount.
pathcost method	Displays the method used for calculating path cost.
counters	Displays the statistics of STP transceived packets.

Defaults N/A

Command Mode Privileged EXEC mode, global configuration mode and interface configuration mode.

Usage Guide N/A

Configuration Examples The following example displays the global spanning-tree configuration.

```
FS# show spanning-tree hello-time
```

The following example displays the sent and received STP packets.

```
FS# show spanning-tree counters
---------------------- STP BPDU count ----------------------
 Port                                    Receive        Send
 GigabitEthernet 0/3                     0              122594


------------------------- STP TC or TCN count -------------------------
 MSTID        Port                                Receive        Send
 0            GigabitEthernet 0/3                 0              0
```

Related Commands

Command	Description
spanning-tree pathcost method	Sets the pathcost method.

spanning-tree forward-time	Sets BridgeForwardDelay.
spanning-tree hello-time	Sets BridgeHelloTime.
spanning-tree max-age	Sets BridgeMaxAge.
spanning-tree max-hops	Sets the maximum hops of an instance.
spanning-tree tx-hold-count	Displays TxHoldCount.

Platform Description N/A

10.14 Show Spanning-tree Interface

Use this command to display the STP configuration of the interface, including the optional spanning tree.

show spanning-tree interface *interface-id* [{ **bpdufilter** | **portfast** | **bpduguard** | **link-type** }]

Parameter Description

Parameter	Description
interface-id	Interface ID
bpdufilter	Displays the status of BPDU filter.
portfast	Displays the status of portfast.
bpduguard	Displays the status of BPDU guard.
link-type	Displays the link type of an interface.

Defaults N/A

Command Mode Privileged EXEC mode, global configuration mode and interface configuration mode.

Usage Guide N/A

Configuration Examples The following example displays the STP configuration on interface Gi 0/1.

```
FS# show spanning-tree int gi 0/1

PortAdminPortFast : Disabled
PortOperPortFast : Disabled
PortAdminAutoEdge : Enabled
PortOperAutoEdge : Disabled
PortAdminLinkType : auto
PortOperLinkType : point-to-point
PortBPDUGuard : Disabled
PortBPDUFilter : Disabled
PortGuardmode    : None

###### MST 0 vlans mapped :ALL
PortState : forwarding
PortPriority : 128
```

```
PortDesignatedRoot : 32768.001a.a979.00ea
PortDesignatedCost : 0
PortDesignatedBridge :32768.001a.a979.00ea
PortDesignatedPortPriority : 128
PortDesignatedPort : 1
PortForwardTransitions : 1
PortAdminPathCost : 200000
PortOperPathCost : 200000
Inconsistent states : normal
PortRole : rootPort
```

Related Commands

Command	Description
spanning-tree bpdufilter	Enables the BPDU filter feature someone the interface.
spanning-tree portfast	Enables the portfast on the interface.
spanning-tree bpduguard	Enables the BPDU guard on the interface.
spanning-tree link-type	Sets the link type of the interface to point-to-point.

Platform Description

N/A

10.15 Show Spanning-tree Mst

Use this command to display the information of MST and instances.

show spanning-tree mst { **configuration** | *instance-id* [**interface** *interface-id*] }

Parameter Description

Parameter	Description
configuration	The MST configuration of the equipment.
instance-id	Instance number
interface-id	Interface number

Defaults

All the instances are displayed by default.

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example displays the information of MST and instances.

```
FS# show spanning-tree mst configuration
Multi spanning tree protocol : Enable
Name        : test
Revision : 0
```

```
Instance    Vlans Mapped
-------- -------------------------------------------
0           : 2-4094
1           : 1
```

Field Description

Field	Description
Multi spanning tree protocol	Enables MSTP protocol.
Name	Name of the MST region
Revision	Revision of the MST region
Instance Vlans Mapped	Mapping relation between the instance and VLAN

Related Commands

Command	Description
spanning-tree mst configuration	Configures the MST region.
spanning-tree mst cost	Displays the path cost of the instance.
spanning-tree mst max-hops	Displays the maximum hops of the instance.
spanning-tree mst priority	Displays the equipment priority of the instance.
spanning-tree mst port-priority	Displays the port priority of the instance.

Platform Description

N/A

10.16 Show Spanning-tree Mst Topochange Record

Use this command to display the STP topology change record.

show spanning-tree mst *instance-id* **topochange record**

Parameter Description

Parameter	Description
instance-id	Instance ID.

Defaults

N/A

Command Mode

Privileged EXEC mode / Global configuration mode / Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example displays the STP topology change record of instance 0.

```
FS# show spanning-tree mst 0 topochange record
Topology change information on mst 0:
 Time                    Interface              Old status    New status    Type
 ------------------- -------------------- ------------ ------------ ----------------
 2013.5.1 4:18:46     GI0/6                  Learning      Forwarding    Normal
```

Field	Description
Time	The time when the topology changes.
Interface	The interface whose topology changes.
Old status	Old STP status on the interface.
New status	New STP status on the interface.
Type	Topology change may be caused by the following causes: Normal: UP/DOWN state change on the interface, LoopGuard Block: Loop-inconsistence causes the interface to be blocked. RootGuard Block: Root-inconsistence causes the interface to be blocked. Inferior Block: Receiving inferior BPDU frames causes the interface to be blocked. LoopGuard Unblock: The interface returns to Forward status from loop-inconsistence. RootGuard Unblock: The interface returns to Forward status from root-inconsistence. Inferior Unblock-The interface returns to Forward status after not receiving inferior BPDU frames.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

10.17 Spanning-tree

Use this command to enable MSTP and configure its basic settings globally. The **no** form of the command disables the spanning-tree function. The **no** form of the command with parameters only restores the corresponding parameters to the default values, but does not disable the spanning-tree function.

spanning-tree [**forward-time** *seconds* | **hello-time** *seconds* | **max-age** *seconds*]

no spanning-tree [**forward-time** | **hello-time** | **max-age**]

Parameter Description

Parameter	Description
forward-time *seconds*	Interval at which the port status changes, in the range from 4 to 30 in the unit of seconds. The default is 15.
hello-time *seconds*	Interval at which the switch sends the BPDU message, in the range from 1 to 10 in the unit of seconds. The default is 2.
max-age *seconds*	Maximum aging time of the BPDU message, in the range from 6 to 40 in the unit of seconds. The default is 20.

Defaults This function is disabled by default.

Command Mode Global configuration mode.

Usage Guide The values of **forward-time, hello time** and **max-age** are interrelated. Modifying one of these three parameters will affect the others. There is a restricted relationship among the above three values.

2*(Hello Time+1.0snd) <= Max-Age Time <= 2*(Forward-Delay–1.0snd)

If the values do not according with the condition, the settings do not work.

Configuration Examples The following example enables the spanning-tree function.

```
FS(config)# spanning-tree
```

The following example configures the BridgeForwardDelay.

```
FS(config)# spanning-tree    forward-time 10
```

Related Commands

Command	Description
show spanning-tree	Displays the global STP configuration.
spanning-tree mst cost	Sets the PathCost of an STP interface.
spanning-tree tx-hold-count	Sets the global TxHoldCount of STP.

Platform Description N/A

10.18 Spanning-tree Autoedge

Use this command to enable Autoedge on the interface. Use the **disabled** form of this command to disable this function.

spanning-tree autoedge [**disabled**]

Parameter Description

Parameter	Description
disabled	Disabled Autoedge on the interface.

Defaults This function is enabled by default.

Command Mode Interface configuration mode.

Usage Guide If the designated port of a device does not receive a BPDU from the downlink port within a specific period (3 seconds), the device regards a network device connected to the designated port, configures the port as an edge port, and switches the port directly into the forwarding state. The edge port will be automatically identified as a non-edge port after receiving a BPDU.

You can run the spanning-tree autoedge disabled command to disable Auto Edge.

Configuration Examples

The following example disables Autoedge on the interface.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if-interface-id-interface-id)# spanning-tree autoedge disabled
```

Related Commands

Command	Description
show spanning-tree interface	Displays the STP configuration information of the interface.

Platform Description

N/A

10.19 Spanning-tree Bpdufilter

Use this command to enable BPDU filter on the interface. You can use the **enabled** or **disabled** option of the command to enable or disable the BPDU filter function on the interface.

spanning-tree bpdufilter [**enabled** | **disabled**]

Parameter Description

Parameter	Description
enabled	Enables BPDU filter on the interface.
disabled	Disables BPDU filter on the interface.

Defaults

This function is disabled by default,

Command Mode

Interface configuration mode.

Usage Guide

If BPDU filter is enabled on a port, the port neither sends nor receives BPDUs.

Configuration Examples

The following example enables BPDU filter on interface Gi 1/1.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if-interface-id-interface-id)# spanning-tree bpdufilter enable
```

Related Commands

Command	Description
show spanning-tree interface	Displays the STP configuration of the interface.

Platform Description

N/A

10.20 Spanning-tree Bpduguard

Use this command to enable the BPDU guard function on the interface. You can use the **enabled** or **disabled** option of the command to enable or disable the BPDU guard function on the interface.

spanning-tree bpduguard [**enabled** | **disabled**]

Parameter Description

Parameter	Description
enabled	Enables BPDU guard on the interface.
disabled	Disables BPDU guard on the interface.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode.

Usage Guide

1. If BPDU guard is enabled on a port, the port enters the error-disabled state after receiving a BPDU.
2. Run command **errdisable recovery** [**interval** *seconds*] to recover the interface in Error-disabled state.

Configuration Examples

The following example enables the BPDU guard function on the interface.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if-interface-id-interface-id)# spanning-tree bpduguard enable
```

Related Commands

Command	Description
show spanning-tree interface	Displays the STP configuration of the interface.

Platform Description

N/A

10.21 Spanning-tree Compatible Enable

Use this command to send the message selectively carried with MSTI according to the interface attribute of current port to realize interconnection with other vendors. Use the **no** form of this command to restore the default setting.

spanning-tree compatible enable

no spanning-tree compatible enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default. .

Command Mode

Interface configuration mode.

Usage Guide

If the compatibility mode is enabled on a port, this port will add different MSTI information into the to-be-sent BPDU based on the current port to realize interconnection between FS devices and other SPs' devices.

Configuration Examples

The following example enables the compatibility mode on interface Gi 0/1.

```
FS(config)# interface gigabitethernet 0/1
FS(config-if-interface-id-interface-id)#spanning-tree compatible enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

10.22 Spanning-tree Guard Loop

Use this command to enable **loop guard** on the interface to prevent the root port or backup port from generating loop since they cannot receive bpdu. Use the **no** form of this command to disable **loop guard**.

spanning-tree guard loop

no spanning-tree guard loop

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode.

Usage Guide

1. Enabling loop guard on a root port or backup port will prevent possible loops caused by BPDU receipt failure.
2. The loop guard function and root guard function cannot be enabled at the same time.

Configuration Examples

The following example enables **loop guard** on interface Gi 0/1.

```
FS(config)# interface gigabitethernet 0/1
FS(config-if-interface-id)# spanning-tree guard loop
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

10.23 Spanning-tree Guard None

Use this command to disable **guard** on the interface. Use the **no** form of this command to enable this function

spanning-tree guard none

no spanning-tree guard none

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example disables **guard** on interface Gi 0/1.

```
FS(config)# interface gigabitethernet 0/1
FS(config-if-interface-id)# spanning-tree guard none
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

10.24 Spanning-tree Guard Root

Use this command to enable **root guard** on the interface to prevent the change of current root bridge position because of error configuration and illegal packet attack. Use the **no** form of this command to restore the default setting.

spanning-tree guard root

no spanning-tree guard root

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode.

Usage Guide

3. If root guard is enabled, the current root bridge will not change due to incorrect configuration or illegal packet attacks.

4. The loop guard function and root guard function cannot be enabled at the same time.

Configuration Examples

The following example enables **root guard** on the interface.

```
FS(config)# interface gigabitethernet 0/1
FS(config-if-interface-id)# spanning-tree guard root
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

10.25 Spanning-tree Ignore Tc

Use this command to enable the tc filtering on the interface. Use the **no** form of this command to restore the default setting. With tc filtering enabled, the TC packets received on the interface will not be processed.

spanning-tree ignore tc

no spanning-tree ignore tc

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode.

Usage Guide

If TC filter is enabled on a port, the port does not process received TC packets.

Configuration Examples

The following example enables the tc filtering on the interface.

```
FS(config)# interface gigabitethernet 0/1
FS(config-if-interface-id)# spanning-tree ignore tc
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

10.26 Spanning-tree Link-type

Use this command to configure the link type of the interface. Use the **no** form of this command to restore the

default setting.

spanning-tree link-type [**point-to-point** | **shared**]

no spanning-tree link-type

Parameter Description

Parameter	Description
point-to-point	Sets the link type of the interface to point-to-point.
shared	Forcibly sets the link type of the interface to shared.

Defaults

For a full-duplex interface, its link type is set to point-to-point link; for a half-duplex interface, its link type is set to shared.

Command Mode

Interface configuration mode.

Usage Guide

If the link type of a port is point-to-point connection, RSTP can rapidly converge. If the link type is not configured, the device automatically sets the link type based on the duplex mode of the port.

Configuration Examples

The following example configures the link type of the interface.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if-interface-id)# spanning-tree link-type point-to-point
```

Related Commands

Command	Description
show spanning-tree interface	Displays the STP configuration of the interface.

Platform Description

N/A

10.27 Spanning-tree Loopguard Default

Use this command to enable **loop guard** globally to prevent the root port or backup port from generating loop since they cannot receive bpdu. Use the **no** form of this command to restore the default setting.

spanning-tree loopguard default

no spanning-tree loopguard default

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode.

Usage Guide Enabling loop guard on a root port or backup port will prevent possible loops caused by BPDU receipt failure.

Configuration Examples The following example enables **loop guard** globally to prevent the root port or backup port from generating loop since they cannot receive bpdu.

```
FS(config)# spanning-tree loopguard default
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

10.28 Spanning-tree max-hops

Use this command to set the maximum number of hops(Max-hopsCount) of the BPDU message in the global configuration mode, the number of hops in a region that the BPDU message passes before being dropped. This parameter takes effect for all instances. Use the **no** form of this command to restore the default setting.

spanning-tree max-hops *hop-count*

no spanning-tree max-hops

Parameter Description

Parameter	Description
hop-count	Number of hops in a region that the BPDU message passes before being dropped. The range is 1 to 40 hops.

Defaults The default is 20 hops.

Command Mode Global configuration mode.

Usage Guide In the region, the BPDU message sent by the root bridge includes a Hot Count field. When the BPDU message passes a device, the Hop Count is decreased by 1 until it reaches 0, which indicates the BPDU message times out. The device will drop the BPDU message whose Hop Count is 0.

Changing the max-hops command affects all instances.

Configuration Examples This example sets the max-hops of the spanning tree to 10 for all instances.

```
FS(config)# spanning-tree    max-hops 10
```

Related Commands

Command	Description
show spanning-tree	Displays the MSTP information.

Platform Description N/A

10.29 Spanning-tree Mode

Use this command to set the STP version. Use the **no** form of the command to restore the default setting.

spanning-tree mode [**stp** | **rstp** | **mstp**]

no spanning-tree mode

Parameter Description

Parameter	Description
stp	Spanning tree protocol(IEEE 802.1d)
rstp	Rapid spanning tree protocol(IEEE 802.1w)
mstp	Multiple spanning tree protocol(IEEE 802.1s)

Defaults

The default is **mstp**.

Command Mode

Global configuration mode.

Usage Guide

However, some vendors' devices do not work according to 802.1 protocol standards, possibly causing incompatibility. If other vendors' devices are incompatible with FS devices, run this command to switch the STP mode to a lower version.

Configuration Examples

The following example sets the STP version.

```
FS(config)# spanning-tree mode stp
```

Related Commands

Command	Description
show spanning-tree	Displays the spanning-tree configuration.

Platform Description

N/A

10.30 Spanning-tree Mst Configuration

Use this command to enter the MST configuration mode in the global configuration mode and configure the MSTP region. Use the **no** form of the command to restore the default setting.

spanning-tree mst configuration

no spanning-tree mst configuration

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Command Mode Global configuration mode.

Usage Guide To return to the privileged EXEC mode, enter end or Ctrl+C.

To return to the global configuration mode, enter exit.

After entering the MST configuration mode, you can configure MSTP Region parameters:

Configuration Examples This example enters the MST configuration mode.

```
FS(config)# spanning-tree mst configuration
FS(config-mst)# instance 1 vlan    3, 5-10
FS(config-mst)# name region 1
FS(config-mst)# revision    1
FS(config-mst)# show spanning-tree mst configuration
Multi spanning tree protocol : Enable
Name          : region1
Revision : 1Instance    Vlans Mapped
----------    ---------------------
0               1-2,4,11-4094
1               3,5-10
------------------------------------
FS(config-mst)# exit
FS(config)#
```

Related Commands

Command	Description
show spanning-tree mst	Displays the MST region configuration.
instance *instance-id* **vlan** *vlan-range*	Adds VLANs to the MST instance.
name	Configures the name of MST.
revision	Configures the version of MST.

Platform Description N/A

10.31 Spanning-tree Mst Cost

Use this command to set the path cost of an instance in the interface configuration mode. Use the **no** form of the command to restore the default setting.

spanning-tree [**mst** *instance-id*] **cost** *cost*

no spanning-tree [**mst** *instance-id*] *cost*

Parameter Description

Parameter	Description
instance-id	Instance ID in the range from 0 to 64.

cost	Path cost in the range from 1 to 200,000,000.

Defaults

The default instance-id is 0.

The default value is calculated by the link rate of the interface automatically.

1000 Mbps—20000

100 Mbps—200000

10 Mbps—2000000

Command Mode

Interface configuration mode.

Usage Guide

A higher cost value means a higher path cost.

Configuration Examples

This example sets the path cost to 400 on the interface associated with instances 3.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if)# spanning-tree mst 3 cost 400
```

Related Commands

Command	Description
show spanning-tree mst	Displays the MSTP information of an interface.
spanning-tree mst port-priority	Configures the priority of an interface.
spanning-tree mst priority	Configures the priority of an instance.

Platform Description

N/A

10.32 Spanning-tree Mst Port-priority

Use this command to configure the interface priority for different instances in the interface configuration mode. It will determine which interface of a loop in a region is in charge of forwarding. Use the **no** form of this command to restore the default setting.

spanning-tree [**mst** *instance-id*] **port-priority** *priority*

no spanning-tree [**mst** *instance-id*] **port-priority**

Parameter Description

Parameter	Description
Instance-id	Instance ID, in the range of 0 to 64
priority	Interface priority. Sixteen integers are available: 0, 16, 32, 48, 64, 80, 96, 112, 128, 144, 160, 176, 192, 208, 224, 240, which are the multiples of 16.

Defaults

The default instance-id is 0.

The default priority is 128.

Command Mode

Interface configuration mode.

Usage Guide

When a loop occurs in the region, the interface of the higher priority will be in charge of forwarding. If all interfaces have the same priority value, the interface of the smaller number will be in charge of the forwarding. Run this command to determine which port in the loop of a region enters the forwarding state.

Configuration Examples

This example sets the priority of **gigabitethernet 1/1** to 10 in instance 20.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if-interface-id)# spanning-tree mst 20 port-priority 0
```

Related Commands

Command	Description
show spanning-tree mst	Displays the MSTP information of an interface.
spanning-tree mst cost	Sets the path cost.
spanning-tree mst priority	Sets the device priority for different instances.

Platform Description

N/A

10.33 Spanning-tree Mst Priority

Use this command to set the device priority for different instances in the global configuration mode. Use the **no** form of this command to restore the default setting.

spanning-tree [**mst** *instance-id*] **priority** *priority*

no spanning-tree [**mst** *instance-id*] **priority**

Parameter Description

Parameter	Description
instance-id	Instance ID, in the range of 0 to 64
priority	Device priority. Sixteen integers are available: 0, 4096, 8192, 12288, 16384, 20480, 24576, 28672, 32768, 36864, 40960, 45056, 49152,53248, 57344 and 61440, which are all multiples of 4096.

Defaults

The default instance ID is 0.

The default device priority is 32768.

Command Mode

Global configuration mode.

Usage Guide

Configure the switch priority to determine a device as the root of the entire network and to determine the topology of the entire network.

Configuration Examples

The following example sets the device priority of the Instance to 8192.

```
FS(config)# spanning-tree mst 20 priority 8192
```

Related Commands

Command	Description
show spanning-tree mst	Displays the MSTP information of an interface.
spanning-tree mst cost	Sets path cost.
spanning-tree mst port-priority	Sets the port priority of an instance.

Platform Description

N/A

10.34 Spanning-tree Pathcost Method

Use this command to configure the path cost of the port. Use the **no** form of this command to restore the default setting.

spanning-tree pathcost method { { **long** [**standard** } | **short** }

no spanning-tree pathcost method

Parameter Description

Parameter	Description
Long [**standard**]	Adopts the 802.1t standard to configure path cost. The standard indicates that use the expression recommended by the standard to calculate the cost value.
short	Adopts the 802.1d standard to configure path cost.

Defaults

802.1T standard is adopted to set path cost by default.

Command Mode

Global configuration mode.

Usage Guide

If the port path cost uses the default value, the device automatically calculates the port path cost based on the port rate.

Configuration Examples

The following example configures the path cost of the port.

```
FS(config-if)# spanning-tree pathcost method long
```

Related Commands

Command	Description
show spanning-tree interface	Displays the STP configuration of the interface.

Platform Description

N/A

10.35 Spanning-tree Portfast

Use this command to enable the portfast on the interface. Use the disabled form of this command to restore the default setting,

spanning-tree portfast [**disabled**]

Parameter Description

Parameter	Description
disabled	Disables the portfast on the interface.

Defaults This function is disabled by default.

Command Mode Interface configuration mode.

Usage Guide After PortFast is enabled on a port, the port directly enters the forwarding state. However, since the Port Fast Operational State becomes disabled due to receipt of BPDUs, the port can properly run the STP algorithm and enter the forwarding state.

Configuration Examples The following example enables the portfast on the interface.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if-interface-id)# spanning-tree portfast
```

Related Commands

Command	Description
show spanning-tree interface	Displays the STP configuration of the interface.

Platform Description N/A

10.36 Spanning-tree Portfast Bpdufilter Default

Use this command to enable the BPDU filter function globally. You can use the **no** form of the command to restore the default setting.

spanning-tree portfast bpdufilter default

no spanning-tree portfast bpdufilter default

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default,

Command Mode Global configuration mode.

Usage Guide Once the BPDU filter is enabled, the BPDU message is neither received nor sent on the interface. Use the **show spanning-tree** command to display the configuration.

Configuration The following example enables the BPDU filter function globally.

Examples

```
FS(config)# spanning-tree portfast bpdufilter default
```

Related Commands

Command	Description
show spanning-tree interface	Displays the global STP configuration.

Platform Description

N/A

10.37 Spanning-tree Portfast Bpduguard Default

Use this command to enable the BPDU guard globally. Use the **no** form of this command to restore the default setting,

spanning-tree portfast bpduguard default

no spanning-tree portfast bpduguard default

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode.

Usage Guide

Once the BPDU guard is enabled on the interface, it will enter the error-disabled status if the BPDU message arrives at the interface. Use the **show spanning-tree** command to display the configuration.

The global BPDU guard takes effect only when PortFast is enabled on a port.

Configuration Examples

The following example enables the GPDU guard globally.

```
FS(config)# spanning-tree portfast bpduguard
default
```

Related Commands

Command	Description
show spanning-tree interface	Displays the global STP configuration.

Platform Description

N/A

10.38 Spanning-tree Portfast Default

Use this command to enable the portfast feature on all interfaces globally. Use the **no** form of this command to restore the default setting.

spanning-tree portfast default

no spanning-tree portfast default

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example enables the portfast feature on all interfaces globally.

```
FS(config)# spanning-tree portfast default
```

Related Commands

Command	Description
show spanning-tree interface	Displays the global STP configuration.

Platform Description N/A

10.39 Spanning-tree Reset

Use this command to restore the **spanning-tree** configuration to the default setting.

spanning-tree reset

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Global configuration mode.

Usage Guide Enable TC guard to prevent TC packets from spreading.

Configuration Examples The following example enables tc-guard on interface Gi 1/1.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if-interface-id)# spanning-tree tc-guard
```

Related Commands

Command	Description
show spanning-tree	Displays the global STP configuration.

show spanning-tree interface	Displays the STP configuration of the interface.

Platform Description N/A

10.40 Spanning-tree Tc-guard

Use this command to enable **tc-guard** on the interface to prevent the spread of TC messages. Use the **no** form of this command to disable this function on the interface.

spanning-tree tc-guard

no spanning-tree tc-guard

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example enables **tc-guard** on the interface to prevent the spread of TC messages.

```
FS(config)# spanning-tree tc-guard
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

10.41 Spanning-tree Tc-protection

Use this command to enable **tc-protection** globally. Use The **no** form of this command to disable this function.

spanning-tree tc- protection

no spanning-tree tc- protection

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Global configuration mode.

Mode

Usage Guide N/A

Configuration Examples The following example enables **tc-protection** globally.

```
FS(config)# spanning-tree tc-protection
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

10.42 Spanning-tree Tc-protection Tc-guard

Use this command to enable tc-guard to prevent TC packets from being flooded. Use the **no** form of this command to restore the default setting.

spanning-tree tc-protection tc-guard

no spanning-tree tc-protection tc-guard

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode.

Usage Guide Enable TC guard to prevent TC packets from spreading.

Configuration Examples The following example enables tc-guard to prevent TC packets from being flooded.

```
FS(config)# spanning-tree tc-protection tc-guard
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

10.43 Spanning-tree Tx-hold-count

Use this command to configure the TxHoldCount of the STP, the maximum number of the BPDU messages sent in one second. Use the **no** form of this command to restore the default setting.

spanning-tree tx-hold-count *tx-hold-count*

no spanning-tree tx-hold-count

Parameter Description

Parameter	Description
tx-hold-count	Indicates the maximum number of BPDUs sent per second. The value ranges from 1 to 10. The default value is 3.

Defaults

The default is 3.

Command Mode

Global configuration mode.

Usage Guide

N/A

Configuration Examples

The following example sets the maximum number of the BPDU messages sent in one second.

```
FS(config)# spanning-tree tx-hold-count 5
```

Related Commands

Command	Description
show spanning-tree	Displays the global MSTP configuration.

Platform Description

N/A

11. GVRP Commands

11.1 Bridge-frame Forwarding Protocol Gvrp

Use this command to enable GVRP PDUs transparent transmission. Use the **no** form of this command to restore the default setting.

bridge-frame forwarding protocol gvrp

no bridge-frame forwarding protocol gvrp

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command mode

Global configuration mode

Usage Guide

In the IEEE 802.1Q standard, the MAC address 01-80-C2-00-00-21 of GVRP PDUs is reserved for future standardization. In other words, the device following the IEEE 802.1Q standard does not forward GVRP PDUs frames. However, in actual network deployment, GVRP PDUs transparent transmission may be required. For example, the device not enabled with GVRP needs to transmit GVRP PDUs frames transparently to ensure proper GVRP topology calculation.

Configuration Examples

The following example enables GVRP PDUs transparent transmission.

```
FS(config)# bridge-frame forwarding protocol gvrp
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

11.2 Clear Gvrp Statistic

Use this command to clear the GVRP statistics for re-counting.

clear gvrp statistics { *interface-id* | **all** }

Parameter Description

Parameter	Description
interface-id	Interface id

Defaults

N/A

Command

Privileged EXEC mode.

mode

Usage Guide Use the **show gvrp statistics** to display the statistics.

Configuration Examples The following example clears GVRP statistics.

```
FS# clear gvrp statistics all
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.3 Gvrp Applicant State

Use this command configures the GVRP advertisement mode on the interface.. Use the **no** form of this command to restore default setting.

gvrp applicant state { **normal** | **non-applicant** }

no gvrp applicant state

Parameter Description

Parameter	Description
normal	The interface sends VLAN advertisement.
non-applicant	The interface does not send VLAN advertisement.

Defaults The interface sends GVRP advertisement by default.

Command mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example configures the GVRP advertisement mode on the interface.

```
FS(config-if)# gvrp applicant state normal
```

Related Commands

Command	Description
show gvrp configuration	Displays the GVRP configurations.

Platform Description N/A

11.4 Gvrp Dynamic-vlan-creation

Use this command to enable dynamic VLAN creation. Use the **no** form of this command to restore the default setting.

gvrp dynamic-vlan-creation enable

no gvrp dynamic-vlan-creation enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command mode Global configuration mode.

Usage Guide Use the **show gvrp configuration** to display the configuration.

Configuration Examples The following example enables dynamic VLAN creation.

```
FS(config)# gvrp dynamic-vlan-creation enable
```

Related Commands

Command	Description
show gvrp configuration	Displays the GVRP configurations.

Platform Description N/A

11.5 Gvrp Enable

Use this command to enable the GVRP function. Use the **no** form of this command to restore the default setting.

gvrp enable

no gvrp enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command mode Global configuration mode

Usage Guide This command is used to display the configuration.

Configuration Examples

The following example enables the GVRP function.

```
FS(config)#gvrp enable
```

Related Commands

Command	Description
show gvrp configuration	Displays the GVRP configurations.

Platform Description

N/A

11.6 Gvrp Registration Mode

Use this command to set the registration mode to control whether to enable dynamic VLAN creation/registration/canceling on the port. Use the **no** form of this command to restore the default setting.

gvrp registration mode { **normal** | **disabled** }

no gvrp registration mode

Parameter Description

Parameter	Description
normal	Enables dynamic VLAN creation/registration/canceling on the port.
disabled	Disables dynamic VLAN creation/registration/canceling on the port.

Defaults

Dynamic VLAN creation/registration/canceling is enabled by default,

Command mode

Interface configuration mode.

Usage Guide

N/A

Configuration Examples

The following example sets the registration mode.

```
FS(config-if)# gvrp registration mode normal
```

Related Commands

Command	Description
show gvrp configuration	Displays the GVRP configurations.

Platform Description

N/A

11.7 Gvrp Timer

Use this command to set the GVRP timer. Use the **no** form of this command to restore the default setting.

gvrp timer { **join** *timer_value* | **leave** *timer_value* | **leaveall** *timer_value* }

no gvrp timer

Parameter Description

Parameter	Description
join *timer_value*	Controls the maximum delay before sending the advertisement on the port. The actual sending interval is in the range of 0 to the maximum delay.
leave *timer_value*	Controls the waiting time before removing the VLAN from the port with the Leave Message received. If the Join Message is received again within this time range, the port-VLAN relation still exists and the timer becomes invalid. If no Join Message is received on the port, the port status will be the Empty and removed from the VLAN member list.
leave all *timer_value*	Controls the minimum interval of sending the LeaveAll Message on the port. If the LeaveAll Message is received before the timer expires, the timer re-counts. If the timer expires, send the LeaveAll Message on the port and also send this Message to the port, so that the Leave timer begins counting. The actual sending interval ranges from leaveall to leaveall+join.

Defaults

Join timer: 200 milliseconds;
Leave timer: 600 milliseconds;
Leaveall timer: 10000 milliseconds.

Command mode

Global configuration mode

Usage Guide

Use the **show gvrp configuration** to display the configuration.
Use the **no gvrp timer** command to restore **join**, **leave** and **leaveall timer** to default settings.

Configuration Examples

The following example configures the join timer.

```
FS(config)# gvrp timer join 200
```

Related Commands

Command	Description
show gvrp configuration	Displays the GVRP configuration.

Platform Description

N/A

11.8 L2protocol-tunnel Gvrp

Use this command to enable global GVRP PDUs TUNNEL globally. Use the **no** form of this command to restore the default setting.

l2protocol-tunnel gvrp

no l2protocol-tunnel gvrp

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command mode Global configuration mode

Usage Guide If you want to enable global GVRP PDUs TUNNEL, enable GVRP PDUs TUNNEL on the interface first.

Configuration Examples The following example enables GVRP PDUs TUNNEL globally.

```
FS(config)# l2protocol-tunnel gvrp
FS(config)# show l2protocol-tunnel gvrp

L2protocol-tunnel: Gvrp Disable
L2protocol-tunnel destination mac address:01d0.f800.0006
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.9 L2protocol-tunnel gvrp Enable

Use this command to enable GVRP PDUs TUNNEL on the interface. Use this command to restore the default setting.

l2protocol-tunnel gvrp enable

no l2protocol-tunnel gvrp enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command mode Interface configuration mode

Usage Guide If you want to enable global GVRP PDUs TUNNEL, enable GVRP PDUs TUNNEL on the interface first.

Configuration Examples The following example enables GVRP PDUs TUNNEL on the interface.

```
FS(config-if-interface-id)# l2protocol-tunnel gvrp enable
FS(config-if-interface-id)# show l2protocol-tunnel gvrp

L2protocol-tunnel: Gvrp Disable
```

```
L2protocol-tunnel destination mac address:01d0.f800.0006
GigabitEthernet 0/1 l2protocol-tunnel gvrp enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.10 L2protocol-tunnel gvrp tunnel-dmac

Use this command to configure the MAC address for transparent transmission in GVRP PDUs TUNNEL. Use the **no** form of this command to restore the default setting.

l2protocol-tunnel gvrp tunnel-dmac *mac-address*

no l2protocol-tunnel gvrp tunnel-dmac

Parameter Description

Parameter	Description
mac-address	The MAC address for transparent transmission in GVRP PDUs TUNNEL.

Defaults The default is 01d0.f800.0006.

Command mode Global configuration mode

Usage Guide The available MAC address f ranges from 01d0.f800.0006 to 011a.a900.0006.

Configuration Examples The following example configures the MAC address for transparent transmission in GVRP PDUs TUNNEL.

```
FS(config)# l2protocol-tunnel gvrp tunnel-dmac 011a.a900.0006
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

10.1 Show Gvrp Configuration

Use this command to display the GVRP configuration.

show gvrp configuration

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command mode Privileged EXEC mode.

Usage Guide Use the **show gvrp configuration** to display the configuration.

Configuration Examples The following example displays GVRP configuration.

```
Global GVRP Configuration:
GVRP Feature:enabled
GVRP dynamic VLAN creation:enabled
Join Timers(ms):200
Leave Timers(ms):600
Leaveall Timers(ms):1000
Port based GVRP Configuration:
        PORT                    Applicant Status        Registration Mode
------------------------  --------------------  ----------------------
GigabitEthernet 0/2             normal                  normal
```

Field	Description
GVRP Feature	Whether to enable GVRP
GVRP dynamic VLAN creation	Whether to enable dynamic VLAN creation
Join Timers	Join timer
Leave Timers	Leave timer
Leaveall Timers	Leaveall timer
PORT	Port
Applicant Status	Advertisement mode
Registration Mode	Registration mode

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.11 Show Gvrp Statistics

Use this command to display the GVRP statistics of one interface or all interfaces.

show gvrp statistics { *interface-id* | **all** }

Parameter Description

Parameter	Description
interface-id	Interface id.

Defaults N/A

Command mode Privileged EXEC mode

Usage Guide Use the **show gvrp statistics** to display the statistics of one interface or all interfaces.

Configuration Examples

```
FS# show gvrp statistics gigabitethernet 1/1
Interface          GigabitEthernet 3/1
RecValidGvrpPdu          0
RecInvalidGvrpPdu        0
RecJoinEmpty     0
RecJoinIn        0
RecEmpty         0
RecLeaveEmpty    0
RecLeaveIn       0
RecLeaveAll      0
SentGvrpPdu      0
SentJoinEmpty    0
SentJoinIn       0
SentEmpty        0
SentLeaveEmpty   0
SentLeaveIn      0
SentLeaveAll     0
JoinIndicated    0
LeaveIndicated   0
JoinPropagated   0
LeavePropagated  0
```

Field	Description
RecValidGvrpPdu	Number of received valid GPDU packets.
RecInvalidGvrpPdu	Number of received unvalid GPDU packets.
RecJoinEmpty/ SentJoinEmpty	Number of received/sent JoinEmpty messages.
RecJoinIn/ SentJoinIn	Number of received/sent JoinIn messages.
RecEmpty/SentEmpty	Number of received/sent Empty messages.
RecLeaveEmpty/SentLeaveEmpty	Number of received/sent LeaveEmpty messages,
RecLeaveIn/ SentLeaveIn	Number of received/sent LeaveIn messages.
RecLeaveAll/SentLeaveAll	Number of received/sent LeaveAll messages.
SentGvrpPdu	Number of sent GPDU messages.
JoinIndicated/ LeaveIndicated	Number of Join/Leave service requests.
JoinPropagated / LeavePropagated	Number of Join/Leave topology update requests.

Related Commands

Command	Description
clear gvrp statistics	Clears the statistics of one interface or all interfaces.

Platform Description N/A

11.12 Show Gvrp Status

Use this command to display all dynamic VLAN ports generated by GVRP and the dynamic VLAN ports added to the static VLAN.

show gvrp status

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command mode Privileged EXEC mode.

Usage Guide Use the **show gvrp status** command to display the GVRP status.

Configuration Examples The following example displays the GVRP status.

```
FS# show gvrp status
VLAN 1
Dynamic Ports:
DVLAN 2
Dynamic Ports：
```

Field	Description
VLAN	Static VLAN
DVLAN	Dynamic VLAN
Dynamic Ports	Dynamic ports.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.13 show l2protocol-tunnel gvrp

Use this command to display GVRP PDUs TUNNEL configuration.

show l2protocol-tunnel gvrp

Parameter

Parameter	Description

Description

N/A	N/A

Defaults N/A

Command mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays GVRP PDUs TUNNEL configuration.

```
FS# show l2protocol-tunnel gvrp

L2protocol-tunnel: Gvrp Enable
L2protocol-tunnel destination mac address:011a.a900.0006
GigabitEthernet 0/1 l2protocol-tunnel gvrp enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12. LLDP Commands

12.1 { voice | voice-signaling } Vlan

Use this command to configure the LLDP network policy. Use the **no** form of this command to delete the policy.

{ **voice | voice-signaling** } **vlan** { { *vlan-id* [**cos** *cvalue* **| dscp** *dvalue*] } | { **dot1p** [**cos** *cvalue* **| dscp** *dvalue*] } **| none | untagged** }

no { **voice | voice-signaling** } **vlan**

Parameter Description

Parameter	Description
voice	Voice application
voice-signaling	Voice-signaling application
vlan-id	(Optional) VLAN ID of voice flow. The value ranges from 1 to 4094.
cos	(Optional) Class of service
cvalue	(Optional) CoS of the configured voice flow. The value ranges from 0 to 7, and the default value is **5**.
dscp	(Optional) Differentiated services code point
dvalue	(Optional) DSCP value of the configured voice flow. The value ranges from 0 to 63. The default value is 46.
dot1p	(Optional) 802.1p priority tagging. The tag frame includes user_priority and vlan id is 0.
none	(Optional) The network policy is not advertised. VoIP determines the network policy based on its configuration.
untagged	(Optional) The untag frame is sent in the voice vlan in VoIP. In this case, the value of vlan id and cos are ignored.

Defaults N/A

Command Mode LLDP network policy configuration mode

Usage Guide In the LLDP network policy configuration mode, configure the LLDP network policy.

Configuration Examples The following example configures the LLDP network policy (profile-num is 1).

```
FS#config
FS(config)#lldp network-policy profile 1
FS(config-lldp-network-policy)# voice vlan untagged
FS(config-lldp-network-policy)# voice-signaling vlan 3 cos 4
FS(config-lldp-network-policy)# voice-signaling vlan 3 dscp 6
```

Related Commands

Command	Description
show lldp network-policy profile [*profile-num*]	Displays the LLDP network policy.

Platform N/A

Description

12.2 Civic-location

Use this command to configure a common LLDP address. Use the **no** form of this command to delete the address.

{ **country | state | county | city | division | neighborhood | street-group | leading-street-dir | trailing-street-suffix | street-suffix | number | street-number-suffix | landmark | additional-location-information | name | postal-code | building | unit | floor | room | type-of-place | postal-community-name | post-office-box | additional-code** } *ca-word*

no { **country | state | county | city | division | neighborhood | street-group | leading-street-dir | trailing-street-suffix | street-suffix | number | street-number-suffix | landmark | additional-location-information | name | postal-code | building | unit | floor | room | type-of-place | postal-community-name | post-office-box | additional-code** } *ca-word*

Parameter Description

Parameter	Description
country	Country code, two bytes. For example, the country code of China is CH.
state	Address information, CA type 1
county	CA type 2
city	CA type 3
division	CA type 4
neighborhood	CA type 5
street-group	CA type 6
leading-street-dir	CA type 16
trailing-street-suffix	CA type 17
street-suffix	CA type 18
number	CA type 19
street-number-suffix	CA type 20
landmark	CA type 21
additional-location-information	CA type 22
name	CA type 23
postal-code	CA type 24
building	CA type 25
unit	CA type 26
floor	CA type 27
room	CA type 28
type-of-place	CA type 29
postal-community-name	CA type 30
post-office-box	CA type 31
additional-code	CA type 32
ca-word	Address information

Defaults N/A

Command Mode LLDP Civic address configuration mode

Usage Guide This command is used to configure a common LLDP address in LLDP Civic address configuration mode.

Configuration Examples The following example configures an LLDP Civic Address (ID: 1).

```
FS#config
FS(config)# lldp location civic-location identifier 1
FS(config-lldp-civic)# country CH
FS(config-lldp-civic)# city Fuzhou
```

Related Commands

Command	Description
show lldp location civic-location { **identifier** *id* **| interface** *interface-name* **| static** }	Displays the information about an LLDP Civic address.

Platform Description N/A

12.3 Clear Lldp Statistics

Use this command to clear LLDP statistics.

clear lldp statistics [**interface** *interface-name*]

Parameter Description

Parameter	Description
interface-name	Interface name

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide **interface** parameter: clear the LLDP statistics of the specified interface

Configuration Examples The following example clears LLDP statistics of interface 1.

```
FS# clear lldp statistics interface GigabitEthernet 0/1
FS# show lldp statistics interface GigabitEthernet 0/1
Lldp statistics information of port [GigabitEthernet 0/1]
-----------------------------------------------------------
The number of lldp frames transmitted    : 0
The number of frames discarded        : 0
The number of error frames          : 0
The number of lldp frames received      : 0
The number of TLVs discarded        : 0
The number of TLVs unrecognized        : 0
```

```
The number of neighbor information aged out : 0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.4 Clear Lldp Table

Use this command to clear LLDP neighbor information.

clear lldp table [**interface** *interface-name*]

Parameter Description

Parameter	Description
interface-name	Interface name

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide If the **interface** parameter is specified, the LLDP neighbor information on the specified interface is cleared.

If the **interface** parameter is not specified, the LLDP neighbor information on all interfaces is cleared.

Configuration Examples The following example clears the LLDP neighbor information on interface 1.

```
FS# show lldp neighbors interface GigabitEthernet 0/1
Lldp statistics information of port [GigabitEthernet 0/1]
------------------------------------------------------------
The number of lldp frames transmitted    : 0
The number of frames discarded        : 0
The number of error frames          : 0
The number of lldp frames received      : 0
The number of TLVs discarded        : 0
The number of TLVs unrecognized        : 0
The number of neighbor information aged out : 0
FS# clear lldp table interface GigabitEthernet 0/1
FS# show lldp neighbors interface GigabitEthernet 0/1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.5 Device-type

Use this command to configure the device type. Use the **no** form of this command to restore the default setting.

device-type *device-type*

no device-type

Parameter Description

Parameter	Description
device-type	Device type. The value ranges from 0 to 2. 0: The device type is DHCP Server. 1: The device type is switch. 2: The device type is LLDP MED terminal.

Defaults

Command Mode

LLDP Civic address configuration mode

Usage Guide

This command is used to configure the device type in a common LLDP address in LLDP Civic address configuration mode.

Configuration Examples

The following example sets the device type to switch.

```
FS#config
FS(config)# lldp location civic-location identifier 1
FS(config-lldp-civic)# device-type 1
```

Related Commands

Command	Description
show lldp location civic-location { **identifier** *id* **| interface** *interface-name* **| static** }	Displays LLDP Civic Address information.

Platform Description

N/A

12.6 Lldp Compliance Vendor

Use this command to enable detection of compatible neighbors.

lldp compliance vendor

no lldp compliance vendor

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide N/A

Configuration Examples The following example enables detection of compatible neighbors.

```
FS#configure terminal
FS(config)# lldp compliance vendor
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.7 Lldp Enable

Use this command to enable the LLDP globally or on the interface. Use **no** form of this command to disable this function.

lldp enable

no lldp enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Global (or interface) configuration mode

Usage Guide LLDP takes effect on an interface only when LLDP is enabled globally.

Configuration Examples The following example disables LLDP globally and on the interface.

```
FS#config
FS(config)#no lldp enable
FS(config)#interface gigabitethernet 0/1
FS(config-if)# no lldp enable
```

Related Commands

Command	Description
show lldp status	Displays LLDP status information.

Platform Description N/A

12.8 Lldp Encapsulation Snap

Use this command to configure the encapsulation format of LLDP packets. Use the **no** form of this command to

restore the default setting.

lldp encapsulation snap

no lldp encapsulation snap

Parameter Description

Parameter	Description
N/A	N/A

Defaults

By default, Ethernet II encapsulation format is used.

Command Mode

Interface configuration mode.

Usage Guide

To guarantee the normal communication between local device and neighbor device, the same LLDP packet encapsulation format must be used.

Configuration Examples

The following example sets LLDP packet encapsulation format to SNAP.

```
FS#config
FS(config)#interface gigabitethernet 0/1
FS(config-if)#lldp encapsulation snap
```

Related Commands

Command	Description
show lldp status	Displays LLDP status information.

Platform Description

N/A

12.9 Lldp Error-detect

Use this command to configure the LLDP error detection, including the detection of VLAN configurations on both sides of the link, port state detection, port aggregation configuration detection, MTU configuration detection and loop detection. If any error is detected by LLDP, warning message will be printed to notify the administrator. Use the **no** form of this command to disable this function.

lldp error-detect

no lldp error-detect

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default.

Command Mode

Interface configuration mode.

Usage Guide

LLDP error detection relies on the specific TLV in the LLDP packets exchanged between devices on both sides of

the link. To ensure normal functioning of the detection feature, correct TLVs must be advertised.

Configuration Examples

The following example configures LLDP error detection.

```
FS#config
FS(config)#interface gigabitethernet 0/1
FS(config-if)#lldp error-detect
```

Related Commands

Command	Description
show interface status	Displays LLDP status information.

Platform Description

N/A

12.10 Lldp Fast-count

When a new neighbor is detected or when LLDP operating mode changes from shutdown or Rx to TxRx or Tx, to allow the neighbor device to quickly study the information about this device, the fast sending mechanism will be initiated. The fast sending mechanism shortens the LLDPDU sending interval to 1 second and continuously transmits a certain number of LLDPDUs before restoring to the normal transmit interval. Use the **no** form of this command to restore the default setting.

lldp fast-count *value*

no lldp fast-count

Parameter Description

Parameter	Description
value	The number of fast sent LLDP packets, in the range from 1 to 10.

Defaults

The default is 3.

Command Mode

Global configuration mode.

Usage Guide

N/A

Configuration Examples

The following example sets the number of fast sent LLDP packets to 5.

```
FS#config
FS(config)#lldp fast-count 5
```

Related Commands

Command	Description
show interface status	Displays LLDP status information.

Platform Description

N/A

12.11 Lldp Hold-multiplier

Use this command to set the TTL multiplier. Use the **no** form of this command to restore to default setting.

lldp hold-multiplier *value*

no lldp hold-multiplier

Parameter Description

Parameter	Description
value	TTL multiplier, in the range from 2 to 10.

Defaults

The default is 4.

Command Mode

Global configuration mode.

Usage Guide

The value of Time To Live (TLV) in LLDP packet = TTL multiplier × LLDP packet transmit interval + 1. Therefore, the TTL of local device information on the neighbor device can be controlled by adjusting TTL multiplier.

Configuration Examples

The following example sets TTL multiplier to 5.

```
FS#config
FS(config)#lldp hold-multiplier 5
```

Related Commands

Command	Description
show lldp status	Displays LLDP status information.

Platform Description

N/A

12.12 Lldp Location Civic-location Identifier

Use this command to create a common address of a device connected to the network in LLDP Civic Address configuration mode. Use the **no** form of this command to delete the address.

lldp location civic-location identifier *id*

no lldp location civic-location identifier *id*

Parameter Description

Parameter	Description
id	ID of a common address of a network device, in the range from 1 to 1024.

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

This command can be used to enter the LLDP Civic Address configuration mode.

Configuration Examples

The following example creates the Civic Address information in LLDP MED-TLV as follows: set *id* to **1**.

```
FS#config
FS(config)#lldp location civic-location identifier 1
FS(config-lldp-civic)#
```

Related Commands

Command	Description
show lldp location civic-location { **identifier** *id* **|** **interface** *interface-name* **|** **static** }	Displays the LLDP Civic Address information.

Platform Description N/A

12.13 Lldp Location Elin Identifier

Use this command to set an emergency number encapsulated in a Location Identification TLV. Use the **no** form of this command to delete the number.

lldp location elin identifier *id* **elin-location** *tel-number*

no lldp location elin identifier *id*

Parameter Description

Parameter	Description
id	ID of an emergency number, in the range from 1 to 1024.
tel-number	Emergency number, in the range from 10 to 25 bytes.

Defaults N/A

Command Mode Global configuration mode

Usage Guide This command is used to configure an emergency number.

Configuration Examples The following example sets an emergency number.

```
FS#config
FS(config)#lldp location elin identifier 1 elin-location 085283671111
```

Related Commands

Command	Description
show lldp location elin-location { **identifier** *id* **|** **interface** *interface-name* **|** **static** }	Displays an LLDP emergency number.

Platform Description N/A

12.14 Lldp Management-address-tlv

Use this command to configure the management address advertised in LLDP packets. Use the **no** form of this command to disable the advertisement of management address.

lldp management-address-tlv [*ip-address*]

no lldp management-address-tlv

Parameter Description

Parameter	Description
ip-address	The management address advertised in LLDP packets.

Defaults N/A

Command Mode Interface configuration mode.

Usage Guide By default, the management address is advertised in LLDP packets, and is the IPv4 address of the lowest-ID VLAN carried on the port. If IPv4 address is not configured for this VLAN, the next lowest-ID VLAN carried on the port will be tried until the IPv4 address is obtained.
If the IPv4 address is still not found, the IPv6 address of the lowest-ID VLAN carried on the port will be tried.
If the IPv6 address is still not found, the MAC address of the device will be advertised as the management address.

Configuration Examples The following example configures the management address advertised in LLDP packets to 192.168.1.1.

```
FS#config
FS(config)#interface gigabitethernet 0/1
FS(config-if)#lldp management-address-tlv 192.168.1.1
```

Related Commands

Command	Description
show lldp local-information	Displays LLDP local information

Platform Description N/A

12.15 Lldp Mode

Use this command to configure the LLDP operating mode. Use **no** form of this command to restore the default setting.

lldp mode { **rx** | **tx** | **txrx** }

no lldp mode

Parameter Description

Parameter	Description
rx	Only sends LLDPDUs.
tx	Only receives LLDPDUs.
txrx	Sends and receives LLDPDUs.

Defaults The default is **txrx**.

Command Mode Interface configuration mode

Usage Guide Disable LLDP operating mode on the interface. The interface won't send and receive LLDP packets.
The precondition for enabling LLDP on the interface is that LLDP has been enabled globally and LLDP operates in tx, rx or txrx mode.

Configuration Examples

The following example sets LLDP operating mode to tx on the interface.

```
FS#config
FS(config)#interface gigabitethernet 0/1
FS(config-if)#lldp mode tx
```

Related Commands

Command	Description
show lldp status	Displays LLDP status information

Platform Description

N/A

12.16 Lldp Network-policy Profile

Use this command to create an LLDP network policy and enter the LLDP network policy configuration mode. Use the no form of this command to delete the policy.

lldp network-policy profile *profile-num*

no lldp network-policy profile *profile-num*

Parameter Description

Parameter	Description
profile-num	ID of an LLDP network policy, in the range from 1 to 1024.

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

This command is used to enter the LLDP network policy configuration mode. When this command is run, the policy ID must be specified.

In LLDP network-policy mode, the { **voice** | **voice-signaling** } **vlan** command can be used to configure the specific network policy.

Configuration Examples

The following example creates an LLDP network policy whose ID is 1.

```
FS#config
FS(config)#lldp network-policy profile 1
FS(config-lldp-network-policy)#
```

Related Commands

Command	Description
show lldp network-policy profile [*profile-num*]	Displays an LLDP network policy.

Platform Description

N/A

12.17 Lldp Notification Remote-change Enable

Use this command to configure LLDP Trap. Use the **no** form of this command to restore the default setting.

lldp notification remote-change enable

no lldp notification remote-change enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode.

Usage Guide

By configuring LLDP Trap, the LLDP information of local device (such as information about the detection of new neighbor or the fault on the communication link) can be sent to the network management server. The administrator can monitor the network operation status according to such information.

Configuration Examples

The following example configures LLDP Trap.

```
FS#config
FS(config)#interface gigabitethernet 0/1
FS(config-if)#lldp notification remote-change enable
```

Related Commands

Command	Description
show lldp status	Displays LLDP status information.

Platform Description

N/A

11.1 Lldp Timer Notification-interval

Use this command to set an interval of sending LLDP Traps. Use the **no** form of this command to restore the default setting.

lldp timer notification-interval *seconds*

no lldp timer notification-interval

Parameter Description

Parameter	Description
seconds	Interval of sending LLDP Traps, in the range from 5 to 3600 in the unit of seconds.

Defaults

The default is 5.

Command Mode

Global configuration mode.

Usage Guide

To prevent excessive LLDP traps from being sent, you can set an interval of sending LLDP Traps. If LLDP information change is detected during this interval, traps will be sent to the network management server.

Configuration Examples

The following example sets the interval of sending LLDP Traps to 10 seconds.

```
FS#config
FS(config)#lldp timer notification-interval 10
```

Related Commands

Command	Description
show lldp status	Displays LLDP status information.

Platform Description

N/A

12.18 Lldp Timer Reinit-delay

Use this command to set port initialization delay. Use the **no** form of this command to restore he default setting.

lldp timer reinit-delay *seconds*

no lldp timer reinit-delay

Parameter Description

Parameter	Description
seconds	Port initialization delay, in the range from 1 to 10 in the unit of seconds.

Defaults

The default is 2.

Command Mode

Global configuration mode.

Usage Guide

To prevent LLDP from being initialized too frequently due to the frequent operating mode change, you can configure port initialization delay.

Configuration Examples

The following example sets LLDP port initialization delay to 3 seconds.

```
FS#config
FS(config)#lldp timer reinit-delay 3
```

Related Commands

Command	Description
show lldp status	Displays LLDP status information.

Platform Description

N/A

12.19 Lldp Timer Tx-delay

Use this command to set LLDP packet transmission delay. Use the **no** form of this command to restore the default setting.

lldp timer tx-delay *seconds*

no lldp timer tx-delay

Parameter Description

Parameter	Description
seconds	LLDP packet transmission delay, in the range from 1 to 8192 in the unit of seconds.

Defaults The default is 2.

Command Mode Global configuration mode.

Usage Guide An LLDP-enabled port will send LLDP packets when the local device information changes. To avoid frequently sending LLDP packets due to the frequent local device information change, configure the LLDP packet transmission delay to control the frequent transmission of LLDP packets.

Configuration Examples The following example sets LLDPDU transmission delay to 3 seconds.

```
FS#config
FS(config)#lldp timer tx-delay 3
```

Related Commands

Command	Description
show lldp status	Displays LLDP status information.

Platform Description N/A

12.20 Lldp Timer Tx-interval

Use this command to set the interval of sending the LLDP packets. Use **no** form of this command to restore the default setting.

lldp timer tx-interval *seconds*

no lldp timer tx-interval

Parameter Description

Parameter	Description
seconds	Interval of sending the LLDP packets, in the range from 5 to 32768 in the unit of seconds.

Defaults The default is 30.

Command Mode Global configuration mode.

Usage Guide N/A

Configuration The following example sets the interval of sending the LLDP packets to 10 seconds.

Examples

```
FS#config
FS(config)#lldp timer tx-interval 10
```

Related Commands

Command	Description
show lldp status	Displays LLDP status information.

Platform Description

N/A

12.21 Lldp Tlv-enable

Use this command to configure the types of advertisable TLVs. Use the **no** form of this command to restore the default setting.

lldp tlv-enable { **basic-tlv** { **all | port-description | system-capability | system-description | system-name** } **| dot1-tlv** { **all | port-vlan-id | protocol-vlan-id** [*vlan-id*] **| vlan-name** [*vlan-id*] } **| dot3-tlv** { **all | link-aggregation | mac-physic | max-frame-size | power** } **| med-tlv** { **all | capability | inventory | location** { **civic-location | elin** } **identifier** *id* **| network-policy profile** [*profile-num*] **| power-over-ethernet** } }

no lldp tlv-enable { **basic-tlv** { **all | port-description | system-capability | system-description | system-name** } **| dot1-tlv** { **all | port-vlan-id | protocol-vlan-id | vlan-name** } **| dot3-tlv** { **all | link-aggregation | mac-physic | max-frame-size | power** } **| med-tlv** { **all | capability | inventory | location** { **civic-location | elin** } **identifier** *id* **| network-policy profile** [*profile-num*] **| power-over-ethernet** } }

Parameter Description

Parameter	Description
basic-tlv	Basic management TLV
port-description	Port Description TLV
system-capability	System Capabilities TLV
system-description	System Description TLV
system-name	System Name TLV
dot1-tlv	802.1 organizationally specific TLV
port-vlan-id	Port VLAN ID TLV
protocol-vlan-id	Port And Protocol VLAN ID TLV
vlan-id	VLAN ID
vlan-name	VLAN Name TLV
vlan-id	VLAN ID corresponding to the specified VLAN name
dot3-tlv	802.3 organizationally specific TLV
link-aggregation	Link Aggregation TLV
mac-physic	MAC/PHY Configuration/Status TLV
max-frame-size	Maximum Frame Size TLV
power	Power Via MDI TLV
med-tlv	LLDP MED TLV
capability	LLDP-MED Capabilities TLV

inventory	Inventory management TLVs, including hardware revision TLVs, firmware revision TLVs, software revision TLVs, serial number TLVs, manufacturer name TLVs, model name TLVs, and asset ID TLVs.
location	Location Identification TLV
civic-location	Common address information about the network device in location identification TLVs.
elin	Encapsulated emergency number
id	Policy ID
network-policy	Network Policy TLV
profile-num	ID of network policy
power-over-ethernet	Extended Power-via-MDI TLV

Defaults

-

Command Mode

Interface configuration mode

Usage Guide

During configuration of basic management TLVs, IEEE 802.1 TLVs, and IEEE 802.3 TLVs, if the **all** parameter is specified, all optional TLVs of the types are advertised.

During configuration of LLDP-MED TLVs, if the **all** parameter is specified, all LLDP-MED TLVs except Location Identification TLVs are advertised.

When configuring LLDP-MED Capability TLVs, configure LLDP-MED MAC/PHY TLVs first. When canceling LLDP-MED MAC/PHY TLVs, cancel LLDP-MED Capability TLVs first.

When configuring LLDP-MED TLVs, configure LLDP-MED Capability TLVs first so that LLDP-MED TLVs of other types can be configured.

To cancel LLDP-MED TLVs, cancel LLDP-MED TLVs of other types first so that LLDP-MED Capability TLVs can be canceled.

Configuration Examples

The following example configures all IEEE 802.1 TLVs to be advertised.

```
FS# configure terminal
FS(config)#interface gigabitethernet 0/1
FS(config-if-GigabitEthernet 0/1)#lldp tlv-enable dot1-tlv all
```

The following example applies LLDP network policy 1 on the 0/1 interface.

```
FS#config
FS(config)#interface gigabitethernet 0/1
FS(config-if-GigabitEthernet 0/1)#lldp tlv-enable med-tlv network-policy profile 1
```

The following example applies the LLDP Civic Address (ID: 1) configuration on the 0/1 interface.

```
FS#config
FS(config)#interface gigabitethernet 0/1
FS(config-if-GigabitEthernet 0/1)#lldp tlv-enable med-tlv location civic-location identifier 1
```

The following example applies the emergency number (ID: 1) on the 0/1 interface.

```
FS#config
FS(config)#interface gigabitethernet 0/1
FS(config-if-GigabitEthernet 0/1)#lldp location elin identifier 1
```

Related Commands

Command	Description
show lldp tlv-config interface	Displays the attributes of advertisable TLVs

Platform Description N/A

12.22 Show Lldp Local-information

Use this command to display the LLDP information of local device. The information will be encapsulated in the TLVs and sent to the neighbor device.

show lldp local-information [**global** | **interface** *interface-name*]

Parameter Description

Parameter	Description
interface-name	Interface name

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide

- **global** parameter: display the global LLDP information to be sent.
- **Interface** parameter: displays the LLDP information to be sent out the interface specified.
- No parameter: display all LLDP information, including global and interface-based LLDP information.

Configuration Examples The following example displays the device information to be sent to neighbor device.

```
FS# show lldp local-information
Global LLDP local-information:
 Chassis ID type          : MAC address
 Chassis id            : 00d0.f822.33aa
 System name              : System name
 System description       : System description
 System capabilities supported    : Repeater, Bridge, Router
 System capabilities enabled    : Repeater, Bridge, Router

 LLDP-MED capabilities        : LLDP-MED Capabilities, Network Policy, Location Identification, Extended Power via
      MDI–PD, Inventory
 Device class            : Network Connectivity
 HardwareRev             : 1.0
 FirmwareRev             :
```

```
 SoftwareRev            : FSOS 10.4(3) Release(94786)
 SerialNum              : 1234942570001
 Manufacturer name      : Manufacturer name
 Asset tracking identifier     :
-------------------------------------------------------
Lldp local-information of port [GigabitEthernet 0/1]
-------------------------------------------------------
 Port ID type           : Interface name
 Port id                : GigabitEthernet 0/1
 Port description       :

 Management address subtype    : 802 mac address
 Management address        : 00d0.f822.33aa
 Interface numbering subtype    :
 Interface number       : 0
 Object identifier      :



 802.1 organizationally information
 Port VLAN ID           : 1
 Port and protocol VLAN ID(PPVID) : 1
   PPVID Supported      : YES
   PPVID Enabled        : NO
 VLAN name of VLAN 1        : VLAN0001
 Protocol Identity      :



 802.3 organizationally information
 Auto-negotiation supported    : YES
 Auto-negotiation enabled      : YES
 PMD auto-negotiation advertised : 100BASE-TX full duplex mode, 100BASE-TX half duplex mode
 Operational MAU type       :
 PoE support            : NO
 Link aggregation supported    : YES
 Link aggregation enabled      : NO
 Aggregation port ID        : 0
 Maximum frame Size         : 1500

 LLDP-MED organizationally information
 Power-via-MDI device type      : PD
 Power-via-MDI power source     : Local
 Power-via-MDI power priority    :
 Power-via-MDI power value      :
 Model name             : Model name
```

show lldp local-information command output description:

Field	Description
Chassis ID type	Chassis ID type for identifying the Chassis ID field
Chassis ID	Used to identify the device, and is generally represented with MAC address
System name	Name of the sending device
System description	Description of the sending device, including hardware/software version, operating system and etc.
System capabilities supported	Capabilities supported by the system
System capabilities enabled	Capabilities currently enabled by the system
LLDP-MED capabilities	LLDP-MED capabilities supported by the system
Device class	MED device class, which is divided into 2 categories: network connectivity device and terminal device. Network connectivity device Class I: normal terminal device Class II: media terminal device; besides Class I capabilities, it also supports media streams. Class III: communication terminal device; it supports all the capabilities of Class I and Class II and IP communication.
HardwareRev	Hardware version
FirmwareRev	Firmware version
SoftwareRev	Software version
SerialNum	Serial number
Manufacturer name	Device manufacturer
Asset tracking identifier	Asset tracking ID
Port ID type	Port ID type
Port ID	Port ID
Port description	Port description
Management address subtype	Management address type
Management address	Management address
Interface numbering subtype	Type of the interface identified by the management address
Interface number	ID of the interface identified by the management address
Object identifier	ID of the object identified by the management address
Port VLAN ID	Port VLAN ID
Port and protocol VLAN ID	Port and Protocol VLAN ID
PPVID Supported	Indicates whether port and protocol VLAN is supported
PPVID Enabled	Indicates whether port and protocol VLAN is enabled
VLAN name of VLAN 1	Name of VLAN 1
Protocol Identity	Protocol identifier
Auto-negotiation supported	Indicates whether auto-negotiation is supported
Auto-negotiation enabled	Indicates whether auto-negotiation is enabled

PMD auto-negotiation advertised	Auto-negotiation advertising capability of the port
Operational MAU type	Speed and duplex state of the port
PoE support	Indicates whether POE is supported
Link aggregation supported	Indicates whether link aggregation is supported
Link aggregation enabled	Indicates whether link aggregation is enabled
Aggregation port ID	ID of the link aggregation port
Maximum frame Size	Maximum frame size supported by the port
Power-via-MDI device type	Device type, including: PSE (power sourcing equipment) PD (powered device)
Power-via-MDI power source	Power source type
Power-via-MDI power priority	Power supply priority
Power-via-MDI power value	Available power on port
Model name	Name of model

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.23 Show Lldp Location

Use this command to display the common LLDP address or emergency number of the local device.

show lldp location { **civic-location | elin-location**} { **identifier** *id* **| interface** *interface-name* **| static** }

Parameter Description

Parameter	Description
civic-location	Encapsulates a common address of a network device.
elin-location	Encapsulates an emergency number.
identifier	Displays one address or emergency number configured.
id	Policy ID of configured information
interface	Displays the address or emergency number on an interface.
interface-name	Interface name
static	Displays all addresses or emergency numbers configured.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide If the policy ID is specified, the specified address or emergency number is displayed.

If the interface name is specified, the address or emergency number configured on the interface is displayed.

If no parameter is specified, all addresses or emergency numbers are displayed.

Configuration Examples

The following example displays all addresses.

```
FS# show lldp location civic-location static
LLDP Civic location information
---------------------------
Identifier          : testt
County              : china
City Division       : 22
Leading street direction : 44
Street number       : 68
Landmark            : 233
Name                : liuy
Building            : 19bui
Floor               : 1
Room                : 33
City                : fuzhou
Country             : 86
Additional location    : aaa
Ports               : Gi0/1
---------------------------
Identifier          : tee
---------------------------
```

The following example displays all emergency numbers.

```
FS# show lldp location elin-location static
Elin location information
---------------------------
Identifier : t
Elin    : iiiiiiiiii
Ports               : Gi1/0/3
---------------------------
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

12.24 Show Lldp Neighbors

Use this command to display the LLDP information about a neighboring device.

show lldp neighbors [**interface** *interface-name*] [**detail**]

Parameter

Parameter	Description

Description

interface-name	Interface name
detail	All information about a neighboring device

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

If the **detail** parameter is not specified, the brief information about a neighboring device is displayed.

If the **detail** parameter is specified, the detailed information about a neighboring device is displayed.

If the **interface** parameter is specified, the neighboring device information received on the specified interface is displayed.

Configuration Examples

The following example displays the neighboring device information received on all ports.

```
FS# show lldp neighbors detail
Lldp neighbor-information of port [GigabitEthernet 0/1]
 Neighbor index          : 1
 Device type             : LLDP Device
 Update time             : 1hour 53minutes 30seconds
Aging time               : 5seconds

 Chassis ID type         : MAC address
 Chassis id              : 00d0.f822.33cd
 System name             : System name
 System description      : System description
 System capabilities supported    : Repeater, Bridge, Router
 System capabilities enabled    : Repeater, Bridge, Router

 Management address subtype    : 802 mac address
 Management address      : 00d0.f822.33cd
 Interface numbering subtype    :
 Interface number        : 0
 Object identifier       :



 LLDP-MED capabilities      :
 Device class            :
 HardwareRev             :
 FirmwareRev             :
 SoftwareRev             :
 SerialNum               :
 Manufacturer name       :
 Asset tracking identifier     :
```

```
Port ID type          : Interface name
Port id               : GigabitEthernet 0/1
Port description      :

802.1 organizationally information
Port VLAN ID          : 1
Port and protocol VLAN ID(PPVID) : 1
  PPVID Supported     : YES
  PPVID Enabled       : NO
VLAN name of VLAN 1   : VLAN0001
Protocol Identity     :
802.3 organizationally information
Auto-negotiation supported    : YES
Auto-negotiation enabled      : YES
PMD auto-negotiation advertised : 1000BASE-T full duplex mode, 100BASE-TX full duplex mode, 100BASE-TX
      half duplex mode, 10BASE-T full duplex mode, 10BASE-T half duplex mode
Operational MAU type          : speed(1000)/duplex(Full)
PoE support           : NO
Link aggregation supported    : YES
Link aggregation enabled      : NO
Aggregation port ID           : 0
Maximum frame Size            : 1500
LLDP-MED organizationally information
Power-via-MDI device type     :
Power-via-MDI power source    :
Power-via-MDI power priority  :
Power-via-MDI power value     :
```

Description of fields:

Field	Description
Neighbor index	Neighbor index
Device type	Type of neighboring device
Update time	Latest update time of neighbor information
Aging time	Aging time of a neighbor, namely the time after which a neighbor is aged and deleted
Chassis ID type	Chassis ID type
Chassis ID	Used to identify a device. Usually, a MAC address is used.
System name	Device name
System description	Device description, including hardware/software version and operating system
System capabilities supported	Functions supported by the system
System capabilities enabled	Functions enabled by the system
Management address subtype	Type of management address

Management address	Management address
Interface numbering subtype	Interface type of management address
Interface number	Interface ID of management address
Object identifier	Object ID of management address
Device class	MED device type: network connectivity device and terminal device Network connectivity device: Class I: general terminal device Class II: media terminal device, including capabilities of Class I and supporting media stream Class III: communication terminal device, including capabilities of Class I and Class II and supporting IP communication
HardwareRev	Hardware version
FirmwareRev	Firmware version
SoftwareRev	Software version
SerialNum	Serial number
Manufacturer name	Manufacturer name
Asset tracking identifier	Asset ID
Port ID type	Port ID type
Port ID	Port ID
Port description	Port description
Port VLAN ID	VLAN ID of a port
Port and protocol VLAN ID	Port and protocol VLAN ID
PPVID Supported	Whether port and protocol VLAN is supported
PPVID Enabled	Whether port and protocol VLAN is enabled
VLAN name of VLAN 1	VLAN 1 name
Protocol Identity	Protocol ID
Auto-negotiation supported	Whether auto-negotiation is supported
Auto-negotiation enabled	Whether auto-negotiation is enabled
PMD auto-negotiation advertised	Port auto-negotiation advertisement capability
Operational MAU type	Rate and duplex status of port auto-negotiation
PoE support	Whether POE is supported
Link aggregation supported	Whether link aggregation is supported
Link aggregation enabled	Whether link aggregation is enabled
Aggregation port ID	ID of link aggregation port
Maximum frame Size	Maximum frame length supported by a port
Power-via-MDI device type	Device type, including: ● PSE ● PD
Power-via-MDI power source	Power type
Power-via-MDI power priority	Power supply priority
Power-via-MDI power value	Power value of a port where power is supplied

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.25 Show Lldp Network-policy Profile

Use this command to display the information about an LLDP network policy.

show lldp network-policy { **profile** [*profile-num*] | **interface** *interface-name* }

Parameter Description

Parameter	Description
profile-num	ID of a network policy, in the range from 1 to 1024.
interface-name	Interface name

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide If *profile-num* is specified, the information about the specified network policy is displayed.

If no parameter is specified, the information about all network policies is displayed.

Configuration Examples The following example displays the information about a network policy.

```
FS# show lldp network-policy profile
network-policy information:
--------------------------
Network Policy Profile 1
    voice vlan 2 cos 4 dscp 6
    voice-signaling vlan 2000 cos 4 dscp 6
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.26 Show Lldp Statistics

The following example displays LLDP statistics.

show lldp statistics [**global** | **interface** *interface-name*]

Parameter Description

Parameter	Description
interface-name	Interface name

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide

- **global** parameter: display the global LLDP statistics.
- **Interface** parameter: display the LLDP statistics of the specified interface.

Configuration Examples The following example displays all LLDP statistics.

```
FS# show lldp statistics
lldp statistics global Information:
Neighbor information last changed time    : 1hour 52minute 22second
The number of neighbor information inserted : 2
The number of neighbor information deleted : 0
The number of neighbor information dropped : 0
The number of neighbor information age out : 1

------------------------------------------------------------
Lldp statistics information of port [GigabitEthernet 0/1]
------------------------------------------------------------
The number of lldp frames transmitted    : 26
The number of frames discarded        : 0
The number of error frames          : 0
The number of lldp frames received      : 12
The number of TLVs discarded        : 0
The number of TLVs unrecognized        : 0
The number of neighbor information aged out : 0
```

show lldp statistics command output description:

Field	Description
Neighbor information last change time	Time the neighbor information is latest updated
The number of neighbor information inserted	Number of times of adding neighbor information
The number of neighbor information deleted	Number of times of removing neighbor information
The number of neighbor information dropped	Number of times of dropping neighbor information
The number of neighbor information aged out	Number of the neighbor information entries that have aged out
The number of lldp frames transmitted	Total number of the LLDPDUs transmitted
The number of frames discarded	Total number of the LLDPDUs discarded
The number of error frames	Total number of the LLDP error frames received
The number of lldp frames received	Total number of the LLDPDUs received
The number of TLVs discarded	Total number of the LLDP TLVs dropped

The number of TLVs unrecognized	Total number of the LLDP TLVs that cannot be recognized
The number of neighbor information aged out	Number of the neighbor information entries that have aged out

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.27 Show Lldp Status

Use this command to display LLDP status information.

show lldp status [**interface** *interface-name*]

Parameter Description

Parameter	Description
interface-name	Interface name

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide **interface** parameter: display the LLDP status information of the specified interface.

Configuration Examples The following example displays LLDP status information of all ports.

```
FS# show lldp status
Global status of LLDP          : Enable
Neighbor information last changed time : 1hour 52minute 22second
Transmit interval            : 30s
Hold multiplier            : 4
Reinit delay              : 2s
Transmit delay              : 2s
Notification interval          : 5s
Fast start counts            : 3
------------------------------------------------------------
Port [GigabitEthernet 0/1]
------------------------------------------------------------
Port status of LLDP        : Enable
Port state            : UP
Port encapsulation        : Ethernet II
Operational mode        : RxAndTx
Notification enable        : NO
Error detect enable        : YES
```

```
Number of neighbors        : 1
Number of MED neighbors     : 0
```

show lldp status command output description:

Field	Description
Global status of LLDP	Whether LLDP is globally enabled
Neighbor information last changed time	Time the neighbor information is latest updated
Transmit interval	LLDPDU transmit interval
Hold multiplier	TTL multiplier
Reinit delay	Port re-initialization delay
Transmit delay	LLDPDU transmit delay
Notification interval	Interval for sending LLDP Traps
Fast start counts	The number of fast sent LLDPDUs
Port status of LLDP	Whether LLDP is enabled on the port
Port state	Link status of port: UP or DOWN
Port encapsulation	LLDPDU encapsulation format
Operational mode	Operating mode of LLDP
Notification enable	Whether LLDP Trap is enabled on the port
Error detect enable	Whether error detection is enabled on the port
Number of neighbors	Number of neighbors
Number of MED neighbors	Number of MED neighbors

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.28 Show Lldp Tlv-config

Use this command to display the advertisable TLV configuration of a port.

show lldp tlv-config [**interface** *interface-name*]

Parameter Description

Parameter	Description
interface-name	Interface name

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide **Interface** parameter: display the LLDP TLV configuration of the specified interface.

Configuration Examples

The following example displays TLV information of port 1.

```
FS# show lldp tlv-config interface GigabitEthernet 0/1
LLDP tlv-config of port [GigabitEthernet 0/1]
-----------------------------------------------------
        NAME        STATUS DEFAULT
---------------------------------- ------ -----------
Basic optional TLV:
Port Description TLV        YES YES
System Name TLV          YES YES
System Description TLV      YES YES
System Capabilities TLV      YES YES
Management Address TLV      YES YES

IEEE 802.1 extend TLV:
Port VLAN ID TLV          YES YES
Port And Protocol VLAN ID TLV    YES YES
VLAN Name TLV            YES YES

IEEE 802.3 extend TLV:
MAC-Physic TLV          YES YES
Power via MDI TLV          YES YES
Link Aggregation TLV        YES YES
Maximum Frame Size TLV      YES YES

LLDP-MED extend TLV:
Capabilities TLV          YES YES
Network Policy TLV        YES YES
Location Identification TLV    NO    NO
Extended Power via MDI TLV    YES YES
Inventory TLV            YES YES
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

13. QinQ Commands

13.1 Dot1q New-outer-vlan New-vid Translate Old-outer-vlan Vid Inner-Vlan V-List

Use this command to modify the policy list of outer vid based on the inner Tag VID and outer Tag VID on the access, trunk, hybrid, uplink port. Use the **no** form of this command to restore the default setting.

dot1q new-outer-vlan *new-vid* **translate old-outer-vlan** *vid* **inner-vlan** *v_list*

no dot1q new-outer-vlan *new-vid* **translate old-outer-vlan** *vid* **inner-vlan** *v_list*

Parameter Description

Parameter	Description
new-vid	Vid list of the
vid	Vid of outer tag.
no	Removes the setting.

Defaults

The policy list is null by default.

Command Mode

Interface configuration mode.

Usage Guide

N/A.

Configuration Examples

The following example modifies the vid to 3888 when the input packets inner tag vid.

```
FS(config)# vlan 1888, 3888
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# switchport mode trunk
FS(config-if)# dot1q new-outer-vlan 3888 translate old-outer-vlan 1888 inner-vlan 2001-3000
FS(config-if)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

13.2 Dot1q Outer-vid Vid Register Inner-vid V-List

Use this command to configure the add policy list of outer vid based on protocol on tunnel port. Use the **no** or **default** form of this command to restore the default setting.

dot1q outer-vid *vid* **register inner-vid** *v_list*

no dot1q outer-vid *vid* **register inner-vid** *v_list*

Parameter Description

Parameter	Description
v_list	Inner vlan id list

vid	Outer vlan id list

Defaults The policy list is null by default.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example specifies vid in the tag of input message as 4-22 and setss the vid to 3.

```
FS#configure
FS(config)#interface gigabitEthernet 0/1
FS(config-if)#switchport mode dot1q-tunnel
FS(config-if)#dot1q outer-vid 3 register inner-vid 4-22
FS(config-if)#end
```

Related Commands

Command	Description
show registration-table [**interface** *intf-id*]	N/A

Platform Description N/A

13.3 Dot1q Relay-vid Vid Translate Local-vid V-list

Use this command to configure the modify policy list of outer vid based on protocol on access, trunk, hybrid port.

Use the **no** or **default** form of this command to restore the default setting.

dot1q relay-vid *vid* **translate local-vid** *v-list*

no dot1q relay-vid *vid* **translate local-vid** *v-list*

default dot1q relay-vid *vid* **translate local-vid** *v-list*

Parameter Description

Parameter	Description
v_list	Outer vlan list of input message
vid	Modified outer vlan id list
no	Removes the settings.

Defaults The policy list is null by default.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration The following example specifies vid in the outer tag of input message as 10-20 and sets the vid to 100.

Examples

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# switchport mode access
FS(config-if)# dot1q relay-vid 100 translate local-vid 10-20
FS(config-if)# end
```

Related Commands

Command	Description
show translation-table [interface *intf-id*]	N/A

Platform Description N/A

13.4 Dot1q Relay-vid Vid Translate Inner-vid V-List

Use this command to configure the modify policy list of outer vid based on protocol on access, trunk, hybrid port.

Use the **no** or **default** form of this command to restore the default setting.

dot1q relay-vid *vid* **translate inner-vid** *v-list*

no dot1q relay-vid *vid* **translate inner-vid** *v-list*

default dot1q relay-vid *vid* **translate inner-vid** *v-list*

Parameter Description

Parameter	Description
v_list	Outer vlan list of input message
vid	Modified outer vlan id list

Defaults The policy list is null by default.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example configures vid in the outer tag of input message as 10-20 and sets the vid to 100.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# switchport mode access
FS(config-if)# dot1q relay-vid 100 translate inner-vid 10-20
FS(config-if)# end
```

Related Commands

Command	Description
show translation-table [interface *intf-id*]	N/A

Platform Description N/A

13.5 Dot1q-Tunnel Cos Inner-cos-value Remark-cos Outer-cos-value

Use this command to map the priority from the outer tag to the inner tag for the packets on the interface. Use the **no** form of this command to restore the default setting.

dot1q-tunnel cos inner-cos-value remark-cos outer-cos-value

no dot1q-tunnel cos inner-cos-value remark-cos outer-cos-value

default dot1q-Tunnel cos *inner-cos-value* **remark-cos** *outer-cos-value*

Parameter Description

Parameter	Description
inner-cos-value	Indicates the CoS value of the inner tag.
outer-cos-value	Indicates the CoS value of the outer tag.
no	Cancels the priority mapping of the packets on the interface.

Defaults

The policy list is null by default.

Command Mode

Interface configuration mode.

Usage Guide

If the QoS policy based on the COS value is set for the service provider's network to which a user network connects, the COS value of the outer tag can be set to different values based on the data packet importance. In this case, important services can be preferentially processed and transmitted.

Configuration Examples

The following example configures the priority mapping from the outer tag to the inner tag.

```
FS# configure
FS(config)# interface gigabitEthernet 0/2
FS(config-if)# dot1q-tunnel cos 3 remark-cos 5
FS(config-if)# end
```

Related Commands

Command	Description
show interface intf-name remark	N/A

Platform Description

N/A

13.6 Frame-tag Tpid

Use this command to set the packet TPID compatible with the manufacturer TPID. Use the **no** or **default** form of this command to restore the default setting.

frame-tag tpid *tpid*

no frame-tag tpid

default frame-tag tpid

Parameter Description

Parameter	Description
tpid	Packet TPID.

Defaults The default is 0x8100.

Command Mode Interface configuration mode.

Usage Guide If the TPID value of the connected third-party device is not 0x8100 (default value) defined in IEEE802.1Q, the TPID value on the egress used to connect to the third-party device is the TPID value of the third-party device.

Configuration Examples The following example sets the packet TPID compatible with the manufacturer TPID.

```
FS(config)# interface g0/3
FS(config-if)# frame-tag tpid 0x9100
FS(config-if)# end
FS# show frame-tag tpid
Port        tpid
------   ---------
Gi0/3          0x9100
```

Related Commands

Command	Description
show frame-tag tpid	N/A

Platform Description N/A

13.7 Inner-priority-trust Enable

Use this command to copy the priority of the inner tag to the outer tag of the packets on the interface. Use the **no** or **default** form of this command to restore the default setting.

inner-priority-trust enable

no inner-priority-trust enable

default inner-priority-trust enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode.

Usage Guide If the QoS policy is configured based on the COS value of the user's VLAN tag for the service provider's network to which a user network connects, the user's VLAN tag priority can be copied to the outer VLAN tag, so that the user's packets are encapsulated with the outer VLAN tag and have the same priority as the user's VLAN tag. In this

case, the user's packets can be preferentially processed and transmitted on the service provider's network.

Configuration Examples

The following example copies the priority of the inner tag to the outer tag of the packets on the interface.

```
FS#configure terminal
FS(config)# interface gigabitEthernet 0/2
FS(config-if)# inner-priority-trust enable
FS(config-if)#end
```

Related Commands

Command	Description
show inner-priority-trust	N/A

Platform Description

N/A

13.8 L2protocol-tunnel

Use this command to set the dot1q-tunnel port to receive L2 protocol message. Use the **no** or **default** form of this command to disable this function.

l2protocol-tunnel { **stp | gvrp** }

no l2protocol-tunnel { **stp | gvrp** }

default l2protocol-tunnel { **stp** | **gvrp** }

Parameter Description

Parameter	Description
stp	Receives stp message.
gvrp	Receives gvrp message.

Defaults

N/A

Command Mode

Global configuration mode.

Usage Guide

If the STP and GVRP packets need to be transparently transmitted, this function must be enabled in global configuration mode.

Configuration Examples

The following example enables the function of receiving L2 protocol gvrp and stp.

```
FS#configure
FS(config)# l2protocol-tunnel stp
FS(config)# l2protocol-tunnel gvrp
FS(config)#end
```

Related Commands

Command	Description
show l2protocol-tunnel { gvrp | stp }	N/A

Platform Description N/A

12.1 L2protocol-tunnel enable

Use this command to enable transparent transmission of L2 protocol message. Use the **no** or **default** form of this command to restore the default setting.

l2protocol-tunnel { **stp | gvrp** } **enable**

no l2protocol-tunnel { **stp | gvrp** } **enable**

Parameter Description

Parameter	Description
stp	Transparently transmits stp message.
gvrp	Transparently transmits gvrp message.

Defaults It is disabled by default.

Command Mode Intereface configuration mode.

Usage Guide If this function is enabled in global and interface configuration modes, STP packets can be transparently transmitted after the bridge-frame forwarding protocol bpdu command is enabled in global configuration mode.

Configuration Examples Here is an example of enabling transparent transmission of L2 protocol message :

```
FS#configure
FS(config)# interface fa 0/1
FS(config-if)# l2protocol-tunnel gvrp enable
FS(config-if)#end
```

Related Commands

Command	Description
show l2protocol-tunnel { gvrp | stp }	N/A

Platform Description N/A

12.2 L2protocol-tunnel Tunnel-dmac

Use this command to set the MAC address for the transparent transmission of the corresponding protocol messages. Use the **no** or **default** form of this command to restore the default setting.

l2protocol-tunnel { **stp|gvrp** } **tunnel-dmac** *mac-address*

no l2protocol-tunnel { **stp|gvrp** } **tunnel-dmac** *mac-address*

default l2protocol-tunnel { **stp** | **gvrp** } **tunnel-dmac** *mac-address*

Parameter Description

Parameter	Description
stp	Sets the STP transparent transmission address.
gvrp	Sets the GVRP transparent transmission address.

Defaults

The first three bytes of the address are 01d0f8 and the last three bytes are 000005 for **stp** and 000006 for **gvrp** by default.

Command Mode

Global configuration mode.

Usage Guide

N/A

Configuration Examples

The following example sets the MAC address for the L2-protocol transparent transmission function:

```
FS# configure terminal
FS(config-if)# l2protocol-tunnel gvrp tunnel-dmac 011AA9 000005
FS(config-if)#end
```

Related Commands

Command	Description
show l2protocol-tunnel { gvrp | stp }	N/A

Platform Description

N/A

12.3 Mac-address-mapping x source-vlan src-vlan-list destination-vlan dst-vlan-id

Use this command to copy the MAC address dynamically-learned from the source VLAN to the destination VLAN. Use the **no** or **default** form of this command to restore the default setting.

mac-address-mapping *x* **source-vlan** *src-vlan-list* **destination-vlan** *dst-vlan-id*

no mac-address-mapping *x* **source-vlan** *src-vlan-list* **destination-vlan** *dst-vlan-id*

default mac-address-mapping *x* **source-vlan** *src-vlan-list* **destination-vlan** *dst-vlan-id*

Parameter Description

Parameter	Description
index-id	Policy ID of copying MAC addresses.
src-vlan-list	Source VLAN list of copying MAC addresses.
dst-vlan-id	Destination VLAN ID of copying MAC addresses.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode.

Usage Guide

N/A

Configuration Examples

The following example copies the MAC addresses dynamically-learned from the source VLANs 1-3 to the destination VLAN 5.

```
FS#configure
FS(config)# interface gigabitEthernet 0/2
FS(config-if)# mac-address-mapping 1 source-vlan    1-3 destination-vlan    5
FS(config-if)#end
```

Related Commands

Command	Description
show interface mac-address-mapping x	N/A

Platform Description

N/A

12.4 Show Dot1q-tunnel

Use this command to display whether dot1q-tunnel of interface is enabled or not.

show dot1q-tunnel [**interfaces** *intf-id*]

Parameter Description

Parameter	Description
intf-id	The specified interface.

Defaults

N/A

Command Mode

Any mode

Usage Guide

N/A

Configuration Examples

The following example displays whether dot1q-tunnel of interface is enabled or not.

```
FS# show dot1q-tunnel
Ports      Dot1q-tunnel
-----      ---------
Gi0/1          Enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

12.5 Show Frame-tag Tpid

Use this command to display the configuration of interface tpid.

show frame-tag tpid [**interfaces** *intf-id*]

Parameter Description

Parameter	Description
intf-id	Specifies the interface.

Defaults N/A

Command Mode Any mode

Usage Guide N/A

Configuration Examples The following example displays the configuration of interface tpid.

```
FS# show frame-tag tpid
Ports        tpid
-----    ---------
Gi0/1          0x9100
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.6 Show Inner-priority-trust

Use this command to display whether the priority copy function is enabled.

show inner-priority-trust

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Any mode

Usage Guide N/A

Configuration Examples

The following example displays whether the priority copy function is enabled.

```
FS# show inner-priority-trust
Port   inner-priority-trust
----       ----------
Gi0/1          enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

12.7 Show Interfaces Dot1q-tunnel

Use this command to display the VLAN configuration on the dot1q-tunnel port.

show interfaces [*intf-Id*] **dot1q-tunnel**

Parameter Description

Parameter	Description
intf-id	Specifies the interface.

Defaults

N/A

Command Mode

Any mode

Usage Guide

N/A

Configuration Examples

The following example displays the VLAN configuration on the dot1q-tunnel port.

```
FS# show interfaces dot1q-tunnel
Interface: Gi0/3
Native vlan: 10
Allowed vlan list: 4-6, 10, 30-60
Tagged vlan list: 4, 6, 30-60
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

12.8 Show Interfaces Mac-address-mapping

Use this command to display the MAC address mapping configuration.

show interfaces mac-address-mapping

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Any mode

Usage Guide N/A

Configuration Examples The following example displays the MAC address mapping configuration.

```
FS# show interfaces mac-address-mapping
Ports        Status     Index      Destination-VID Source-VID-list
------------ ---------- ---------- --------------- ------------------
Gi0/1        active     2          3               2
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.9 Show Interfaces Remark

Use this command to display the priority mapping configuration.

show interfaces [*intf-id*] **remark**

Parameter Description

Parameter	Description
intf-id	specifies an interface

Defaults N/A

Command Mode Any mode

Usage Guide N/A

Configuration Examples The following example displays the priority mapping configuration.

```
FS# show interfaces remark
Ports        Type        From value  To value
```

```
------------ ----------- ----------- --------
Gi0/1        Cos-To-Cos  3           5
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.10 Show Interfaces Vlan-mapping

Use this command to display the VLAN mapping configuration.

show interfaces vlan-mapping

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Any mode

Usage Guide N/A

Configuration Examples The following example displays the VLAN mapping configuration.

```
FS# show interfaces vlan-mapping
Ports        Type     Status Destination-VID  Source-VID-list
------------ ------   ------ ---------------- ---------------
Gi0/1        in       active 5                3
Gi0/1        out      active 3                5
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.11 Show L2protocol-tunnel

Use this command to display transparent transmission configuration of L2 protocol.

show l2protocol-tunnel { **gvrp** | **stp** }

Parameter Description

Parameter	Description
gvrp	Displays configuration of transparently transmitting gvrp protocol.
stp	Displays configuration of transparently transmitting stp protocol.

Defaults N/A

Command Mode Any mode

Usage Guide N/A

Configuration Examples The following example displays transparent transmission configuration of L2 protocol.

```
FS# show l2protocol-tunnel stp
L2protocol-tunnel: Stp Enable
FS# show l2protocol-tunnel gvrp
L2protocol-tunnel: gvrp Disable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.12 Show Registration-table

Use this command to display vid add policy list of prorocol-based dot1q-tunnel port.

show registration-table [**interfaces** *intf-id*]

Parameter Description

Parameter	Description
intf-id	Specifies the interface.

Defaults N/A

Command Mode Any mode

Usage Guide N/A

Configuration Examples The following example displays vid add policy list of prorocol-based dot1q-tunnel port.

```
FS# show registration-table
Ports          Type      Outer-VID   Inner-VID-list
---------      ------    ------- ------------------
```

```
Gi0/7          Add-outer   5          7-10,15,20-30
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.13 Show Traffic-redirect

Use this command to display flow-based vid change or add policy list.

show traffic-redirect [**interfaces** *intf-id*]

Parameter Description

Parameter	Description
intf-id	Specifies the interface.

Defaults N/A

Command Mode Any mode

Usage Guide N/A

Configuration Examples The following example displays flow-based vid change or add policy list.

```
FS# show traffic-redirect
Ports          Type          VID    Match-filter
------------ ----------- ---- ------------
Gi0/3          Mod-outer     23    11
Gi0/3          Mod-outer     3     4
Gi0/3          Mod-outer     6     5
Gi0/3          Mod-inner     8     inner-to-8
Gi0/6          Mod-inner     9     100
Gi0/7          Nested-vid    13    nest-13
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.14 Show Translation-table

Use this command to display vid modify policy list of prorocol-based access, trunk, hybrid port.

show translation-table [**interfaces** *intf-id*]

Parameter Description

Parameter	Description
intf-id	Specifies the interface.

Defaults N/A

Command Mode Any mode

Usage Guide N/A

Configuration Examples The following example displays vid modify policy list of prorocol-based access, trunk, hybrid port.

```
FS# show translation-table
Ports        Type        Relay-VID   Old-local   Local\inner-VID-list
------------ ---------- ---------- ---------- -------------------
Gi0/7        Inner-CVID 8           N/A         10-20
Gi0/7        Local-SVID 1001        N/A         30-60
Gi0/7        In+Out     8           20          50
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.15 Switchport Dot1q-tunnel Allowed Vlan

Use this command to configure the allowed VLAN of dot1q-tunnel. Use the **no** or **default** form of this command to restore the default setting.

switchport dot1q-tunnel allowed vlan { [**add**] **tagged** *vlist* | [**add**] **untagged** *vlist* | **remove** *vlist* }

no switchport dot1q-tunnel allowed vlan

default switchport dot1q-tunnel allowed vlan

Parameter Description

Parameter	Description
add	Add allowed VLAN.
tagged	Tag-carried.
untagged	Not tag-carried.
v_list	vlan id list.
no	Remove the settings.

Defaults The default is **untagged** 1.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example specifies vlan 3-6 of dot1q-tunnel port as allowed VLAN and outputting the frame with tag.

```
FS(config)#interface gigabitEthernet 0/1
FS(config-if)#switchport dot1q-tunnel allowed vlan tagged 3-6
FS(config)#end
```

Related Commands

Command	Description
show interface dot1q-tunnel	N/A

Platform Description N/A

12.16 Switchport Dot1q-tunnel Native Vlan

Use this command to configure the default vlan id of dot1q-tunnel. Use the **no** or **default** form of this command to restore the default setting.

switchport dot1q-tunnel native vlan *vid*

no switchport dot1q-tunnel native vlan

default switchport dot1q-tunnel native vlan

Parameter Description

Parameter	Description
vid	Configures default vlan id.

Defaults The default is VLAN 1.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example specifies default VLAN of dot1q-tunnel port as 8.

```
FS(config)#interface gigabitEthernet 0/1
FS(config-if)#switchport dot1q-tunnel native vlan 8
FS(config)#end
```

Related Commands

Command	Description

show interface dot1q-tunnel	N/A

Platform Description N/A

13.9 Switchport Mode Dot1q-tunnel

Use this command to configure the interface as the dot1q-tunnel interface. Use the **no** or **default** form of this command to restore the default setting.

switchport mode dot1q-tunnel

no switchport mode

default switchport mode

Parameter Description

Parameter	Description
-	-

Defaults The interface is not a tunnel port by default.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example configures the interface as the dot1q-tunnel interface.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# switchport mode dot1q-tunnel
FS(config)# end
```

Related Commands

Command	Description
show vlan	N/A

Platform Description N/A

13.10 Traffic-redirect Access-group Acl Inner-vlan Vid Out

Use this command to configure the modification policy of inner vid based on flow for the packets outputted from the access, trunk, hybrid port. Use the **no** or **default** form of this command to restore the default setting.

traffic-redirect access-group *acl* **inner-vlan** *vid* **out**

no traffic-redirect access-group *acl* **inner-vlan**

default traffic-redirect access-group *acl* **inner-vlan**

Parameter Description

Parameter	Description

acl	Flow matching.
vid	Modified inner vid

Defaults By default, no policy is configured.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example specifies the outer vid of outgoing messages whose source address is 1.1.1.2 as 6,

```
FS#configure
FS(config)#ip access-list standard to_6
FS(config-std-nacl)#permit host 1.1.1.2
FS(config-std-nacl)#exit
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# switchport mode trunk
FS(config-if)# traffic-redirect access-group to_6 inner-vlan 6 out
FS(config-if)# end
```

Related Commands

Command	Description
show traffic-redirect	N/A

Platform Description N/A

13.11 Traffic-redirect access-group acl nested-vlan vid in

Use this command to configure vid add policy list based on flow on dot1q-tunne port. Use the **no** or **default** form of this command to restore the default setting.

traffic-redirect access-group *acl* **nested-vlan** *vid* **in**

no traffic-redirect access-group *acl* **nested –vlan**

default traffic-redirect access-group *acl* **nested -vlan**

Parameter Description

Parameter	Description
acl	Flow matching.
vid	vid list to be added.
no	Removes the settings.

Defaults The policy list is null by default.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example specifies the vid of input message whose source address is 1.1.1.3 as 9.

```
FS#configure
FS(config)#ip access-list standard 20
FS(config-std-nacl)#permit host 1.1.1.3
FS(config-std-nacl)#exit
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# switchport mode dot1q-tunnel
FS(config-if)# traffic-redirect access-group 20 nested-vlan 10 in
FS(config-if)# end
```

Related Commands

Command	Description
show traffic-redirect	N/A

Platform Description N/A

13.12 Traffic-redirect access-group acl outer-vlan vid in

Use this command to configure the modify policy list of outer vid based on flow on access, trunk, hybrid port. Use the **no** or **default** form of this command to restore the default setting.

traffic-redirect access-group *acl* **outer-vlan** *vid* **in**

no traffic-redirect access-group *acl* **outer-vlan**

default traffic-redirect access-group *acl* **outer-vlan**

Parameter Description

Parameter	Description
acl	Flow matching.
vid	Modified outer vid list
no	Removes the settings.

Defaults The policy list is null by default.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example specifies outer vid of input message whose source address is 1.1.1.1 as 3.

```
FS# configure
FS(config)#ip access-list standard 2
FS(config-std-nacl)# permit host 1.1.1.1
```

```
FS(config-std-nacl)# exit
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# switchport mode trunk
FS(config-if)# traffic-redirect access-group 2 outer-vlan 3 in
FS(config-if)# end
```

Related Commands

Command	Description
show traffic-redirect	N/A

Platform Description N/A

13.13 Vlan-mapping-in vlan src-vlan-list remark dest-vlan

Use this command to set policy table mapped with the VLAN in the ingress direction on Access, Trunk, Hybrid, and Uplink ports and change the VLAN ID of the input packets as the specified VLAN ID before forwarding the packets. Use the **no** or **default** form of this command to restore the default setting.

vlan-mapping-in vlan *src-vlan-list* **remark** *dest-vlan*

no vlan-mapping-in vlan *src-vlan-list* **remark** *dest-vlan*

default vlan-mapping-in vlan *src-vlan-list* **remark** *dest-vlan*

Parameter Description

Parameter	Description
src-vlan-list	Vid list of the input packets.
dest-vlan	Modified vid
no	Removes the settings.

Defaults The policy list is null by default.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example specifies the vid of the input messages whose vids in the tag ranges from 3 to 7 as 4 and forwards it.

```
FS# configure terminal
FS(config)# vlan range 3-8
FS(config-vlan-range)# exit
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# switchport mode trunk
FS(config-if)# vlan-mapping-in vlan 3-7 remark 8
FS(config-if)# end
```

Related Commands

Command	Description
show interface [*intf-id*] vlan-mapping	N/A

Platform Description N/A

13.14 Vlan-mapping-out vlan src-vlan remark dest-vlan

Use this command to configure the policy list of the one-to-one VLAN mapping in the outgoing direction on the acess, trunk, hybrid, uplink port. Use the **no** or **default** form of this command to restore the default setting.

vlan-mapping-out vlan *src-vlan* **remark** *dest-vlan*

no vlan-mapping-out vlan *src-vlan* **remark** *dest-vlan*

default vlan-mapping-out vlan *src-vlan* **remark** *dest-vlan*

Parameter Description

Parameter	Description
src-vlan	Vid of the input packets
dest-vlan	The modified vid
no	Removes the settings.

Defaults The policy list is null by default.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example specifies the vid of the incoming messages whose vid in the tag is 3 as 4 and forwards it.

```
FS# configure terminal
FS(config)# vlan range 3-4
FS(config-vlan-range)# exit
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# switchport mode trunk
FS(config-if)# vlan-mapping-out vlan 3 remark 4
FS(config-if)# end
```

Related Commands

Command	Description
show interface [*intf-id*] vlan-mapping	N/A

Platform Description N/A

14. ERPS Commands

14.1 Associate Sub-ring

Use this command to associate the ethernet ring with its sub-rings.
associate sub-ring raps-vlan *vlan-list*
no associate sub-ring raps-vlan *vlan-list*

Parameter Description

Parameter	Description
vlan-list	Sub-rings' R-APS VLAN.

Defaults

By default, Ethernet ring is not associated with its sub-rings.

Command Mode

ERPS configuration mode.

Usage Guide

1. You need to configure this command on all nodes of the Ethernet ring, so as to transmit its sub-ring's ERPS protocol packets in the Ethernet ring.
2. Configuring the association is mainly to make the sub-ring's protocol packets transmit in the Ethernet ring. Users can also adopt the configuration command provided by the VLAN module to configure elaborately the VLAN and the relation between ports and VLAN, so as to transmit the sub-ring's protocol packets in other Ethernet rings and not leak the packets to the user network.

Configuration Examples

The following example associates the Ethernet sub-ring with other Ethernet rings:

```
#Enter the privileged EXEC mode
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.

# Configure the link mode of the Ethernet ring port and the default VLAN.
FS(config)# interface fastEthernet 0/1
FS(config-if)# switchport mode trunk
FS(config-if)# exit
FS(config)# interface fastEthernet 0/2
FS(config-if)# switchport mode trunk
FS(config-if)# exit

# Enter the erps configuration mode.
FS(config)# erps raps-vlan 4093

#Add the ports that participate in the ERPS protocol computing to the Ethernet ring.
FS(config-erps4093)#    ring-port west fastEthernet 0/1 east fastEthernet 0/2

# Configure the Ethernet subring
FS(config)# erps raps-vlan 100
FS(config)# interface fastEthernet 0/3
FS(config-if)# switchport mode trunk
FS(config-if)# exit
FS(config)# erps raps-vlan 100
FS(config-erps100)#    ring-port west fastEthernet 0/3 east virtual-channel
FS(config-if)# exit

# Associate the subring with other Ethernet rings.
FS(config)# erps raps-vlan 4093
FS(config-erps4093)#    associate sub-ring raps-vlan 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

14.2 Erps Enable

Use this command to enable/disable the ERPS function in the global configuration mode.
erps enable
no erps enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Disabled

Command Mode

Global configuration mode.

Usage Guide

The ERPS protocol of the specified ring will begin running truly only after the global ERPS protocol and the ERPS protocol of the specified ring are both enabled.

Configuration Examples

The following example enables the ERPS protocol globally:

```
# Enter the privileged EXEC mode
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.

# Enable the ERPS function globally.
FS(config)# erps enable

# Enter the ERPS configuration mode
FS(config)# erps raps-vlan 4093

# Enable the ERPS function for the specified ring.
FS(config-erps4093)#    state enable
```

Related Commands

Command	Description
state enable	After entering the ERPS configuration mode of the specified ring, configure this command to enable the ERPS protocol of this specified ring.

Platform Description

N/A

14.3 Erps Monitor Link-state By Oam

Use this command to configure the method of monitoring the ERPS link state.

erps monitor link-state by oam vlan *vlan-id*

no erps monitor link-state by oam

Parameter Description

Parameter	Description
N/A	N/A

Defaults

By default, it adopts the directly monitoring the link physical state (up or down) rather than the oam method.

Command Mode

Global configuration mode.

Usage Guide

For the link state monitoring, use the method of directly monitoring the link physical state (up or down), also monitor the logic state (unidirectional fault, bidirectional fault or normal) of the link by the OAM. By default, the former is adopted. If the OAM method is used, the inefficient link state monitoring may cause the convergence time longer when the topology changes.

Configuration Examples

The following example configures the method of monitoring the link state.

```
# Enter the privileged EXEC mode.
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.

# Configure the method of monitoring the link state.
FS(config)# erps monitor link-state by oam vlan 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

14.4 Erps Raps-vlan

Use this command to configure the R-APS VLAN of Ethernet ring.
erps raps-vlan *vlan-id*
no erps raps-vlan *vlan-id*

Parameter Description

Parameter	Description
vlan-id	R-APS VLAN ID

Defaults

No R-APS VLAN is configured.

Command Mode

Global configuration mode.

Usage Guide

The R-APS VLAN must be the VLAN that is not used on the device. Cannot set the VLAN1 to the R-APS VLAN.
The same Ethernet ring of different devices needs the same R-APS VLAN.
If you want to transparently transmit the ERPS protocol packets on a device without the ERPS function configured, make sure that only the two ports connected to the Ethernet ring on this device allow the R-APSA VLAN packets corresponding to this ERPS ring passing through. Otherwise, the other VLAN packets may enter the R-APS VLAN through the transparent transmission, causing the shock to the ERPS ring.

Configuration Examples

```
# Enter the privileged EXEC mode.
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.

#Configure the R-APS VLAN globally.
FS(config)# erps raps-vlan 4093
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

14.5 Protected-instance

Use this command to configure the VLAN protected by the Ethernet ring to implement the load balance function.
protected-instance *instance-id-list*
no protected-instance

Parameter Description

Parameter	Description
instance-id-list	Instance protected by this Ethernet ring. (The VLANs corresponding to these instances are the VLANs protected by the Ethernet ring.)

Defaults

By default, all VLANs are protected.

Command Mode

EPRS configuration mode.

Usage Guide

The protected VLAN consists of the R-APS VLAN of this Ethernet ring and the data VLAN protected by this Ethernet ring.

Configuration Examples

Suppose that the ERP1 and ERP2 are configured on the switch to implement the load balance. The R-APS VLAN of the ERPS1 is 100, the protected data VLAN is in the range of 1 to 99 and 101-2000, the R-APS VLAN of the ERPS2 is 4093, and the protected data VLAN is in the range of 2001 to 4092 and 4094. Configuration for the load balance is shown as below:

```
# Enter the privileged EXEC mode.
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
```

```
# Configure the VLAN configured by the ERP1.
FS(config)# spanning-tree mst configuration
FS(config-mst)# instance 1 vlan 100, 1-99, 101-2000
FS(config-mst)# exit
FS(config)# erps raps-vlan 100
FS(config-erps100)#protected-instance 1
```

```
# Configure the VLAN configured by the ERP2.
FS(config)# spanning-tree mst configuration
FS(config-mst)# instance 2 vlan 4093, 2001-4092, 4094
FS(config-mst)# exit
FS(config)# erps raps-vlan 4093
FS(config-erps4093)#protected-instance 2
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

14.6 Ring-port

Use this command to configure the ERPS ring.
ring-port west { *interface-name1* | **virtual-channel** } **east** { *interface-name2* | **virtual-channel** }
no ring-port

Parameter Description

Parameter	Description
interface-name1	Name of the West port.
interface-name2	Name of the East port.

Defaults

No ERPS ring is configured.

Command Mode

EPRS configuration mode.

Usage Guide

1) After adding the port to the ERP ring, the trunk attribute of the port is not allowed to be modified any more.
2) If the ring port is configured on the virtual-channel, this ring will be considered as a sub-ring.
3) Ports running the ERPS do not participate in the STP computing. ERPS, RERP and REUP do not share the port.

Configuration Examples

The following example is for the ERPS ring.

```
# Enter the privileged EXEC mode.
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
```

```
# Configure the link mode of the Ethernet ring port and the default VLAN.
FS(config)# interface fastEthernet 0/1
FS(config-if)# switchport mode trunk
FS(config-if)# exit
FS(config)# interface fastEthernet 0/2
FS(config-if)# switchport mode trunk
FS(config-if)# exit
```

```
# Enter the ERPS configuration mode.
FS(config)# erps raps-vlan 4093
```

```
#Add the ports that participate in the ERPS protocol computing to the Ethernet ring.
FS(config-erps4093)#    ring-port west fastEthernet 0/1 east fastEthernet 0/2
```

Related Commands

Command	Description
state enable	Enable the ERPS protocol of the specified ring in the ERPS mode of the specified ring.
sub-ring associate raps-vlan *vlan-id*	Establish the association between the subring and other Ethernet rings in the subring ERPS configuration mode.

Platform Description

N/A

14.7 Rpl-port

Use this command to configure the RPL port and RPL owner.
rpl-port { **west** | **east** } [**rpl-owner**]

no rpl-port

Parameter Description

Parameter	Description
N/A	N/A

Defaults

No RPL port and RPL owner are configured.

Command Mode

EPRS configuration mode.

Usage Guide

Up to one RPL link and one RPL owner node are needed and configurable for each ring.

Configuration Examples

The following example configures the RPL port and RPL owner.

```
# Enter the privileged EXEC mode.
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
```

```
# Configure the link mode of the Ethernet ring port and the default VLAN.
FS(config)# interface fastEthernet 0/1
FS(config-if)# switchport mode trunk
FS(config-if)# exit
FS(config)# interface fastEthernet 0/2
FS(config-if)# switchport mode trunk
FS(config-if)# exit
```

```
# Enter the ERPS configuration mode.
FS(config)# erps raps-vlan 4093
```

```
# Add the ports that participate in the ERPS protocol computing to the Ethernet ring.
FS(config-erps4093)#    ring-port west fastEthernet 0/1 east fastEthernet 0/2
```

```
# Specify the port where the RPL link is and the RPL owner.
FS(config-erps4093)#    rpl-port west rpl-owner
```

Related Commands

Command	Description
ring-port west { *interface-name1* | **virtual-channel** } **east** { *interface-name2* | **virtual-channel** }	Configure the specified ERP ring in the ERPS configuration mode of the specified ring.
state enable	Enable the ERPS protocol of the specified ring in the ERPS configuration mode of the specified ring.

Platform Description

N/A

14.8 Show Erps

Use this command to show the parameters and states of the ERPS.

show erps [{ **global** | **raps_vlan** *vlan-id* [**sub-ring**] }]

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode.

Usage Guide

N/A

Configuration Examples

The following example shows the use of this command.

```
FS# show erps
ERPS Information
Global Status                    : Enabled
Link monitored by                : Not Oam
-------------------------------------------
R-APS VLAN                       : 4092
Ring Status                      : Enabled
West Port                        : Gi 0/5 (Blocking)
```

```
East Port                          : Gi 0/7 (Forwarding)
RPL Port                                 : West Port
RPL Port Blocked VLAN        : All
RPL Owner                                : Enabled
Holdoff Time                       : 0 milliseconds
Guard Time                               : 500 milliseconds
WTR Time                                 : 5 minutes
Current Ring State                 : Idle
-------------------------------------------
R-APS VLAN                               : 4093
Ring Status                        : Enabled
West Port                                : Virtual Channel
East Port                          : Gi 0/10 (Forwarding)
RPL Port                                 : None
RPL Port Blocked VLAN               : All
RPL Owner                                : Disabled
Holdoff Time                       : 0 milliseconds
Guard Time                               : 500 milliseconds
WTR Time                                 : 5 minutes
Current Ring State                 : Idle
-------------------------------------------
R-APS VLAN                               : 4094
Ring Status                        : Enabled
West Port                                : Virtual Channel
East Port                          : 12 (Forwarding)
RPL Port                                 : None
RPL Port Blocked VLAN               : All
RPL Owner                                : Disabled
Holdoff Time                       : 0 milliseconds
Guard Time                               : 500 milliseconds
WTR Time                                 : 5 minutes
Current Ring State                 : Idle

FS# show erps raps_vlan 4093 sub-ring
R-APS VLAN: 4093
Sub-Ring R-APS VLANs       TC Propagation State
-------------------        ---------------------
100                                Enable
200                                Enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

14.9 State Enable

Use this command to enable/disable the specified R-APS ring.

state enable

no state enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Disabled

Command Mode

EPRS configuration mode.

Usage Guide

Only after the global ERPS protocol and the ERPS protocol of the specified ring are both enabled, the ERPS protocol of the specified ring will begin truly running.

Configuration Examples

The following example enables the specified ERPS ring:

```
#Enter the privileged EXEC mode.
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
```

```
#Configure the link mode of the Ethernet ring port and the default VLAN.
FS(config)# interface fastEthernet 0/1
FS(config-if)# switchport mode trunk
FS(config-if)# exit
FS(config)# interface fastEthernet 0/2
FS(config-if)# switchport mode trunk
FS(config-if)# exit

# Enter the ERPS configuration mode.
FS(config)# erps raps-vlan 4093

# Add the ports that participate in the ERPS protocol computing to the Ethernet ring.
FS(config-erps4093)#    ring-port west fastEthernet 0/1 east fastEthernet 0/2

# Enable the ERPS function for the specified ring.
FS(config-erps4093)#state enable

# Enable the global ERPS function.
FS(config-erps4093)# exit
FS(config)# erps enable
```

Related Commands

Command	Description
erps enable	Enable the global ERPS protocol.

Platform Description

N/A

14.10 Sub-ring tc-propagation

Use this command to specify the devices corresponding to the crossing node on the crossing ring whether to send out the notification when the subring topology changes.

sub-ring tc_propagation enable
no sub-ring tc_propagation

Parameter Description

Parameter	Description
N/A	N/A

Defaults

By default, the topology changing notification is not sent.

Command Mode

EPRS configuration mode.

Usage Guide

This command is just needed to be configured on the crossing nodes on the crossing ring.

Configuration Examples

The following example is configured when the subring topology changes.

```
# Enter the privileged EXEC mode.
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.

#Configure the link mode of the Ethernet ring port and the default VLAN.
FS(config)# interface fastEthernet 0/1
FS(config-if)# switchport mode trunk
FS(config-if)# exit
FS(config)# interface fastEthernet 0/2
FS(config-if)# switchport mode trunk
FS(config-if)# exit

# Enter the ERPS configuration mode.
FS(config)# erps raps-vlan 4093

# Add the ports that participate in the ERPS protocol computing to the Ethernet ring.
FS(config-erps4093)#    ring-port west fastEthernet 0/1 east fastEthernet 0/2

#Configure the Ethernet subring.
FS(config)# erps raps-vlan 100
FS(config)# interface fastEthernet 0/3
FS(config-if)# switchport mode trunk
FS(config-if)# exit
```

```
FS(config)# erps raps-vlan 100
FS(config-erps100)#    ring-port west fastEthernet 0/3 east virtual-channel

# Associate the subring with other Ethernet rings.
FS(config-erps100)#    sub-ring associate raps-vlan 4093

# Enable the topology changing notification for the subring.
FS(config-erps100)#    sub-ring tc-propagation enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

14.11 Timer

Use this command to configure the timer of the ERPS protocol.
timer { **holdoff-time** *interval1* | **guard-time** *interval2* | **wtr-time** *interval3* }
no timer { **holdoff-time** | **guard-time** | **wtr-time** }

Parameter Description

Parameter	Description
interval1	Value of the Holdoff timer in 100 milliseconds, the valid range is 0 to 100.
Interval2	Value of the Guard timer in 10 milliseconds, the valid range is 1 to 200.
Interval3	Value of the WTR in minute, the valid range is 5 to 12.

Defaults

Holdoff timer: 0.
Guard timer: 500 milliseconds.
WTP timer: 5 seconds.

Command Mode

EPRS configuration mode.

Usage Guide

Holdoff timer: This timer is used to avoid the ERPS from topology swithcingswitching continuously due to the link intermittent fault. With this timer configured, if the link fault is detected, the ERPS does not perform the topology switching immediately until the timer times out and the link fault is verified.
Guard timer: This timer is used to prevent the device receiving the timed-out R-APS messages. When the device detects the recovery from failure of the link, it sends out the message of link recovery and starts up the Guard timer. Before the Guard times out, except for the flush packets indicating the subring topology change, other packets are discarded directly without being handled.
WTR (Wait-to-restore) timer: This timer is only valid for the RPL owner device. It is mainly used to prevent the RPL owner making the erroneous judgment to the ring network status. When the RPL detects the fault recovery, it does not perform the topology switching immediately until the WTR times out and the Ethernet ring indeed recovers from the fault. If the ring network fault is checked again before the WTR times out, then the WTR timer will be canceled and topology switching will be not executed any longer.

Configuration Examples

The following example configures the timer of the ERPS protocol.

```
# Enter the privileged EXEC mode.
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
# Enter the ERPS configuration mode.
FS(config)# erps raps-vlan 4093

# Configure the protocol timer.
FS(config-erps4093)#    timer holdoff-time 10
FS(config-erps4093)#    timer guard-time 10
FS(config-erps4093)#    timer wtr-time 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

Chapter 3 IP Address & Application Commands

1. IP Address/Service Commands
2. ARP Commands
3. IPv6 Commands
4. DHCP Commands
5. DHCPv6 Commands
6. DNS Commands
7. FTP Server Commands
8. FTP Client Commands
9. TFTP Server Commands
10. TUNNEL
11. Network Connectivity Test Tool Commands
12. TCP Commands
13. IPv4/IPv6 REF Commands

1. IP Address/Service Commands

1.1 gateway

Use this command to set the gateway address for the management port. Use the no form of this command to remove the setting.

gateway address

no gateway

Parameter Description

Parameter	Description
address	Sets the gateway address for the management port

Defaults

N/A

Command Mode

Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the gateway address for the management port to 1.1.1.1.

```
FS(config)# interface mgmt 0
FS(config-if-Mgmt 0)# gateway 1.1.1.1
FS(config-if-Mgmt 0)#
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.2 Ip-address

Use this command to configure the IP address of an interface. Use the **no** form of this command to restore the default setting.

ip address *ip-address network-mask* [**secondary**]

no ip address [*ip-address network-mask* [**secondary**]

Parameter Description

Parameter	Description
ip-address	32-bit IP address, with 8 bits in one group in decimal format. Groups are separated by dots.
network-mask	32-bit network mask. 1 stands for the mask bit, 0 stands for the host bit, with 8 bits in one group in decimal format. Groups are separated by dots.
secondary	Secondary IP address

Defaults

No IP address is configured for the interface by default.

Command Mode Interface configuration mode

Usage Guide The equipment cannot receive and send IP packets before it is configured with an IP address. After an IP address is configured for the interface, the interface is allowed to run the Internet Protocol (IP).

The network mask is also a 32-bit value that identifies which bits among the IP address is the network portion. Among the network mask, the IP address bits that correspond to value "1" are the network address. The IP address bits that correspond to value "0" are the host address. For example, the network mask of Class A IP address is "255.0.0.0". You can divide a network into different subnets using the network mask. Subnet division means to use the bits in the host address part as the network address part, so as to reduce the capacity of a host and increase the number of networks. In this case, the network mask is called subnet mask.

The FSOS software supports multiple IP address for an interface, in which one is the primary IP address and others are the secondary IP addresses. Theoretically, there is no limit for the number of secondary IP addresses. The primary IP address must be configured before the secondary IP addresses. The secondary IP address and the primary IP address must belong to the same network or different networks. Secondary IP addresses are often used in network construction. Typically, you can try to use secondary IP addresses in the following situations:

A network hasn't enough host addresses. At present, the LAN should be a class C network where 254 hosts can be configured. However, when there are more than 254 hosts in the LAN, another class C network address is necessary since one class C network is not enough. Therefore, the device should be connected to two networks and multiple IP addresses should be configured.

Many older networks are layer 2-based bridge networks that have not been divided into different subnets. Use of secondary IP addresses will make it very easy to upgrade this network to an IP layer-based routing network. The equipment configures an IP address for each subnet.

Two subnets of a network are separated by another network. You can create a subnet for the separated network, and connect the separated subnet by configuring a secondary IP address. One subnet cannot appear on two or more interfaces of a device.

In general, the layer-2 switch is configured a default gateway with the **ip default-gateway** command. Sometimes the layer-2 switch may be managed through the telnet, and the management IP and default gateway of the layer-2 switch needed to be modified. In this case, after configuring any one of the **ip address** and **ip default-gateway** command, the other cannot be configured any more due to the configuration change which causes failing to access this device through the network. So you need to use the keyword **gateway** in the **ip address** command to modify both the management IP and default gateway. The keyword **gateway** is not in the output of **show running config**, but in the output of **ip default-gate** command.

Configuration Examples The following example configures the primary IP address and the network mask as 10.10.10.1 and 255.255.255.0 respectively .

```
FS(config)# interface gigabitEthernet 0/1
```

```
FS(config-if-GigabitEthernet 0/1)# ip address 10.10.10.1 255.255.255.0
```

The following example configures the default gateway address as 10.10.10.254.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# ip address 10.10.10.1 255.255.255.0 gateway 10.10.10.254
```

Related Commands

Command	Description
show ip interface	Displays detailed information of the interface.

Platform Description N/A

1.3 Ip Broadcast-addresss

Use this command to define a broadcast address for an interface in the interface configuration mode. Use the **no** form of this command to restore the default setting.

ip broadcast-addresss *ip-address*

no ip broadcast-addresss

Parameter Description

Parameter	Description
ip-address	Broadcast address of IP network

Defaults The default IP broadcast address is 255.255.255.255.

Command Mode Interface configuration mode.

Usage Guide At present, the destination address of IP broadcast packet is all "1", represented as 255.255.255.255. The FSOS software can generate broadcast packets with other IP addresses through definition, and can receive both all "1" and the broadcast packets defined by itself.

Configuration Examples The following example sets he destination address of IP broadcast packets generated by this interface to 0.0.0.0.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# ip broadcast-address 0.0.0.0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.4 Ip Directed-broadcast

Use this command to enable the conversion from IP directed broadcast to physical broadcast in the interface configuration mode. Use the **no** form of this command to restore the default setting.

ip directed-broadcast [*access-list-number*]

no ip directed-broadcast

Parameter Description

Parameter	Description
access-list-number	(Optional) Access list number, in the range from 1 to 199 and from 1300 to 2699. After an access list number has been defined, only the IP directed broadcast packets that match this access list are converted.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode.

Usage Guide

IP directed broadcast packet is an IP packet whose destination address is an IP subnet broadcast address. For example, the packet with the destination address 172.16.16.255 is called a directed broadcast packet. However, the node that generates this packet is not a member of the destination subnet.

The device that is not directly connected to the destination subnet receives an IP directed broadcast packet and handles this packet in the same way as forwarding a unicast packet. After the directed broadcast packet reaches a device that is directly connected to this subnet, the device converts the directed broadcast packet into a flooding broadcast packet (typically the broadcast packet whose destination IP address is all "1"), and then sends the packet to all the hosts in the destination subnet in the manner of link layer broadcast.

You can enable conversion from directed broadcast into physical broadcast on a specified interface, so that this interface can forward a direct broadcast packet to a directly connected network. This command affects only the final transmission of directed broadcast packets that have reached the destination subnet instead of normal forwarding of other directed broadcast packets.

You can also define an access list on an interface to control which directed broadcast packets to forward. After an access list is defined, only the packets that conform to the conditions defined in the access list undergo conversion from directed broadcast into physical broadcast.

If the **no ip directed-broadcast** command is configured on an interface, FSOS will discard the directed broadcast packets received from the directly connected network.

Configuration Examples

The following example enables forwarding of directed broadcast packet on the fastEthernet 0/1 port of a device.

```
FS(config)# interface fastEthernet 0/1
FS(config-if)# ip directed-broadcast
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.5 Ip Icmp Error-interval

Use this command to set the rate to send the ICMP destination unreachable packets triggered by DF in the IP header. Use the **no** form of this command to restore the default setting.

ip icmp error-interval DF milliseconds [*bucket-size*]

no ip icmp error-interval DF *milliseconds* [*bucket-size*]

Use this command to set the rate to send other ICMP error packets. Use the **no** form of this command to restore the default setting.

ip icmp error-interval milliseconds [bucket-size]

no ip icmp error-interval *milliseconds* [*bucket-siz*]

Parameter Description

Parameter	Description
milliseconds	The refresh period of the token bucket, in the range from 0 to 2147483647 in the unit of milliseconds. 0 indicates no limit on the rate to send ICMP error packets. The default is 100.
bucket-size	The number of tokens in the bucket, in the range is from 1 to 200. The default is 10.

Defaults The default rate is 10 packets per 100 millisecond.

Command Mode Global configuration mode.

Usage Guide To prevent DoS attack, the token bucket algorithm is adopted to limit the rate to send ICMP error packets.

If IP packets need to be fragmented while the DF is set to 1, the device sends ICMP destination unreachable packets numbered 4 to the source IP address for path MTU discovery. Rate limits on ICMP destination unreachable packets and other error packets are needed to prevent path MTU discovery failure.

It is recommended to set the refresh period to an integral multiple of 10 milliseconds. If the refresh period is not an integral multiple of 10 milliseconds, it is adjusted automatically. For example, 1 per 5 milliseconds is adjusted to 2 per 10 milliseconds; 3 per 15 milliseconds is adjusted to 2 per 10 milliseconds.

Configuration Examples The following example sets the rate to send the ICMP destination unreachable packets triggered by DF in the IP header to 100 per second.

```
FS(config)# ip icmp error-interval DF 1000 100
```

The following example sets the rate to send other ICMP error packets to 10 per second.

```
FS(config)# ip icmp error-interval 1000 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.6 Ip Icmp Timestamp

Use this command to enbale the device to return a Timestamp Reply. Use the **no** form of this command to disable returning of Timestamp Reply.

ip icmp timestamp

no ip icmp timestamp

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example disables the device to return a Timestamp Reply.

```
FS(config)# no ip icmp timestamp
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.7 Ip Mask-reply

Use this command to configure the FSOS software to respond the ICMP mask request and send an ICMP response message in the interface configuration mode. Use the **no** form of this command to restore the default setting.

ip mask-reply

no ip mask-reply

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command mode Interface configuration mode.

Usage Guide Sometimes, a network device needs the subnet mask of a subnet on the Internet. To obtain such information, the network device can send an ICMP mask request message, and the network device that

receives this message will send a mask response message.

Configuration Examples

The following example sets the FastEthernet 0/1 interface of a device to respond the ICMP mask request message.

```
FS(config)# interface fastEthernet 0/1
FS(config-if)# ip mask-reply
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.8 Ip Mtu

Use this command to set the Maximum Transmission Unit (MTU) for an IP packet in the interface configuration mode. Use the **no** form of this command is restore the default setting.

ip mtu *bytes*

no ip mtu

Parameter Description

Parameter	Description
bytes	Maximum transmission unit of IP packet , in the range from 68 to 1500 bytes

Defaults

It is the same as the value configured in the interface command **mtu** by default.

Command Mode

Interface configuration mode.

Usage Guide

If an IP packet is larger than the IP MTU, the FSOS software will split this packet. All the devices in the same physical network segment must have the same IP MTU for the interconnected interface.

If the interface configuration command **mtu** is used to set the maximum transmission unit value of the interface, IP MTU will automatically match with the MTU value of the interface. However, if the IP MTU value is changed, the MTU value of the interface will remain unchanged.

Configuration Examples

The following iexample sets the IP MTU value of the fastEthernet 0/1 interface to 512 bytes.

```
FS(config)# interface fastEthernet 0/1
FS(config-if)# ip mtu 512
```

Related Commands

Command	Description
mtu	Sets the MTU value of an interface.

Platform Description

N/A

1.9 Ip Redirects

Use this command to allow the FSOS software to send an ICMP redirection message in the interface configuration

mode. Use the **no** form of this command to disable this function.

ip redirects

no ip redirects

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Interface configuration mode.

Usage Guide When the route is not optimum, it may make the device to receive packets through one interface and send it though the same interface. If the device sends the packet through the interface through which this packet is received, the device will send an ICMP redirection message to the data source, telling the data source that the gateway for the destination address is another device in the subnet. In this way the data source will send subsequent packets along the optimum path.

Configuration Examples The following example disables ICMP redirection for the fastEthernet 0/1 interface.

```
FS(config)# interface fastEthernet 0/1
FS(config-if)# no ip redirects
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.10 Ip Source-route

Use this command to allow the FSOS software to process an IP packet with source route information in global configuration mode. Use the **no** form of this command to disable this function.

ip source-route

no ip source-route

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Global configuration mode.

Usage Guide FSOS supports IP source route. When the device receives an IP packet, it will check the options of the IP packet,

such as strict source route, loose source route and record route. Details about these options can be found in RFC 791. If an option is found to be enabled in this packet, a response will be made. If an invalid option is detected, an ICMP parameter problem message will be sent to the data source, and then this packet is discarded.

Configuration Examples

The following example disables the IP source route.

```
FS(config)# no ip source-route
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.11 Ip Ttl

Use this command to set the TTL value of the unicast packet. Use the **no** form of this command to restore the default setting.

ip ttl *value*

no ip ttl

Parameter Description

Parameter	Description
value	Sets the TTL value of the unicast packet, in the range from 0 to 255.

Defaults

The default is 64.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the TTL value of the unicast packet to 100.

```
FS(config)# ip ttl 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.12 Ip Ttl-expires Enable

This command is used to enable notifications of expired TTL. Use the **no** form of this command to disable this function.

ip ttl-expires enable

no ttl-expires enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

By default, notifications are enabled to indicate expired TTL.

Command mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example disables notifications indicating expired TTL.

```
FS(config)# no ttl-expires enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.13 Ip Unreachables

Use this command to allow the FSOS software to generate ICMP destination unreachable messages. Use the **no** form of this command to disable this function.

ip unreachables

no ip unreachables

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default.

Command Mode

Interface configuration mode.

Usage Guide

FSOS software will send a ICMP destination unreachable message if it receives unicast message with self-destination-address and can not process the upper protocol of this message.

FSOS software will send ICMP host unreachable message to source data if it can not forward a message due to no routing.

This command influences all ICMP destination unreachable messages.

Configuration Examples

The following example disables sending ICMP destination unreachable message on FastEthernet 0/1.

```
FS(config)# interface fastEthernet 0/1
FS(config-if)# no ip unreachables
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.14 Show Ip Interface

Use this command to display the IP status information of an interface.

show ip interface [*interface-type interface-number* | **brief**]

Parameter Description

Parameter	Description
interface-type	Specifies interface type.
interface-number	Specifies interface number.
brief	Displays the brief configurations about the IP of the layer-3 interface (including the interface primary ip, secondary ip and interface status)

Defaults

N/A.

Command Mode

Privileged EXEC mode.

Usage Guide

When an interface is available, FSOS will create a direct route in the routing table. The interface is available in that the FSOS software can receive and send packets through this interface. If the interface changes from available status to unavailable status, the FSOS software removes the appropriate direct route from the routing table.

If the interface is unavailable, for example, two-way communication is allowed, the line protocol status will be shown as "UP". If only the physical line is available, the interface status will be shown as "UP".

The results shown may vary with the interface type, because some contents are the interface-specific options

Configuration Examples

The following exmaple displays the output of the **show ip interface brirf command**.

```
FS#show ip interface brief
Interface IP-Address(Pri) IP-Address(Sec) Status Protocol
GigabitEthernet 0/10 2.2.2.2/24 3.3.3.3/24 down down
GigabitEthernet 0/11 no address no address down down
VLAN 1 1.1.1.1/24 no address down down
```

Description of fields:

Field	Description
Status	Link status of an interface. The value can be **up**, **down**, or **administratively down**.
Protocol	IPv4 protocol status of an interface.

The following example displays the output of the **show ip interface vlan** command.

```
SwitchA#show ip interface vlan 1
VLAN 1
  IP interface state is: DOWN
  IP interface type is: BROADCAST
  IP interface MTU is: 1500
  IP address is:
  1.1.1.1/24 (primary)
  IP address negotiate is: OFF
  Forward direct-broadcast is: OFF
  ICMP mask reply is: ON
  Send ICMP redirect is: ON
  Send ICMP unreachabled is: ON
  DHCP relay is: OFF
  Fast switch is: ON
  Help address is:
  Proxy ARP is: OFF
ARP packet input number: 0
  Request packet:    0
  Reply packet:    0
```

```
 Unknown packet: 0
TTL invalid packet number: 0
ICMP packet input number: 0
 Echo request:   0
Echo reply:   0
 Unreachable:   0
 Source quench:   0
 Routing redirect:   0
```

Description of fields in the results:

Field	Description
IP interface state is:	The network interface is available, and both its interface hardware status and line protocol status are "UP".
IP interface type is:	Show the interface type, such as broadcast, point-to-point, etc.
IP interface MTU is:	Show the MTU value of the interface.
IP address is:	Show the IP address and mask of the interface.
IP address negotiate is:	Show whether the IP address is obtained through negotiation.
Forward direct-broadcast is:	Show whether the directed broadcast is forwarded.
ICMP mask reply is:	Show whether an ICMP mask response message is sent.
Send ICMP redirect is:	Show whether an ICMP redirection message is sent.
Send ICMP unreachabled is:	Show whether an ICMP unreachable message is sent.
DHCP relay is:	Show whether the DHCP relay is enabled.
Fast switch is:	Show whether the IP fash switching function is enabled.
Route horizontal-split is:	Show whether horizontal split is enabled, which will affect the route update behavior of the distance vector protocol.
Help address is:	Show the helper IP address.
Proxy ARP is:	Show whether the agent ARP is enabled.
ARP packet input number: Request packet: Reply packet: Unknown packet:	Show the total number of ARP packets received on the interface, including: ARP request packet ARP reply packet Unknown packet
TTL invalid packet number:	Show the TTL invalid packet number
ICMP packet input number: Echo request: Echo reply: Unreachable: Source quench: Routing redirect:	Show the total number of ICMP packets received on the interface, including: Echo request packet Echo reply packet Unreachable packet Source quench packet Routing redirection packet

Outgoing access list is	Show whether an outgoing access list has been configured for an interface.
Inbound access list is	Show whether an incoming access list has been configured for an interface.

Related Commands

Command	Description
N/A.	N/A.

Platform Description N/A.

1.15 Show Ip Packet Queue

Use this command to display the statistics of IP packet queues.

show ip packet queue

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A.

Configuration Examples The following example displays the statistics of IP packet queues.

```
FS#show ip packet queue
Receive 31925 packets(fragment=0):
  IP packet receive queue: length 0, max 1542, overflow 0.
  Receive 13 ICMP echo packets, 25 ICMP reply packets .
  Discards:
    Failed to alloc skb: 0.
    Receive queue overflow: 0.
    Unknow protocol drops: 0.
    ICMP rcv drops: 0. for skb check fail.
    ICMP rcv drops: 0. for skb is broadcast.
Sent packets:
  Success: 15644
  Generate 13 and send 8 ICMP reply packets, send 26 ICMP echo packets.
  It records 187 us as max time in ICMP reply process.
Failed to alloc efbuf: 0
  Dropped by EFMP: 0
  NoRoutes: 887
  Get vrf fails: 0
```

```
 Cannot assigned address drops: 0
 Failed to encapsulate ethernet head: 0
ICMP error queue: length 0, max 1542, overflow 0.
```

Field	Description
IP packet receive queue	Statistics of received packets
Discards	Statistics of discarded packets
Sent packets	Statistics of sent packets
ICMP error queue	Statistics of ICMP error packets

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.16 Show Ip Packet Statistics

Use this command to display the statistics of IP packets.

show ip packet statistics [**total** | *interface-name*]

Parameter Description

Parameter	Description
interface-name	Interface name
total	Displays the total statistics of all interfaces.

Defaults N/A.

Command Mode Privileged EXEC mode.

Usage Guide N/A.

Configuration Examples The following example displays the output of this command.

```
FS# show ip packet statistics
Total
 Received 1000 packets, 1000000 bytes
 Unicast:1000,Multicast:0,Broadcast:0
 Discards:0
 HdrErrors:0(BadChecksum:0,TTLExceeded:0,Others:0)
 NoRoutes:0
 Others:0
 Sent 100 packets, 6000 bytes
 Unicast:50,Multicast:50,Broadcast:0

VLAN 1
```

```
Received 1000 packets, 1000000 bytes
Unicast:1000,Multicast:0,Broadcast:0
Discards:0
HdrErrors:0(BadChecksum:0,TTLExceeded:0,Others:0)
NoRoutes:0
Others:0
Sent 100 packets, 6000 bytes
Unicast:50,Multicast:50,Broadcast:0
```

Related Commands

Command	Description
ip default-gateway	Configures the default gateway, which is only supported on the Layer 2 switch.

Platform Description N/A

1.17 Show Ip Raw-socket

Use this command to display IPv4 raw sockets.

show ip raw-socket [*num*]

Parameter Description

Parameter	Description
num	Protocol.

Defaults N/A.

Command Mode Priviledged EXEC mode.

Usage Guide N/A.

Configuration Examples The following example displays all IPv4 raw sockets.

```
FS# show ip raw-socket
Number Protocol Process name
1      ICMP     dhcp.elf
2      ICMP     vrrp.elf
3      IGMP     igmp.elf
4      VRRP     vrrp.elf
Total: 4
```

Field Description

Field	Description
Number	Number
Protocol	Protocol
Process name	Process name

Total	Total number

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.18 Show Ip Sockets

Use this command to display all IPv4 sockets.

show ip sockets

Parameter Description

Parameter	Description
N/A.	N/A.

Defaults N/A.

Command Mode Privileged EXEC mode.

Usage Guide N/A.

Configuration Examples The following displays all IPv4 sockets.

```
FS# show ip sockets
Number Process name      Type      Protocol LocalIP:Port   ForeignIP:Port          State
1      dhcp.elf          RAW       ICMP     0.0.0.0:1      0.0.0.0:0               *
2      vrrp.elf          RAW       ICMP     0.0.0.0:1      0.0.0.0:0               *
3      igmp.elf          RAW       IGMP     0.0.0.0:2      0.0.0.0:0               *
4      vrrp.elf          RAW       VRRP     0.0.0.0:112    0.0.0.0:0               *
5      dhcpc.elf         DGRAM     UDP      0.0.0.0:68     0.0.0.0:0               *
6      fs-snmpd          DGRAM     UDP      0.0.0.0:161    0.0.0.0:0               *
7      wbav2             DGRAM     UDP      0.0.0.0:2000   0.0.0.0:0               *
8      vrrp_plus.elf     DGRAM     UDP      0.0.0.0:3333   0.0.0.0:0               *
9      mpls.elf          DGRAM     UDP      0.0.0.0:3503   0.0.0.0:0               *
10     rds_other_th      DGRAM     UDP      0.0.0.0:3799   0.0.0.0:0               *
11     fs-snmpd          DGRAM     UDP      0.0.0.0:14800  0.0.0.0:0               *
12     fs-sshd           STREAM    TCP      0.0.0.0:22     0.0.0.0:0               LISTEN
13     fs-telnetd        STREAM    TCP      0.0.0.0:23     0.0.0.0:0               LISTEN
14     wbard             STREAM    TCP      0.0.0.0:4389   0.0.0.0:0               LISTEN
15     wbard             STREAM    TCP      0.0.0.0:7165   0.0.0.0:0               LISTEN
Total: 15
```

Field Description

Field	Description

Number	Serial number.
Process name	Process name.
Type	Socket type, including the following types: RAW: raw sockets DGRAM: datagram type STREAM: stream type.
Protocol	Protocol.
LocalIP:Port	Local IP address and port.
ForeignIP:Port	Peer IP address and port.
State	State. This field is for only TCP sockets.
Total	The total number of sockets.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.19 Show Ip Udp

Use this command to display IPv4 UDP sockets.

show ip udp [**local-port** *num*]

Use this command to display IPv4 UDP socket statistics.

show ip udp statistics

Parameter Description

Parameter	Description
local-port *num*	Local port number

Defaults N/A.

Command Mode Privileged EXEC mode.

Usage Guide N/A.

Configuration Examples The following example displays all IPv4 UDP sockets.

```
FS# show ip udp
Number Local Address        Peer Address        Process name
1      0.0.0.0:68           0.0.0.0:0           dhcpc.elf
2      0.0.0.0:161          0.0.0.0:0           fs-snmpd
3      0.0.0.0:2000         0.0.0.0:0           wbav2
4      0.0.0.0:3333         0.0.0.0:0           vrrp_plus.elf
5      0.0.0.0:3503         0.0.0.0:0           mpls.elf
```

6	0.0.0.0:3799	0.0.0.0:0	rds_other_th
7	0.0.0.0:14800	0.0.0.0:0	fs-snmpd

Field Description

Field	Description
Number	Number.
Local Address	Local IP address and port.
Peer Address	Peer IP address and port.
Process name	Process name.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2. ARP Commands

2.1 Arp

Use this command to add a permanent IP address and MAC address mapping to the ARP cache table. Use the **no** form of this command to restore the default setting.

arp [vrf name] *ip-address MAC-address type*

no arp [vrf name] *ip-address*

Parameter Description

Parameter	Description
vrf name	Specify a VRF instance. The name parameter is the name of the VRF instance. By default, no VRF instance is specified, and the configured static ARP is global.
ip-address	The IP address that corresponds to the MAC address. It includes four parts of numeric values in decimal format separated by dots.
MAC-address	48-bit data link layer address
type	ARP encapsulation type. The keyword is arpa for the Ethernet interface.

Defaults There is no static mapping record in the ARP cache table by default.

Command Mode Global configuration mode.

Usage Guide FSOS finds the 48-bit MAC address according to the 32-bit IP address using the ARP cache table.

Since most hosts support dynamic ARP resolution, usually static ARP mapping is not necessary. The **clear arp-cache** command can be used to delete the ARP mapping that is learned dynamically.

Configuration Examples The following example sets an ARP static mapping record for a host in the Ethernet.

```
FS(config)# arp 1.1.1.1 4e54.3800.0002 arpa
```

Related Commands

Command	Description
clear arp-cache	Clears the ARP cache table

Platform Description N/A

2.2 Arp Anti-ip-attack

Use this command to configure ARP anti-ip-attack. Use the **no** form of this command to restore the default setting.

arp anti-ip-attack *num*

no arp anti-ip-attack

Parameter Description

Parameter	Description
num	The number of the IP message to trigger the ARP to discarded entry in the range from 0 to 100. 0 stands for disabling the arp anti-ip-attack function.

Defaults By default, set the discarded entry after 3 unknown unicast messages are sent to the CPU.

Command Mode Global configuration mode.

Usage Guide For the messages corresponds to the directly-connected route, if the switch does not learn the ARP that corresponds to the destination IP address, it is not able to forward the message in hardware, and it needs to send the message to the CPU to resolve the address(that is the ARP learning). Sending large number of this message to the CPU will influence the other tasks of the switch. To prevent the IP messages from attacking the CPU, a discarded entry is set to the hardware during the address resolution, so that all sequential messages with that destination IP address are not sent to the CPU. After the address resolution, the entry is updated to the forwarding status, so that the switch could forward the message with that destination IP address in hardware.

In general, during the ARP request ,if the switch CPU receives three destination IP address messages corresponding to the ARP entry, it is considered to be possible to attack the CPU and the switch sets the discarded entry to prevent the unknown unicast message from attacking the CPU. User could set the *num* parameter of this command to decide whether it attacks the CPU in specific network environment or disable this function.

The arp anti-ip-attack function needs to occupy the switch hardware routing resources when attacked by the unknown unicast message. If there are enough resources, the **arp anti-ip-attack *num*** could be smaller. If not, in order to preferential ensure the use of the normal routing, the *num* could be larger or disable this function.

Configuration Examples The following example sets the IP message number that triggers to discard entry as 5.

```
FS(config)# arp anti-ip-attack 5
```

The following example disables the ARP anti-ip-attack function.

```
FS(config)# arp anti-ip-attack 0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.3 Arp Cache Interface-limit

Use this command to set the maximum number of ARP learned on the interface.

Use the **no** form of this command to restore the default setting.

arp cache interface-limit *limit*

no arp cache interface-limit

Parameter Description

Parameter	Description
limit	Sets the maximum number of ARP learned on the interface, including static and dynamic ARPs, in the range from 0 to the number supported on the interface. 0 indicates that the number is not limited.

Defaults The default is 0.

Command Mode Interface configuration mode

Usage Guide This function can prevent ARP attacks from generating ARP entries to consume memory. *limit* must be no smaller than the number of ARPs learned on the interface. Otherwise, the configuration does not take effect.

Configuration Examples The following example sets the maximum number of ARP learned on the interface to 300.

```
FS(config)# interface gi 0/0
FS(config-if-GigabitEthernet 0/0)# arp cache interface-limit 300
```

The following example restores the default setting.

```
FS(config)# interface gi 0/0
FS(config-if-GigabitEthernet 0/0)# no arp cache interface-limit
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.4 Arp Gratuitous-send Interval

Use this command to set the interval of sending the free ARP request message on the interface. Use the**no** form of this command to restore the default setting.

arp gratuitous-send interval *seconds*

no arp gratuitous-send

Parameter Description

Parameter	Description
seconds	The time interval to send the free ARP request message in the range from 1 to 3600 in the unit of seconds.
number	The number of free ARP request message to be sent in the range from 1 to 100. The default value is 1.

Defaults This function is disabled by default.

Command Mode Interface configuration mode.

Usage Guide If an interface of the switch is used as the gateway of its downlink devices and counterfeit gateway behavior occurs in the downlink devices, you can configure to send the free ARP request message regularly on this interface to notify that the switch is the real gateway.

Configuration Examples

The following example sets to send one free ARP request to SVI 1 per second.

```
FS(config)# interface vlan 1
FS(config-if)# arp gratuitous-send interval 1
```

The following example stops sending the free ARP request to SVI 1.

```
FS(config)# interface vlan 1
FS(config-if)# no arp gratuitous-send
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.5 Arp Retry Interval

Use this command to set the frequency for sending the arp request message locally, namely, the time interval between two continuous ARP requests sent for resolving one IP address. Use the **no** form of this command to restore the default setting.

arp retry interval *seconds*

no arp retry interval

Parameter Description

Parameter	Description
seconds	Time for retransmitting the ARP request message in the range from 1 to 3600 in the unit of seconds.

Defaults The default is 1.

Command Mode Global configuration mode.

Usage Guide The switch sends the ARP request message frequently, and thus causing problems like network busy. In this case, you can set the retry interval of the ARP request message longer. In general, it should not exceed the aging time of the dynamic ARP entry.

Configuration Examples

The following example sets the retry interval of the ARP request as 30 seconds.

```
FS(config)# arp retry interval 30
```

Related Commands

Command	Description
arp retry times	Number of times for retransmitting an ARP request message.

Platform Description N/A

2.6 Arp Retry Times

Use this command to set the local retry times of the ARP request message, namely, the times of sending the

ARP request message to resolve one IP address. Use the **no** form of this command to restore the default setting.

arp retry times *number*

no arp retry times

Parameter Description

Parameter	Description
number	The times of sending the same ARP request in the range from 1 to100.When it is set as 1, it indicates that the ARP request is not retransmitted, only 1 ARP request message is sent.

Defaults The default is 5.

Command Mode Global configuration mode.

Usage Guide The switch sends the ARP request message frequently, and thus causing problems like network busy. In this case, you can set the retry times of the ARP request smaller. In general, the retry times should not be set too large.

Configuration Examples The following example sets the local ARP request not to be retried.

```
FS(config)# arp retry times 1
```

The following example sets the local ARP request to be retried for one time.

```
FS(config)# arp retry times 2
```

Related Commands

Command	Description
arp retry interval	Interval for retransmitting an ARP request message

Platform Description N/A

2.7 Arp Timeout

Use this command to configure the timeout for the ARP static mapping record in the ARP cache. Use the **no** form of this command to restore the default setting.

arp timeout *seconds*

no arp timeout

Parameter Description

Parameter	Description
secondsv	The timeout is in the range from 0 to 2147483 in the unit of seconds.

Defaults The default is 3600.

Command Mode Interface configuration mode

Usage Guide The ARP timeout setting is only applicable to the IP address and the MAC address mapping that are learned

dynamically. The shorter the timeout, the truer the mapping table saved in the ARP cache, but the more network bandwidth occupied by the ARP. Hence the advantages and disadvantages should be weighted. Generally it is not necessary to configure the ARP timeout unless there is a special requirement.

Configuration Examples

The following example sets the timeout for the dynamic ARP mapping record that is learned dynamically from FastEthernet port 0/1 to 120 seconds.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# arp timeout 120
```

Related Commands

Command	Description
clear arp-cache	Clears the ARP cache list.
show interface	Displays the interface information.

Platform Description

N/A

2.8 Arp Trusted

Use this command to set the maximum number of trusted ARP entries. Use the **no** form of this command to restore the default setting.

arp trusted *number*

no arp trusted

Parameter Description

Parameter	Description
number	Maximum number of trusted ARP entries. It ranges from 10 to the maximum ARP volum minus 1,024.

Defaults

N/A

Command Mode

Global configuration mode.

Usage Guide

To make this command valid, enable the trusted ARP function firstly. The trusted ARP entries and other entries share the memory. Too much trusted ARP entries may lead to insufficient ARP entry space. In general, you should set the maximum number of trusted ARP entries according to your real requirements.

Configuration Examples

The following example sets 1000 trusted ARPs.

```
FS(config)# arp trusted 1000
```

Related Commands

Command	Description
service trustedarp	Enables the trusted ARP function.

Platform Description

N/A

2.9 Arp Trusted Aging

Use this command to set trusted ARP aging. Use the **no** form of this command to restore the default setting.

arp trusted aging

no arp trusted aging

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode.

Usage Guide Use this command to set trusted ARP aging. Aging time is the same as dynamic ARP aging time. Use the **arp timeout** command to set aging time in interface mode.

Configuration Examples The following example enables trusted ARP aging.

```
FS(config)# arp trusted aging
```

Related Commands

Command	Description
service trustedarp	Enables trusted ARP function.

Platform Description N/A

2.10 Arp Trusted User-vlan

Use this command to execute the VLAN transformation while setting the trusted ARP entries. Use the **no** form of this command to restore the default setting.

arp trusted user-vlan *vid1* **translated-vlan** *vid2*

no arp trusted user-vlan *vid1*

Parameter Description

Parameter	Description
vid1	VID set by the server.
vid2	VID after the transformation.

Defaults This function is disabled by default.

Command Mode Global configuration mode.

Usage Guide In order to validate this command, enable the trusted ARP function first. This command is needed only when the VLAN sent by the server is different from the VLAN which takes effect in the trusted ARP entry.

Configuration The following example sets the VLAN sent by the server to 3, but the VLAN which takes effect in the trusted ARP

Examples

entry to 5.

```
FS(config)# arp trusted user-vlan 3 translated-vlan 5
```

Related Commands

Command	Description
service trustedarp	Enables the trusted ARP function.

Platform Description

N/A

2.11 Arp Trust-monitor Enable

Use this command to enable egress gateway trusted ARP. Use the **no** form of this command to restore the default setting.

arp trust-monitor enable

no arp trust-monitor enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

The egress gateway trusted ARP is different from GSN trusted ARP. With this function enabled, the device sends a unicast request for confirmation when learning an ARP table entry. The device learns the ARP table entry after receiving the response. When the device receives the ARP packet, only if the ARP table entry is aged or incomplete and the ARP packet is a response packet will the packet be handled. After egress gateway trusted ARP is enabled, the aging time of the ARP table entry turns to 60 seconds. After this function is disabled, the aging time restores to 3600 seconds.

Configuration Examples

The following example enables egress gateway trusted ARP.

```
FS(config)# interface gi 0/0
FS(config-if-GigabitEthernet 0/0)# arp trust-monitor enable
```

The following example disables engress gateway trusted ARP.

```
FS(config)# interface gi 0/0
FS(config-if-GigabitEthernet 0/0)# no arp trust-monitor enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.12 Arp Unresolve

Use this command to set the maximum number of the unresolved ARP entries. Use **no** form of this command to restore the default setting.

arp unresolve *number*

no arp unresolve

Parameter Description

Parameter	Description
number	The maximum number of the unresolved ARP entries in the range from 1 to the ARP table size supported by the device.

Defaults The default is the ARP table size supported by the device.

Command Mode Global configuration mode.

Usage Guide If there are a large number of unresolved entries in the ARP cache table and they do not disappear after a period of time, this command can be used to limit the quantity of the unresolved entries.

Configuration Examples The following example sets the maximum number of the unresolved items to 500.

```
FS(config)# arp unresolve 500
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.13 Clear Arp-cache

Use this command to remove a dynamic ARP mapping record from the ARP cache table and clear an IP route cache table.

clear arp-cache [**vrf** vrf_name |**trusted**] [*ip* [*mask*]] | **interface** *interface-name*]

Parameter Description

Parameter	Description
trusted	Deletes trusted ARP entries. Dynamic ARP entries are deleted by default.
vrf vrf_name	Delete the dynamic ARP entry of the specified VRF instance. The default is the public network instance.
ip	Deletes ARP entries of the specified IP address. If *trusted* value is specified, trusted ARP entries are deleted; otherwise, all dynamic ARP entries are deleted which is the default.
mask	Deletes ARP entries in a subnet mask. If *trusted* value is specified, trusted ARP entries in the subnet mask are deleted; otherwise, all dynamic ARP entries are deleted. The dynamic ARP entry specified by the IP address is deleted by default.
interface *interface-name*	Deletes dynamic ARP entries on the specified interface. Dynamic ARP

	entries are deleted on all interfaces by default.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command can be used to refresh an ARP cache table.

On a NFPP-based (Network Foundation Protection Policy) device, it receives one ARP packet for every mac/ip address per second by default. If the interval of two **clear arp** times is within 1s, the second response packet will be filtered and the ARP packet will not be resolved for a short time.

Configuration Examples The following example deletes all dynamic ARP mapping records.

```
FS# clear arp-cache
```

The following deletes the dynamic ARP entry 1.1.1.1.

```
FS# clear arp-cache 1.1.1.1
```

The following example deletes the dynamic ARP entry on interface SVI1.

```
FS# clear arp-cache interface Vlan 1
```

Related Commands

Command	Description
arp	Adds a static mapping record to the ARP cache table.

Platform Description N/A

2.14 ip proxy-arp

Use this command to enable ARP proxy function on the interface. Use the **no** form of this command to restore the default setting.

ip proxy-arp

no ip proxy-arp

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Interface configuration mode.

Usage Guide Proxy ARP helps those hosts without routing message obtain MAC address of other networks or subnet IP address. For example, a device receives an ARP request. The IP addresses of request sender and receiver are in different networks. However, the device that knows the routing of IP address of request receiver sends ARP response, which is Ethernet MAC address of the device itself.

Configuration Examples

The following example enables ARP on FastEthernet port 0/1.

```
FS(config)# interface fastEthernet 0/1
FS(config-if)# ip proxy-arp
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.15 local-proxy-arp

Use this command to enable local proxy ARP on the SVI interface. Use the **no** form of this command to restore the default setting.

local-proxy-arp

no local-proxy-arp

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Interface configuration mode

Usage Guide

With local proxy ARP enabled, the device helps a host to obtain MAC addresses of other hosts on the subnet. If the device enables switchport protected, users on different ports are segregated on layer 2. After local proxy ARP is enabled, the device serves as a proxy to send a response after receiving an ARP request. The ARP response contains a MAC address which is the device's Ethernet MAC address, realizing communication between different hosts through L3 routes.

Configuration Examples

The following example enables local proxy ARP on VLAN1.

```
FS(config)# interface vlan 1
FS(config-if-VLAN 1)# local-proxy-arp
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.16 Service Trustedarp

Use this command to enable the trusted ARP function. Use the **no** form of this command to restore the default

setting.

service trustedarp

no service trustedarp

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide The trusted ARP function of the device is to prevent the ARP fraud function. As a part of the GSN scheme, it should be used together with the GSN scheme.

Configuration Examples The following example enables the trusted ARP function in global configuration mode.

```
FS(config)# service trustedarp
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.17 Show Arp

Use this command to display the Address Resolution Protocol (ARP) cache table

show arp [*interface-type interface-number* | **trusted** [*ip* [*mask*]] | [**vrf** vrf-name] [*ip* [*mask*] | *mac-address* | **static** | **complete** | **incomplete**]]

Parameter Description

Parameter	Description
interface-type interface-number	Displays the ARP entry of a specified Layer-2 or Layer-3 port.
vrf vrf_name	VRF instance, displays the ARP entries of the specified VRF.
trusted	Displays the trusted ARP entries. Currently, only the global VRF supports the trusted ARP.
ip	Displays the ARP entry of the specified IP address. If **trusted** is configured, only trusted ARP entries are displayed. Otherwise, untrusted ARP entries are displayed.
mask	Displays the ARP entries of the network segment included within the mask. If **trusted** is configured, only trusted ARP entries are displayed. Otherwise, untrusted ARP entries are displayed.
static	Displays all the static ARP entries.
complete	Displays all the resolved dynamic ARP entries.
incomplete	Displays all the unresolved dynamic ARP entries.

mac-address	Displays the ARP entry with the specified mac address.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the output result of the **show arp** command:

```
FS# show arp
Total Numbers of Arp: 7
Protocol Address Age(min) Hardware Type Interface
Internet 192.168.195.68 0 0013.20a5.7a5f arpa VLAN 1
Internet 192.168.195.67 0 001a.a0b5.378d arpa VLAN 1
Internet 192.168.195.65 0 0018.8b7b.713e arpa VLAN 1
Internet 192.168.195.64 0 0018.8b7b.9106 arpa VLAN 1
Internet 192.168.195.63 0 001a.a0b5.3990 arpa VLAN 1
Internet 192.168.195.62 0 001a.a0b5.0b25 arpa VLAN 1
Internet 192.168.195.5 -- 00d0.f822.33b1 arpa VLAN 1
```

The following example displays the output result of show arp 192.168.195.68

```
FS# show arp 192.168.195.68
Protocol Address Age(min) Hardware Type Interface
Internet 192.168.195.68 1 0013.20a5.7a5f arpa VLAN 1
```

The following example displays the output result of **show arp** 192.168.195.0 255.255.255.0

```
FS# show arp 192.168.195.0 255.255.255.0
Protocol Address Age(min) Hardware Type Interface
Internet 192.168.195.64 0 0018.8b7b.9106 arpa VLAN 1
Internet 192.168.195.2 1 00d0.f8ff.f00e arpa VLAN 1
Internet 192.168.195.5 -- 00d0.f822.33b1 arpa VLAN 1
Internet 192.168.195.1 0 00d0.f8a6.5af7 arpa VLAN 1
Internet 192.168.195.51 1 0018.8b82.8691 arpa VLAN 1
```

The following example displays the output result of **show arp** 001a.a0b5.378d

```
FS# show arp 001a.a0b5.378d
Protocol Address Age(min) Hardware Type Interface
Internet 192.168.195.67 4 001a.a0b5.378d arpa VLAN 1
```

The following example displays the output result of **show arp static**.

```
FS# show arp static
Protocol    Address    Age(min)    Hardware    Type    Interface          Origin
Internet    192.168.23.55    <static>    0000.0000.0010    arpa    VLAN 100    Configure
```

```
Internet  192.168.23.56    <static>  0000.0000.0020  arpa   VLAN 100   Authentication
Internet  192.168.23.57    <static>  0000.0000.0020  arpa   VLAN 100   DHCP-Snooping
2   static arp entries exist.
```

The meaning of each field in the ARP cache table is described as below:

Table 1 Fields in the ARP cache table

Field	Description
Protocol	Protocol of the network address, always to be Internet
Address	IP address corresponding to the hardware address
Age (min)	Age of the ARP cache record, in minutes; If it is not locally or statically configured, the value of the field is represented with "-".
Hardware	Hardware address corresponding to the IP address
Type	Hardware address type, ARPA for all Ethernet addresses
Interface	Interface associated with the IP addresses
Origin	Origin of static ARP entries.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.18 Show Arp Counter

Use this command to display the number of ARP entries in the ARP cache table.

show arp counter

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the output result of the **show arp counter** command:

```
FS#sho arp counter
ARP Limit:                    75000
Count of static entries:   0
Count of dynamic entries: 1 (complete: 1    incomplete: 0)
Total:                        1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.19 Show Arp Detail

Use this command to display the details of the Address Resolution Protocol (ARP) cache table.

show arp detail [*interface-type interface-number* | **trusted** [*ip* [*mask*]] | [vrf vrf-name] [*ip* [*mask*] | *mac-address* | **static** | **complete** | **incomplete**] | subvlan {subvlan-number | min-max min_value max_value]

Parameter Description

Parameter	Description
interface-type interface-number	Displays the ARP of the layer 2 port or the layer 3 interface.
vrf vrf_name	VRF instance, displays the ARP entries of the specified VRF.
trusted	Displays the trusted ARP entries. Currently, only the global VRF supports the trusted ARP.
ip	Displays the ARP entry of the specified IP address.
ip mask	Displays the ARP entries of the network segment included within the mask.
mac-address	Displays the ARP entry of the specified MAC address.
static	Displays all the static ARP entries.
complete	Displays all the resolved dynamic ARP entries.
incomplete	Displays all the unresolved dynamic ARP entries.
subvlan	Display the ARP entries of the specified subvlan.
subvlan-number	subvlan id, display the ARP entry of a specified single subvlan.
min-max	Display the minimum and maximum values of the subvlan id corresponding to the ARP entry in the specified subvlan interval.
min_value	Display the minimum value of the subvlan id corresponding to the ARP entry in the specified subvlan interval.
max_value	Display the maximum value of the subvlan id corresponding to the ARP entry in the specified subvlan interval.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to display the ARP details, such as the ARP type (Dynamic, Static, Local, Trust), the information on the layer2 port.

If you enter a *min_value* greater than *max_value*, no error message is prompted. Instead, ARP entries corresponding to the subvlan are displayed.

Configuration Examples

The following example displays the output result of the **show arp detail** command:

```
FS# show arp detail
IP Address      MAC Address      Type      Age(min)   Interface   Port      Subvlan
Total number of ARP entries:
```

The meaning of each field in the ARP cache table is described as below:

Table 1 Fields in the ARP cache table

Field	Description
IP Address	IP address corresponding to the hardware address
MAC Address	hardware address corresponding to the IP address
Type	ARP type, including static, dynamic, trusted, and native.
Age (min)	Age of the ARP learning, in minutes
Interface	The Layer 3 interface associated with the IP address.
Port	Layer2 port associated with the ARP
SubVlan	The subvlan associated with ARP.
InnerVlan	Inner VLAN associated with ARP, namely CE-VLAN
Location	Local: Indicates that the ARP entry is generated or learned on the local device; Remote: Indicates that the ARP entry is synchronized through the remote gateway

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.20 show arp oob

Use this command to display the ARP cache table.

show arp oob [*ip* [*mask*] | **static** | **complete** | **incomplete** | *mac-address*]

Parameter Description

Parameter	Description
ip	Displays ARP table entries of the specified IP address.
mask	Displays ARP table entries within the IP subnet.
static	Displays all static ARP table entries.
complete	Displays all analyzed ARP table entries.
incomplete	Displays all unanalyzed ARP table entries.
mac-address	Displays ARP table entries of the specified MAC address.

Defaults

N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to display the ARP cache table. The **complete** / **incomplete** key word represents analyzed / unanalyzed ARP table entries.

Configuration Examples The following example displays the outcome of the running the **show arp oob** command.

```
FS# show arp oob
Total Numbers of Arp: 7
Protocol   Address          Age(min)   Hardware       Type   Interface
Internet   192.168.195.68   0          0013.20a5.7a5f arpa   mgmt 0
Internet   192.168.195.67   0          001a.a0b5.378d arpa   mgmt 0
Internet   192.168.195.65   0          0018.8b7b.713e arpa   mgmt 0
Internet   192.168.195.64   0          0018.8b7b.9106 arpa   mgmt 0
Internet   192.168.195.63   0          001a.a0b5.3990 arpa   mgmt 0
Internet   192.168.195.62   0          001a.a0b5.0b25 arpa   mgmt 0
Internet   192.168.195.5    --         00d0.f822.33b1 arpa   mgmt 0
```

The following example displays the outcome of running the **show arp oob** 192.168.195.68 command.

```
FS# show arp oob 192.168.195.68
Protocol   Address          Age(min)   Hardware       Type   Interface
Internet   192.168.195.68   1          0013.20a5.7a5f arpa   mgmt 0
```

The following example displays the outcome of running the show arp oob 192.168.195.0 255.255.255.0.

```
FS# show arp 192.168.195.0 255.255.255.0
Protocol   Address          Age(min)   Hardware       Type   Interface
Internet   192.168.195.64   0          0018.8b7b.9106 arpa   mgmt 0
Internet   192.168.195.2    1          00d0.f8ff.f00e arpa   mgmt 0
Internet   192.168.195.5    --         00d0.f822.33b1 arpa   mgmt 0
Internet   192.168.195.1    0          00d0.f8a6.5af7 arpa   mgmt 0
Internet   192.168.195.51   1          0018.8b82.8691 arpa   mgmt 0
```

The following example displays the outcome of running the show arp oob 001a.a0b5.378d command.

```
FS# show arp 001a.a0b5.378d
Protocol   Address          Age(min)   Hardware       Type   Interface
Internet   192.168.195.67   4          001a.a0b5.378d arpa   mgmt 0
```

Field	Description
Protocol	Only “Internet“ is available at present, which indicates the IP protocol.
Address	The IPv4 address.

Age(min)	The age of the table entry. For the local IP address, the field is displayed as '-'. For the static table entry, the field is displayed as <static>. For the dynamic table entry, the field indicates the time for which the table entry has been learned, in the unit of minutes.
Hardware	48-bit MAC address, written as a dotted triple of four-digit hexadecimal numbers.
Type	Only "arpa" is available at present.
Interface	The L3 interface corresponding to the ARP table entry. The field is NULL for static ARP table entries for the IP address of the static ARP is not within any network segment directly connected with the device.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.21 Show Arp Packet Statistics

Use this command to display the statistics of ARP packets.

show arp packet statistics [*interface-name*]

Parameter Description

Parameter	Description
interface-name	Displays the statistics of ARP packets on the specified interface.

Defaults N/A.

Command Mode Privileged EXEC mode.

Usage Guide N/A.

Configuration Examples The following example displays the output information of the command.

```
FS#show arp packet statistics
Interface                    Received    Received Received    Sent          Sent
Name                            R
equests    Replies    Others       Requests    Replies
--------------------     --------    -------- --------    --------    -------
GigabitEthernet 0/0      0            0            0            0            0
GigabitEthernet 0/1      143649       232          0            2            0
GigabitEthernet 0/2      0            0            0            0            0
GigabitEthernet 0/3      0            0            0            0            0
```

```
GigabitEthernet 0/4     0          0          0          0          0
GigabitEthernet 0/5     0          0          0          0          0
GigabitEthernet 0/6     0          0          0          0          0
Loopback 1              0          0          0          0          0
```

Description of fields:

Field	description
Received Requests	Number of received ARP requests
Received Replies	Number of received ARP response messages
Received Others	Number of other received ARP packets
Sent Requests	Number of sent ARP requests
Sent Replies	Number of sent ARP requests

Related Commands

Command	Description
N/A.	N/A.

Platform Description N/A

2.22 Show Arp Timeout

Use this command to display the aging time of a dynamic ARP entry on the interface.

show arp timeout

Parameter Description

Parameter	Description
N/A.	N/A.

Defaults N/A.

Command Mode Privileged EXEC mode

Usage Guide N/A.

Configuration Examples The following example displays the output of the **show arp timeout** command:

```
FS# show arp timeout
Interface arp timeout(sec)
---------------------- ----------------
VLAN 1    3600
```

The meaning of each field in the ARP cache table is described in Table 1.

Related Commands

Command	Description
N/A.	N/A.

Platform N/A

Description

2.23 Show Ip Arp

Use this command to display the Address Resolution Protocol (ARP) cache table.

show ip arp[vrf vrf-name]

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A.

Configuration Examples The following example displays the output of **show ip arp**:

```
FS# show ip arp
Protocol Address Age(min)Hardware Type Interface
Internet 192.168.7.233 23 0007.e9d9.0488 ARPA FastEthernet 0/0
Internet 192.168.7.112 10 0050.eb08.6617 ARPA FastEthernet 0/0
Internet 192.168.7.79 12 00d0.f808.3d5c ARPA FastEthernet 0/0
Internet 192.168.7.1 50 00d0.f84e.1c7f ARPA FastEthernet 0/0
Internet 192.168.7.215 36 00d0.f80d.1090 ARPA FastEthernet 0/0
Internet 192.168.7.127 0 0060.97bd.ebee ARPA FastEthernet 0/0
Internet 192.168.7.195 57 0060.97bd.ef2d ARPA FastEthernet 0/0
Internet 192.168.7.183 -- 00d0.f8fb.108b ARPA FastEthernet 0/0
```

Each field in the ARP cache table has the following meanings:

Field	Description
Protocol	Network address protocol, always Internet.
Address	The IP address corresponding to the hardware address.
Age (min)	Age of the ARP cache record, in minutes; If it is not locally or statically configured, the value of the field is represented with "-".
Hardware	Hardware address corresponding to the IP address
Type	The type of hardware address. The value is ARPA for all Ethernet addresses.
Interface	Interface associated with the IP address.

Related Commands

Command	Description
N/A.	N/A.

Platform N/A

Description

3. IPv6 Commands

3.1 Clear Ipv6 Neighbors

Use this command to clear the dynamic IPv6 neighbors.

clear ipv6 neighbors [vrf vrf-name] [oob] [*interface-id*]

Parameter Description

Parameter	Description
vrf-name	VRF name. By default, no vrf name is specified, which means to clear the global IPv6 neighbor table entries.
oob	Use the oob keyword to clear all neighbors on the MGMT port that are dynamically learned through neighbor discovery.
interface-id	Interface name. Clear the dynamically learned IPv6 neighbors on the specified interface.

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide This command does not clear all the dynamic neighbors on authentication VLAN.

Note that the static neighbors will not be cleared.

Configuration Examples The following example clears the dynamic IPv6 neighbors.

```
FS# clear ipv6 neighbors
```

The following example clear all neighbors on the MGMT port that have passed dynamic learning.

```
FS# clear ipv6 neighbors oob
```

The following example clears all dynamic neighbors on the interface gigabitEthernet 0/1.

```
FS# clear ipv6 neighbors gigabitEthernet 0/1
```

Related Commands

Command	Description
ipv6 neighbor	Configures the neighbor.
show ipv6 neighbors	Displays the neighbor information.

Platform Description N/A

3.2 Ipv6 Address

Use this command to configure an IPv6 address for a network interface. Use the **no** form of this command to restore the default setting.

ipv6 address *ipv6-address/prefix-length*

ipv6 address *ipv6-prefix/prefix-length* **eui-64**

ipv6 address *prefix-name sub-bits/prefix-length* [**eui-64**]

no ipv6 address

no ipv6 address *ipv6-address/prefix-length*

no ipv6 address *ipv6-prefix/prefix-length* **eui-64**

no ipv6 address *prefix-name sub-bits/prefix-length* [**eui-64**]

Parameter Description

Parameter	Description
iipv6-prefix	IPv6 address prefix in the format defined in RFC4291. The address shall be in hex; the fields in the address shall be separated by comma, and each field shall contain 16 bits.
ipv6-address	IPv6 address in the format defined in RFC4291. The address shall be in hex; the fields in the address shall be separated by comma, and each field shall contain 16 bits.
prefix-length	Length of the IPv6 prefix, the network address of the IPv6 address.
prefix-name	The general prefix name. Use the specified general prefix to generate the interface address.
sub-bits	The value of the sub-prefix bit and the host bit generates the interface address combining with the general prefix. The value shall be in the format defined in the RFC4291.
eui-64	The generated IPV6 address consists of the address prefix and the 64 bit interface ID

Defaults

N/A

Command Mode

Interface configuration mode

Usage Guide

When an IPv6 interface is created and the link status is UP, the system will automatically generate a local IP address for the interface.

The IPv6 address could also be generated using the general prefix. That is, the IPv6 address consists of the general prefix and the sub-prefix and the host bit. The general prefix could be configured using the **ipv6 general-prefix** command or may be learned through the DHCPv6 agent PD (Prefix Discovery) function (please refer to the *DHCPv6 Configuration*). Use the *sub-bits/prefix-length* parameter of this command to configure the sub-prefix and the host bit.

If no deleted address is specified when using **no ipv6 address**, all the manually configured addresses will be deleted.

The **no ipv6 address** *ipv6-prefix/prefix-length* **eui-64** command can be used to delete the addresses configured with **ipv6 address** *ipv6-prefix/prefix-length* **eui-64**.

Configuration Examples

The following example configures an IPv6 address for the interface GigabitEthernet 0/1.

```
FS(config-if)# ipv6 address 2001:1::1/64
FS(config-if)# no ipv6 address 2001:1::1/64
FS(config-if)# ipv6 address 2002:1::1/64 eui-64
```

```
FS(config-if)# no ipv6 address 2002:1::1/64 eui-64
```

The following example applies general prefix to configure an IPv6 address for the interface GigabitEthernet 0/1.

```
FS(config-if-GigabitEthernet 0/1)# ipv6 address my-prefix 0:0:0:7272::72/64
```

If the prefix 2001:1111:2222::/48 is configured under the general prefix name *my-prefix*, then the generated IPv6 address of the interface is 2001:1111:2222:7272::72/64.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.3 Ipv6 Address Autoconfig

Use this command to automatically configure an IPv6 stateless address for a network interface. Use the **no** form of this command to restore the default setting.

ipv6 address autoconfig [**default**]

no ipv6 address autoconfig

Parameter Description

Parameter	Description
default	(Optional) If this keyword is configured, a default routing is generated. Note that only one layer3 interface on the entire device is allowed to use the **default** keyword

Defaults N/A

Command Mode Interface configuration mode

Usage Guide The stateless automatic address configuration is that when receiving the RA (Route Advertisement) message, the device could use the prefix information of the RA message to automatically generate the EUI-64 interface address.

If the RA message contains the flag of the "other configurations", the interface will obtain these "other configurations" through the DHCPv6. The "other configurations" usually means the IPv6 address of the DNS server, the IPv6 address of the NTP server, etc.

Use the **no ipv6 address autoconfig** command to delete the IPv6 address.

Configuration Examples The following example automatically configures an IPv6 stateless address for a network interface and generates a default route.

```
FS(config-if-GigabitEthernet 0/1)# ipv6 address autoconfig default
```

The following example resotres the default setting.

```
FS(config-if-GigabitEthernet 0/1)# no ipv6 address autoconfig
```

Related

Command	Description

Commands	**ipv6 address ipv6-***prefix/prefix-length* [**eui-64**]	Configures the IPv6 address for the interface manually.

Platform Description N/A

3.4 Ipv6 Enable

Use this command to enable the IPv6 function on an interface. Use the **no** form of this command to restore the default setting.

ipv6 enable

no ipv6 enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide The IPv6 function of an interface can be enabled by configuring **ipv6 enable** or by configuring IPv6 address for the interface.

Configuration Examples The following example enables the IPv6 function on the interface GigabitEthernet 0/1.

```
FS(config-if-GigabitEthernet 0/1)# ipv6 enable
```

Related Commands

Command	Description
show ipv6 interface	Displays the related information of an interface.

Platform Description N/A

3.5 Ipv6 General-prefix

Use this command to configure the IPv6 general prefix in the global configuration mode.

ipv6 general-prefix *prefix-name ipv6-prefix/prefix-length*

no ipv6 general-prefix *prefix-name ipv6-prefix/prefix-length*

Parameter Description

Parameter	Description
prefix-name	The general prefix name.
pv6-prefix	The network prefix value of the general-prefix following the format defined in RFC4291.
prefix-length	The length of the general prefix.

Defaults N/A

Command Mode Global configuration mode.

Usage Guide It is convenient to number the network by using the general prefix, which defines a prefix so that many longer specified prefixes could refer to it. These specified prefixes are updated whenever the general prefix changes. If the network number changes, just modify the general prefix.

A general prefix could contain multiple prefixes.

These longer specified prefixes are usually used for the Ipv6 address configuration on the interface.

Configuration Examples The following example configures manually a general prefix as my-prefix.

```
FS(config)# ipv6 general-prefix my-prefix 2001:1111:2222::/48
```

Related Commands

Command	Description
ipv6 address prefix-name sub-bits/prefix-length	Configures the interface address using the general prefix.
show ipv6 general-prefix	Displays the general prefix.

Platform Description N/A

3.6 Ipv6 Hop-limit

Use this command to configure the default hopcount to send unicast messages in the global configuration mode.

ipv6 hop-limit *value*

no ipv6 hop-limit

Parameter Description

Parameter	Description
value	Hopcount ranging from 1 to 255.

Defaults The default is 64.

Command Mode Global configuration mode.

Usage Guide This command takes effect for the unicast messages only, not for multicast messages.

Configuration Examples The following example sets the default hopcount to 100.

FS(config)# **ipv6 hop-limit** *100*

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.7 Ipv6 Icmp Error-interval

Use this command to set the frequency with which ICMPv6-oversize error packets are sent. Use the **no** form of this command to restore the default setting.

ipv6 icmp error-interval too-big *milliseconds* [*bucket-size*]
no ipv6 icmp error-interval too-big *milliseconds* [*bucket-size*]

Use this command to set the frequency with which other ICMPv6 error packets are sent. Use the **no** form of this command to restore the default setting.
ipv6 icmp error-interval *milliseconds* [*bucket-size*]
no ipv6 icmp error-interval *milliseconds* [*bucket-size*]

Parameter Description

Parameter	Description
milliseconds	Sets the refresh interval of the token bucket, in the range from 0 to 2147483647 in the unit of seconds. Setting the value to 0 indicates that the frequency with which ICMPv6 error packets are sent is not fixed.
bucket-size	Sets the number of tokens in the token bucket, in the range from 1 to 200.

Defaults

The default *milliseconds* is 100 and *bucket-size* is 10.

Command Mode

Global configuration mode

Usage Guide

The token bucket algorithm is adopted to set the frequency with which ICMPv6 error packets are sent so as to prevent Denial of Service (DoS) attack,
If the forwarded IPv6 packet is greater than the egress IPv6 MTU in size, the router discards the IPv6 packet and sends the ICMPv6-oversize error packet to the source IPv6 address. This kind of ICMPv6 error packet is used for IPv6 path MTU discovery. If there are too many ICMPv6 error packets, the ICMPv6-oversize error packet may not be sent, causing IPv6 path MTU discovery failure. Therefore, it is recommended to set the frequency of ICMPv6-oversize error packet and other ICMPv6 error packet respectively. Note that ICMPv6 redirect packet is not an ICMPv6 error packet and FS sets the frequency of the ICMPv6 redirect packet the same as that of other ICMPv6 error packet.
For the timer is accurate to 10 milliseconds, it is recommended to set the refresh interval of the token bucket to an integer multiple of 10 milliseconds. If the refresh interval is not an integer multiple of 10 milliseconds, it is converted automatically. For example, the frequency of 1 per five milliseconds turns out to be 2 per 10 milliseconds; the frequency of 3 per 15 milliseconds is converted to 2 per 10 milliseconds.

Configuration Examples

The following example sets the frequency with which ICMPv6-oversize error packets are sent to 100 per second.

```
FS(config)# ipv6 icmp error-interval too-big 1000 100
```

The following example sets the frequency with which other ICMPv6 error packets are sent to 10 per second.

```
FS(config)# ipv6 icmp error-interval 1000 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.8 Ipv6 Mtu

Use this command to configure the MTU of IPv6 packets. Use the **no** form of this command to restore the default setting.

ipv6 mtu *bytes*

no ipv6 mtu

Parameter Description

Parameter	Description
bytes	MTU of IPv6 packets, in bytes. The value ranges from 1,280 to 1,500.

Defaults The default configuration is the same as the configuration of the **mtu** command.

Command Mode Interface configuration mode

Usage Guide If the size of an IPv6 packet exceeds the IPv6 MTU, the FSOS software segments the packet. For all devices in the same physical network segment, the IPv6 MTU of the interconnected interface must be the same.

Configuration Examples The following example sets the IPv6 MTU of the FastEthernet 0/1 interface to 1400 bytes.

```
FS(config)# interface fastEthernet 0/1
FS(config-if)# ipv6 mtu 1400
```

Related Commands

Command	Description
mtu	Sets the MTU of an interface.

Platform Description This command cannot be used on Layer 2 devices.

3.9 Ipv6 Nd Cache Interface-limit

Use this command to set the maximum number of neighbors learned on the interface. Use the **no** form of this command to restore the default setting.

ipv6 nd cache interface-limit *value*

no ipv6 nd cache interface-limit

Parameter Description

Parameter	Description
value	Sets the maximum number of neighbors learned on the interface, including the static and dynamic neighbors, in the range from 0 to the number supported by the device. 0 indicates the number is not limited.

Defaults The default is 0.

Command Mode Interface configuration mode

Usage Guide This function can prevent neighbor entries generated by malicious neighbor attacks from consuming memory. *limit* must be no smaller than the number of neighbors learned on the interface. Otherwise, the configuration does not take effect.

Configuration Examples The following example sets the number of neighbors learned on the interface to 100.

```
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# ipv6 nd cache interface-limit 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.10 Ipv6 Nd Dad Attempts

Use this command to set the number of the NS packets to be continuously sent for IPv6 address collision check on the interface. Use the **no** form of this command to restore it to the default setting.

ipv6 nd dad attempts value

no ipv6 nd dad attempts *value*

Parameter Description

Parameter	Description
value	Number of the NS packets. If it is set to 0, it indicates that the IPv6 address collision check is disabled on the interface. The range is 0 to 600.

Defaults The default is 1.

Command Mode Interface configuration mode.

Usage Guide When the interface is configured with a new IPv6 address, the address collision shall be checked before the address is assigned to the interface, and the address shall be in the ”tentative” status. After the address collision check is completed, if no collision is detected, the address can be used normally; if collision is detected and the interface ID of the address is an EUI-64 ID, it indicates that the link-layer address is repeated, and the system will automatically shut down the interface (that is, to prohibit IPv6 operations on the interface). In this case, you shall modify and configure a new address manually, and restart address collision check for the **down/up** interface. Whenever the state of an interface changes from **down** to **up**, the address collision check function of the interface will be enabled.

Configuration Examples

The following example sets the number of the NS packets.

```
FS(config-if-GigabitEthernet 0/1)# ipv6 nd dad attempts 3
```

Related Commands

Command	Description
show ipv6 interface	Displays the interface information.

Platform Description

N/A

3.11 Ipv6 Nd Dad Retry

Use this command to set the interval for address conflict detection. Use the **no** form of this command to restore the default setting.

ipv6 nd dad retry *value*

no ipv6 nd dad retry

Parameter Description

Parameter	Description
value	Sets the interval for address conflict detection, 60 seconds by default. Setting *value* to 0 indicates that the function is disabled.

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

Before configuring a new IPv6 address for an interface, enable address conflict detection on the interface. If a conflict address is detected, the device does not receive the IPv6 packet destined to the conflict address. This command is used to perform conflict detection again when the interval expires. If there is no conflict, the address can be used.

Configuration Examples

The following example sets the interval for address conflict detection to 10s.

```
FS(config)# ipv6 nd dad retry 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.12 Ipv6 nd managed-config-flag

Use this command to set the “managed address configuration” flag bit of the RA message. Use the **no** form of this command to restore the default setting.

ipv6 nd managed-config-flag

no ipv6 nd managed-config-flag

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Interface configuration mode.

Usage Guide This flag determines whether the host that receives the RA message obtains an IP address through stateful auto configuration. If the flag is set, the host obtains an IP address through stateful auto configuration, otherwise it does not be used.

Configuration Examples The following example set the "managed address configuration" flag bit of the RA message.

```
FS(config-if)# ipv6 nd managed-config-flag
```

Related Commands

Command	Description
show ipv6 interface	Displays the interface information.
ipv6 nd other-config-flag	Sets the flag for obtaining all information except IP address through stateful auto configuration.

Platform Description N/A

3.13 Ipv4 Nd Max-Opt

Use this command to set the maximum number of ND options. Use the **no** form of this command to restore the default setting.

ipv6 nd max-opt *value*

no ipv6 nd max-opt

Parameter Description

Parameter	Description
value	Sets the maximum number of ND options, in the range from 1 to 100.

Defaults The default is 10.

Command Mode Global configuration mode

Usage Guide This command is used to set the maximum number of ND options, such as source link layer address option, MTU option, redirection option and prefix option.

Configuration Examples

The following example sets the maximum of ND options to 20.

```
FS(config)# ipv6 nd max-opt 20
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.14 Ipv6 nd ns-interval

Use this command to set the interval for the interface to retransmitting NS (Neighbor Solicitation). Use the **no** form of this command to restore the default setting.

ipv6 nd ns-interval *milliseconds*

no ipv6 nd ns-interval

Parameter Description

Parameter	Description
milliseconds	Interval for retransmitting NS in the range of 1000 to 429467295 milliseconds

Defaults

The default value in RA is 0 (unspecified); the interval for retransmitting NS is 1,000 milliseconds (1 second).

Command mode

Interface configuration mode.

Usage Guide

The configured value will be advertised through RA and will be used by the device itself. It is not recommended to set a too short interval.

Configuration Examples

The following example sets the interval to 2,000 milliseconds, namely 2 seconds.

```
FS(conifig-if)# ipv6 nd ns-interval 2000
```

Related Commands

Command	Description
show ipv6 interface	Displays the interface information.

Platform Description

N/A

3.15 Ipv6 nd other-config-flag

Use this command to set “other stateful configuration” flag bit of the RA message. Use the **no** form of this command to delete the flag bit.

ipv6 nd other-config-flag

no ipv6 nd other-config-flag

Parameter Description

Parameter	Description
N/A	N/A

Defaults The flag bit is not set by default.

Command mode Interface configuration mode.

Usage Guide With this flag bit set, the flag bit of the RA message sent by the device is set. After receiving this flag bit, the host uses the dhcpv6 to acquire the information excluding the IPv6 address for the purpose of automatic configuration. When the **managed address configuration** is set, the default **other stateful configuration** is also set

Configuration Examples The following example sets "other stateful configuration" flag bit of the RA message.

```
uijie(config-if-GigabitEthernet 0/1)# ipv6 nd other-config-flag
```

Related Commands

Command	Description
show ipv6 interface	Displays the interface information.

Platform Description N/A

3.16 Ipv6 Nd Prefix

Use this command to configure the address prefix included in the RA. Use the **no** form of this command to delete the set prefix or restore the default setting.

ipv6 nd prefix { *ipv6-prefix/prefix-length* | **default** } [[*valid-lifetime preferred-lifetime*] | [**at** *valid-date preferred-date*] | [**infinite** | *preferred-lifetime*]] [**no-advertise**] | [[**off-link**] [**no-autoconfig**]]

no ipv6 nd prefix { *ipv6-prefix/prefix-length* | **default** }

Parameter Description

Parameter	Description
ipv6-prefix	IPv6 network ID following the format defined in RFC4291
prefix-length	Length of the IPv6 prefix. "/" shall be added in front of the prefix
valid-lifetime	Valid lifetime of the RA prefix received by the host
preferred-lifetime	Preferred lifetime of the RA prefix received by the host
at valid-date preferred-date	Sets the dead line for the valid lifetime and that of the preferred lifetime, in day, month, year, hour, minute.
infinite	Indicates that the prefix is always valid.
default	Sets the default prefix.
no-advertise	The prefix will not be advertised by the device.
off-link	When the host sends an IPv6 packet, if the prefix of the destination address matches the set prefix, it is considered that the destination is on-link and is directly reachable. If this option is set, it indicates that the prefix is not used for on-link judgment.
no-autoconfig	Indicates that the RA prefix received by the host cannot be used for auto address configuration.

Defaults

By default, the advertised prefix is the one set with **ipv6 address** on the interface. The default parameters of the prefix configured in the RA are as follows:

valid-lifetime: 2592000s (30 days)

preferred-lifetime: 604800s (7 days),

The prefix is advertised and is used for on-link judgment and auto address configuration.

Command Mode

Interface configuration mode.

Usage Guide

This command can be used to configure the parameters of each prefix, including whether to advertise the prefix. By default, the prefix advertised in RA is the one set with **ipv6 address** on the interface. To add other prefixes, use this command.

ipv6 nd prefix default

Set the default parameters to be used by the interface. If no parameter is specified for an added prefix, the parameters set with **ipv6 nd prefix default** will be used. Note that after a parameter is specified for the prefix, the default configuration will not be used. That is to say, the configuration of the prefix cannot be modified with **ipv6 nd prefix default**; only the prefix that uses all the default configurations can be modified with this command.

at *valid-date preferred-date*

The valid lifetime of a prefix can be specified in two ways. One way is to specify a fixed time for each prefix in the RA; the other way is to specify the end time (in this mode, the valid lifetime of the prefix sent in RA will be gradually reduced until the end time is 0).

Configuration Examples

The following example adds a prefix for SVI 1.

```
FS(config)# interface vlan 1
FS(conifig-if)# ipv6 nd prefix 2001::/64 infinite 2592000
```

The following example sets the default prefix parameters for SVI 1 (they cannot be used for auto address configuration):

```
FS(config)# interface vlan 1

FS(config-if)# ipv6 prefix default no-autoconfig
```

If no parameter is specified, the default parameters will be used, and the prefix cannot be used for auto address configuration.

Related Commands

Command	Description
show ipv6 interface	Displays the RA information of an interface.

Platform Description

N/A

3.17 Ipv6 nd ra-hoplimit

Use this command to set the hopcount of the RA message. Use the **no** form of this command to restore the default setting.

ipv6 nd ra-hoplimit *value*

no ipv6 nd ra-hoplimit

Parameter Description

Parameter	Description
value	Hopcount

Defaults The default is 64.

Command Mode Interface configuration mode.

Usage Guide This command is used to set the hopcount of the RA message.

Configuration Examples The following example sets the hopcount to 110.

```
FS(config-if-GigabitEthernet 0/1)# ipv6 nd ra-hoplimit 110
```

Related Commands

Command	Description
show ipv6 interface	Displays the interface information.
ipv6 nd ra-lifetime	Sets the lifetime of the device.
ipv6 nd ra-interval	Sets the interval of sending the RA message.
ipv6 nd ra-mtu	Sets the MTU of the RA message.

Platform Description N/A

3.18 Ipv6 nd ra-interval

Use this command to set the interval of sending the RA. Use the **no** form of this command to restore the default setting.

ipv6 nd ra-interval { *seconds* | **min-max** *min_value max_value* }

no ipv6 nd ra-interva l

Parameter Description

Parameter	Description
seconds	Interval of sending the RA message in seconds, 3-1800s.
min-max	Maximum and minimum interval sending the RA message in seconds
min_value	Minimum interval sending the RA message in seconds
max_value	Maximum interval sending the RA message in seconds

Defaults 200s. The actual interval of sending the RA message will be fluctuated 20% based on 200s.

Command Interface configuration mode.

Mode

Usage Guide If the device serves as the default device, the set interval shall not be longer than the lifetime of the device. Besides, to ensure other devices along the link occupies network bandwidth while sending the RA message, the actual interval for sending the RA message will be fluctuated 20% based on the set value.

If the key word **min-max** is specified, the actual interval for sending the packet will be chosen between the range of minimum value and maximum value.

Configuration Examples The following example sets the interval to 110 seconds.

```
FS(config-if-GigabitEthernet 0/1)# ipv6 nd ra-interval 110
```

The following example sets the interval to between 110 and 120 seconds.

```
FS(config-if-GigabitEthernet 0/1)# ipv6 nd ra-interval min-max 110 120
```

Related Commands

Command	Description
show ipv6 interface	Displays the interface information.
ipv6 nd ra-lifetime	Sets the lifetime of the device.
ipv6 nd ra-hoplimit	Sets the hopfcount of the RA message.
ipv6 nd ra-mtu	Sets the MTU of the RA message.

Platform Description N/A

3.19 Ipv6 nd ra-lifetime

Use this command to set the device lifetime of the RA sent on the interface. Use the **no** form of this command to restore the default setting.

ipv6 nd ra-lifetime *seconds*

no ipv6 nd ra-lifetime

Parameter Description

Parameter	Description
seconds	Default life time of the device on the interface, in the range from 0 to 9000 in the unit of seconds.

Defaults The default is 1,800.

Command Mode Interface configuration mode.

Usage Guide The router lifetime field is available in each RA. It specifies the time during which the hosts along the link of the interface can select the device as the default device. If the value is set to 0, the device will not serve as the default device any longer. If it is not set to 0, it shall be larger than or equal to the interval of sending the RA (ra-interval)

Configuration The following example sets the device lifetime to 2,000 seconds.

Examples

```
FS(config-if-GigabitEthernet 0/1)# ipv6 nd ra-lifetime 2000
```

Related Commands

Command	Description
show ipv6 interface	Displays the interface information.
ipv6 nd ra-interval	Sets the interval of sending the RA.
ipv6 nd ra-hoplimit	Sets the hopcount of the RA.
ipv6 nd ra-mtu	Sets the MTU of the RA.

Platform Description

N/A

3.20 Ipv6 nd ra-mtu

Use this command to set the MTU of the RA message. Use the **no** form of this command to restore the default setting.

ipv6 nd ra-mtu *value*

no ipv6 nd ra-mtu

Parameter Description

Parameter	Description
value	MTU value, in the range from 0 to 4294967295.

Defaults

IPv6 MTU value of the network interface.

Command Mode

Interface configuration mode.

Usage Guide

If it is specified as 0, the RA will not have the MTU option

Configuration Examples

The following example sets the MTU to 1,4000 bytes.

```
FS(config -if)# ipv6 nd ra-mtu 1400
```

Related Commands

Command	Description
show ipv6 interface	Displays the interface information.
ipv6 nd ra-lifetime	Sets the lifetime of the device.
ipv6 nd ra-interval	Sets the interval of sending the RA message.
ipv6 nd ra-hoplimit	Sets the hopcount of the RA message.

Platform Description

N/A

3.21 Ipv6 nd reachable-time

Use this command to set the reachable time after the interface checks the reachability of the neighbor dynamically learned through NDP. Use the **no** form of this command to restore the default setting.

ipv6 nd reachable-time *milliseconds*

no ipv6 nd reachable-time

Parameter Description

Parameter	Description
milliseconds	Reachable time for the neighbor in the range from 0 to 3,600,000 in the unit of milliseconds.

Defaults

The default value in RA is 0 (unspecified); the reachable time for the neighbor is 30,000 milliseconds (30 seconds) when the device discovers the neighbor.

Command Mode

Interface configuration mode.

Usage Guide

The device checks the unreachable neighbor through the set time. A shorter time means that the device can check the neighbor failure more quickly, but more network bandwidth and device resource will be occupied. Therefore, it is not recommended to set a too short reachable time.

The configured value will be advertised through RA and will be used by the device itself. If the value is set to 0, it indicates that the time is not specified, that is, the default value is used.

Configuration Examples

The following example sets the reachable time to 1,000,000 milliseconds, namely 1,000 seconds.

```
FS(config-if-GigabitEthernet 0/1)# ipv6 nd reachable-time 1000000
```

Related Commands

Command	Description
show ipv6 interface	Displays the interface information.

Platform Description

N/A

3.22 Ipv6 Nd State-time

Use this command to set the period for the neighbor to maintain the state. Use the **no** form of this command to restore the default setting.

ipv6 nd stale-time *seconds*

no ipv6 nd stale-time

Parameter Description

Parameter	Description
Seconds	Sets the period for the neighbor to maintain the state, in the range from 0 to 86400 in the unit of seconds.

Defaults

The default is 3600.

Command Mode

Global configuration mode

Usage Guide

This command is used to set the period for the neighbor to maintain the state. After the period expires, neighbor

unreachability detection is performed. The shorter the period, the faster the neighbor is found unreachable. On the other hand, more network bandwidth and device resources are consumed. Therefore, it is recommended to set a value not too small.

Configuration Examples

The following example sets the period to 600 seconds for the neighbor to maintain the state.

```
FS(config)# ipv6 nd stale-time 600
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.23 Ipv6 nd suppress-ra

Use this command to disable the interface from sending the RA message. Use the **no** form of this command to enable the function.

ipv6 nd suppress-ra

no ipv6 nd suppress-ra

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The **ipv6 nd suppress-ra** command is enabled by default.

Command Mode

Interface configuration mode.

Usage Guide

This command suppresses the sending of the RA message on an interface.

Configuration Examples

The following example disables the interface from sending the RA message.

```
FS(config-if-GigabitEthernet 0/1)# ipv6 nd suppress-ra
```

Related Commands

Command	Description
show ipv6 interface	Displays the interface information.

Platform Description

N/A

3.24 Ipv6 nd unresolved

Use this command to set the maximum number of the unresolved neighbor table entries. Use the **no** form of this command to restore the default setting.

ipv6 nd unresolved *number*

no ipv6 nd unresolved

Parameter Description

Parameter	Description
number	Sets the maximum number of the unresolved neighbor table entries, in the range from 1 to the neighbor table size supported by the device.

Defaults The default is 0. (The maximum number is the neighbor table size supported by the device)

Command Mode Global configuration mode

Usage Guide This command is used to prevent unresolved ND table entries generated by malicious scan attacks from consuming table entry resources,

Configuration Examples The following example sets the maximum number of the unresolved neighbor table entries to 200.

```
FS(config)# ipv6 nd unresolved 200
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.25 Ipv6 neighbor

Use this command to configure a static neighbor. Use the **no** form of this command to delete a static neighbor.

ipv6 neighbor *ipv6-address interface-id hardware-address*

no ipv6 neighbor *ipv6-address interface-id*

Parameter Description

Parameter	Description
ipv6-address	The neighbor IPv6 address, in the form as defined in RFC4291.
interface-id	Specifies the network interface where the neighbor is (including Router Port, L3 AP port and SVI interface).
hardware-address	The 48-bit MAC address, a dotted triple of four-digit hexadecimal numbers.

Defaults No static neighbor is configured by default.

Command Mode Global configuration mode

Usage Guide This command can only be configured on the interface enabled with IPv6 protocol, similar to the ARP command.

If the neighbor to be configured has been learned through Neighbor Discovery Protocol (NDP) and stored in the

NDP neighbor table, the dynamic neighbor turns to be static. If the static neighbor is valid, it is always reachable. An invalid static neighbor refers to the neighbor whose IPv6 address is not valid (not in the IPv6 network segment configured for the interface or interface address conflict). The packet is not forwarded to the MAC address as specified by the invalid static neighbor. The invalid static neighbor is in inactive state. Use the show ipv6 neighbor static command to display the state of the static neighbor.

Use the **clear ipv6 neighbors** command to clear all neighbors learned dynamically through NDP.

Configuration Examples

The following example configures a static neighbor on SVI 1.

```
FS(config)# ipv6 neighbor 2001::1 vlan 1 00d0.f811.1111
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.26 Ipv6 ns-linklocal-src

Use this command to set the local address of the link as the source IP address to send neighbor requests. Use the **no** form of this command to use the global IP address w as the source address to send neighbor requests.

ipv6 ns-linklocal-src

no ipv6 ns-linklocal-src

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The local address of the link is always used as the source address to send neighbor requests.

Command Mode

Global configuration mode.

Usage Guide

N/A

Configuration Examples

The following example sets the local address of the link as the source IP address to send neighbor requests.

```
FS(config)# no ipv6 ns-linklocal-src
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.27 Ipv6 redirects

Use this command to control whether to send ICMPv6 redirect message when the switch receives and forwards

an IPv6 packet through an interface. Use the **no** form of this command to restore the default setting.

ipv6 redirects

no ipv6 redirects

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Interface configuration mode.

Usage Guide The transmission rate of any ICMPv6 error message is limited. By default, it is 10pps.

Configuration Examples The following example enables ICMPv6 redirection on interface GigabitEthernet 0/1.

```
FS(config-if-GigabitEthernet 0/1)# ipv6 redirects
```

Related Commands

Command	Description
show ipv6 interface	Displays the interface information.

Platform Description N/A

3.28 Ipv6 source-route

Use this command to forward the IPv6 packet with route header. Use the **no** form of this command to restore the default setting.

ipv6 source-route

no ipv6 source-route

Parameter Description

Parameter	Description
N/A	N/A

Defaults The **ipv6 source-route** command is disabled by default.

Command Mode Global configuration mode.

Usage Guide Because of the potential security of the header of type 0 route, it's easy for the device to suffer from the denial service attack. Therefore, forwarding the IPv6 packet with route header is disabled by default. However, the IPv6 packet of route header with type 0 that destined to the local machine is processed.

Configuration Examples The following example forwards the IPv6 packet with route header.

```
FS(config)# no ipv6 source-route
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.29 Show Ipv6 Address

Use this command to display the IPv6 addresses.

show ipv6 address [*interface-name*]

Parameter Description

Parameter	Description
interface-name	Interface name

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays all IPv6 address configured on the device.

```
FS#show ipv6 addr
Global unicast address limit: 1024, Global unicast address count: 2
Tentative address count: 3,Duplicate address count: 0
Preferred address count: 0,Deprecated address count: 0
  GigabitEthernet 0/5
    2003:1::23/64                                    Tentative
  Preferred lifetime: INFINITE, Valid lifetime: INFINITE
    fe80::2d0:f8ff:fefb:deb2/64                      Tentative
  Preferred lifetime: INFINITE, Valid lifetime: INFINITE
    2005:1::1111/64                                  Tentative
  Preferred lifetime: INFINITE, Valid lifetime: INFINITE
FS#
```

The following example displays the IPv6 address configured on the GigabitEthernet 0/1.

```
FS#show ipv6 addr gi 0/5
Global unicast address count: 2
Tentative address count: 3,Duplicate address count: 0
Preferred address count: 0,Deprecated address count: 0
    2003:1::23/64                                    Tentative
  Preferred lifetime: INFINITE, Valid lifetime: INFINITE
    fe80::2d0:f8ff:fefb:deb2/64                      Tentative
```

```
  Preferred lifetime: INFINITE, Valid lifetime: INFINITE
    2005:1::1111/64                                    Tentative
  Preferred lifetime: INFINITE, Valid lifetime: INFINITE
FS#
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.30 Show Ipv6 General-prefix

Use this command to display the information of the general prefix.

show ipv6 general-prefix

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide Use this command to display the information of the general prefix including the manually configured and learned from the DHCPv6 agent.

Configuration Examples The following example displays the information of the general prefix.

```
FS# show ipv6 general-prefix
There is 1 general prefix.
IPv6 general prefix my-prefix, acquired via Manual configuration
 2001:1111:2222::/48
 2001:1111:3333::/48
```

Related Commands

Command	Description
ipv6 general-prefix	Configures the general prefix.

Platform Description N/A

3.31 Show Ipv6 Interface

Use this command to display the IPv6 interface information.

show ipv6 interface [*interface-id*] [**ra-info**]] [*brief* [interface-id]]

Parameter Description

Parameter	Description
interface-id	Interface (including Ethernet interface, aggregate port, or SVI)
ra-info	Displays the RA information of the interface.
brief	Displays the brief information of the interface (interface status and address information).

Defaults

N/A

Command Mode

Privileged EXEC mode.

Usage Guide

Use this command to display the address configuration, ND configuration and other information of an IPv6 interface.

Configuration Examples

The following example displays the information of the IPv6 interface.

```
FS# show ipv6 interface vlan 1
Interface vlan 1 is Up, ifindex: 2001
address(es):
Mac Address: 00:00:00:00:00:01
INET6: fe80::200:ff:fe00:1 , subnet is fe80::/64
Joined group address(es):
ff01:1::1
ff02:1::1
ff02:1::2
ff02:1::1:ff00:1
INET6: 2001::1 , subnet is 2001::/64 [TENTATIVE]
Joined group address(es):
ff01:1::1
ff02:1::1
ff02:1::2
ff02:1::1:ff00:1
MTU is 1500 bytes
ICMP error messages limited to one every 10 milliseconds
ICMP redirects are enabled
ND DAD is enabled, number of DAD attempts: 1
ND reachable time is 30000 milliseconds
ND advertised reachable time is 0 milliseconds
ND retransmit interval is 1000 milliseconds
ND advertised retransmit interval is 0 milliseconds
ND router advertisements are sent every 200 seconds<240--160>
ND device advertisements live for 1800 seconds
```

The following line is included in the above information: 2001::1, subnet is 2001::/64 [**TENTATIVE**]. The flag bit in

the [ ] following the INET6 address is explained as follows:

Flag	Meaning
ANYCAST	Indicate that the address is an anycast address.
TENTATIVE	Indicate that the DAD is underway. The address is a tentative before the DAD is completed.
DUPLICATED	Indicate that a duplicate address exists.
DEPRECATED	Indicate that the preferred lifetime of the address expires.
NODAD	Indicate that no DAD is implemented for the address.
AUTOIFID	Indicate that the interface ID of the address is automatically generated by the system, which is usually an EUI-64 ID.
PRE	Indicate the IP stateless address that is automatically configured.
GEN	Indicate the IP address that is generated by the general prefix.

The following example displays the RA information of the IPv6 interface.

```
FS# show ipv6 interface vlan 1 ra-info
vlan 1: DOWN
RA timer is stopped
waits: 0, initcount: 3
statistics: RA(out/in/inconsistent): 4/0/0, RS(input): 0
Link-layer address: 00:00:00:00:00:01
Physical MTU: 1500
ND device advertisements live for 1800 seconds
ND device advertisements are sent every 200 seconds<240--160>
Flags: !M!O, Adv MTU: 1500
ND advertised reachable time is 0 milliseconds
ND advertised retransmit time is 0 milliseconds
ND advertised CurHopLimit is 64
Prefixes: (total: 1)
fec0:1:1:1::/64(Def,Auto,vltime: 2592000, pltime: 604800, flags: LA)
```

Description of the fields in **ra-info**:

Field	Meaning
RA timer is stopped (on)	Indicate whether the RA timer is started.
waits	Indicate that the RS is received but the number of the responses is not available.
initcount	Indicate the number of the RAs when the RA timer is restarted.

RA(out/in/ inconsistent)	out: Indicate the number of the RAs that are sent. In: Indicate the number of the RAs that are received. inconsistent: Indicate the number of the received RAs in which the parameters are different from those contained in the RAs advertised by the device.
RS(input)	Indicate the number of the RSs that are received.
Link-layer address	Link-layer address of the interface.
Physical MTU	Link MTU of the interface.
!M | M	!M indicates the managed-config-flag bit in the RA is not set. M: Conversely
!O | O	!O indicates the other-config-flag bit in the RA is not set. O: Conversely

Description of the fields of the prefix list in **ra-info**:

Field	Meaning
total	The number of the prefixes of the interface.
fec0:1:1:1::/64	A specific prefix.
Def	Indicate that the interfaces use the default prefix.
Auto | CFG	Auto: Indicate the prefix is automatically generated after the interface is configured with the corresponding IPv6 address. CFG: Indicate that the prefix is manually configured.
!Adv	Indicate that the prefix will not be advertised.
vltime	Valid lifetime of the prefix, measured in seconds.
pltime	Preferred lifetime of the prefix, measured in seconds.
L | !L	L: Indicate that the on-link in the prefix is set. !L: Indicate that the on-link in the prefix is not set.
A | !A	A: Indicate that the auto-configure in the prefix is set. !A: It indicates that the auto-configure in the prefix is not set.

The following example displays the brief information of the IPv6 interface.

```
FS#show ipv6 interface brief

GigabitEthernet 0/1                [down/down]
        2222::2
        FE80::1614:4BFF:FE5C:ED3A
```

Related Commands

Command	Description
N/A	N/A

Platform N/A

Description

3.32 Show Ipv6 Neighbors

Use this command to display the IPv6 neighbors.

show ipv6 neighbors [vrf vrf-name][**verbose**] [*interface-id*] [*ipv6-address*] [**static**][oob]

Parameter Description

Parameter	Description
vrf-name	VRF name. By default, the global IPv6 neighbor is displayed.
verbose	Show details of neighbors
interface-id	Displays the neighbors of the specified interface.
ipv6-addres	Displays the neighbors of the specified IPv6 address.
static	Displays the validity status of static neighbors.
oob	Display the IPv6 neighbors of the mgmt port

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays the neighbors on the SVI 1 interface.

```
FS# show ipv6 neighbors vlan 1
IPv6 Address Linklayer Addr Interface
fa::1 00d0.0000.0002 vlan 1
fe80::200:ff:fe00:2 00d0.0000.0002 vlan 1
```

The following example displays the neighbor details.

```
FS# show ipv6 neighbors verbose
IPv6 Address Linklayer Addr Interface
2001::1 00d0.f800.0001 vlan 1
  State: Reach/H Age: - asked: 0
fe80::200:ff:fe00:1 00d0.f800.0001 vlan 1
  State: Reach/H Age: - asked: 0
```

Field	Meaning
IPv6 Address	IPv6 address of the Neighbor
Linklayer Addr	Link address, namely, MAC address. If it is not available, incomplete is displayed.
Interface	Interface the neighbor locates.
State	State of the neighbor: state/H(R)

	The values of STATE are as below: INCMP (Incomplete): The address resolution of the neighbor is underway, the NS is sent, but the NA is not received. REACH (Reachable): The switch is connected with the neighbor. In this state, the switch takes no additional action when sending packets to the neighbor. STALE: The reachable time of the neighbor expires. In this state, the switch takes no additional action; it only starts NUD (Neighbor Unreachability Detection) after a packet is sent to the neighbor. DELAY: A packet is sent to the neighbor in STALE state. If the STALE state changes to DELAY, DELAY will be changed to PROBE if no neighbor reachability notification is received within DELAY_FIRST_PROBE_TIME seconds (5s), the NS will be sent to the neighbor to start NUD. PROBE: The NUD is started to check the reachability of the neighbor. The NS packets are sent to the neighbor at the interval of RetransTimer milliseconds until the response from the neighbor is received or the number of the sent NSs hits MAX_UNICAST_SOLICIT(3). ?: Unknown state. /R—indicate the neighbor is considered as a device /H: The neighbor is a host.
Age	The reachable time of the neighbor. '-' indicates that the neighbor is always reachable. Note that the reachability of a static neighbor depends on the actual situation. 'expired' indicates that the lifetime of the neighbor expires, and the neighbor is waits for the triggering of NUD.
Asked	The number of the NSs that are sent to the neighbor for the resolution of the link address of the neighbor.

The following example displays the status of static neighbors.

```
FS# show ipv6 neighbors static
IPv6 Address        Linklayer Addr    Interface                    State
2001:1::1           00d0.f822.33ab    GigabitEthernet 0/14         ACTIVE
2001:2::2           00d0.f822.33ac    VLAN 1                       INACTIVE
```

Related Commands

Command	Description
ipv6 neighbor	Configures a neighbor.

Platform Description N/A

3.33 Show Ipv6 Neighbors Statistics

Use the following commands to display the statistics of one IPv6 neighbors.

show ipv6 neighbors [vrf vrf-name] statistics[**all**]

Parameter Description

Parameter	Description
Vrf-name	VRF name. By default, global IPv6 neighbor table statistics

	are displayed.
all	Statistics of all IPv6 neighbors

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays the statistics of the global neighbors.

```
 FS#show ipv6 neighbor statistics

Memory: 0 bytes
Entries: 0
   Static: 0,Dynamic: 0,Local: 0
   Incomplete:0, Reachable:0, Stale:0, Delay:0, Probe:0
FS#
```

The following example displays the statistics of all IPv6 statistics.

```
FS#show ipv6 neighbor statistics all

IPv6 neighbor table count: 1
Static neighbor count: 0(0 active, 0 inactive)
Total
Memory: 0 bytes
Entries: 0
   Static: 0,Dynamic: 0,Local: 0
   Incomplete:0, Reachable:0, Stale:0, Delay:0, Probe:0;

Global
Memory: 0 bytes
Entries: 0
   Static: 0,Dynamic: 0,Local: 0
   Incomplete:0, Reachable:0, Stale:0, Delay:0, Probe:0;
FS#
```

Related Commands

Command	Description
N/A	N/A

Platform Description Supported on all platforms.

3.34 Show Ipv6 Packet Statistics

Use this command to display the statistics of IPv6 packets.

show ipv6 packet statistics [**total** | *interface-name*]

Parameter Description

Parameter	Description
total	Displays total statistics of all interfaces.
interface-name	Interface name

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays the total statistics of the Ipv6 packets and the statistics of each inerface.

```
FS#show ipv6 pack statistics
Total
  Received 0 packets, 0 bytes
    Unicast:0,Multicast:0
    Discards:0
      HdrErrors:0(HoplimitExceeded:0,Others:0)
      NoRoutes:0
      Others:0
  Sent 0 packets, 0 bytes
    Unicast:0,Multicast:0
  GigabitEthernet 0/5
  Received 0 packets, 0 bytes
    Unicast:0,Multicast:0
    Discards:0
      HdrErrors:0(HoplimitExceeded:0,Others:0)
      NoRoutes:0
      Others:0
  Sent 0 packets, 0 bytes
    Unicast:0,Multicast:0
FS#
```

The following example displays the total statistics of the Ipv6 packets.

```
FS#show ipv6 pack statistics total
Total
  Received 0 packets, 0 bytes
    Unicast:0,Multicast:0
    Discards:0
      HdrErrors:0(HoplimitExceeded:0,Others:0)
      NoRoutes:0
```

```
        Others:0
  Sent 0 packets, 0 bytes
      Unicast:0,Multicast:0
FS#
```

Related Commands

Command	Description
N/A	N/A

Platform Description

Supported on all platforms.

3.35 Show Ipv6 Raw-socket

Use this command to display all original IPv6 sockets.

show ipv6 raw-socket [*num*]

Parameter Description

Parameter	Description
num	Protocol number

Defaults

N/A

Command Mode

Privileged EXEC mode.

Usage Guide

N/A

Configuration Examples

The following example displays all original IPv6 sockets.

```
FS# show ipv6 raw-socket
Number Protocol Process name
1      ICMPv6   vrrp.elf
2      ICMPv6   tcpip.elf
3      VRRP     vrrp.elf
Total: 3
```

Field	Description
Number	Number.
Process name	Process name.
Protocol	Protocol number
Total	Total number of sockets.

Related

Command	Description

Commands	N/A	N/A

Platform Description N/A

3.36 Show Ipv6 Routers

In the IPv6 network, some neighbor routers send out the advertisement messages. Use this command to display the neighbor routers and the advertisement.

show ipv6 routers [*interface-type interface-number*]

Parameter Description

Parameter	Description
interface-type interface-number	(Optional) Displays the routing advertisement of the specified interface.

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide Use this command to display the neighbor routers and the routing advertisement. If no interface is specified, all the routing advertisement of this device will be displayed.

Configuration Examples The following example displays the IPv6 router

```
FS# show ipv6 routers
Router FE80::2D0:F8FF:FEC1:C6E1 on VLAN 2, last update 62 sec
  Hops 64, Lifetime 1800 sec, ManagedFlag=0, OtherFlag=0, MTU=1500
  Preference=MEDIUM
  Reachable time 0 msec, Retransmit time 0 msec
  Prefix 6001:3::/64 onlink autoconfig
    Valid lifetime 2592000 sec, preferred lifetime 604800 sec
  Prefix 6001:2::/64 onlink autoconfig
Valid lifetime 2592000 sec, preferred lifetime 604800 sec
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.37 Show Ipv6 Sockets

Use this command to display all IPv6 sockets.

show ipv6 sockets

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Privileged EXEC mode.

Mode

Usage Guide N/A

Configuration Examples The following example displays all IPv6 sockets.

```
FS# show ipv6 sockets
Number Process name      Type     Protocol   LocalIP:Port   ForeignIP:Port   State
1      vrrp.elf          RAW      ICMPv6     :::58          :::0             *
2      tcpip.elf         RAW      ICMPv6     :::58          :::0             *
3      vrrp.elf          RAW      VRRP       :::112         :::0             *
4      fs-snmpd          DGRAM    UDP        :::161         :::0             *
5      fs-snmpd          DGRAM    UDP        :::162         :::0             *
6      dhcp6.elf         DGRAM    UDP        :::547         :::0             *
7      fs-sshd           STREAM   TCP        :::22          :::0             LISTEN
8      fs-telnetd        STREAM   TCP        :::23          :::0             LISTEN
Total: 8
```

Field	Description
Number	Number.
Process name	Process name.
Type	Socket type. RAW indicates the raw socket. DGRAM indicates data packet type. STREAM indicates traffic type.
Protocol	Protocol number
LocalIP:Port	Local IPv6 address and port.
ForeignIP:Port	Peer IPv6 address and port.
State	State (for IPv6 TCP sockets).
Total	Total number of sockets.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.38 Show Ipv6 Udp

Use this command to display all IPv6 UDP sockets.

show ipv6 udp [**local-port** *num*] [**peer-port** *num*]

Use this command to display IPv6 UDP socket statistics.

show ipv6 udp statistics

Parameter Description

Parameter	Description
local-port *num*	Local port number.

peer-port *num*	Peer port number.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays all IPv6 UDP sockets.

```
FS# show ipv6 udp
Number Local Address     Peer Address     Process name
1      :::161            :::0             fs-snmpd
2      :::162            :::0             fs-snmpd
3      :::547            :::0             dhcp6.elf
```

Filed	Description
Number	Number.
Local Address	Local IPv6 address and port.
Peer Address	Peer IPv6 address and port.
Process name	Process name.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4. DHCP Commands

4.1 Address Range

Use this command to specify the network segment range of the addresses that can be allocated by CLASS associated with DHCP address pool. Use the **no** form of this command to restore the default setting.

address range *low-ip-address high-ip-address*

no address range

Parameter Description

Parameter	Description
low-ip-address	Start address in the network segment range.
high-ip-address	End address in the network segment range.

Defaults

By default, the associated CLASS is not configured with the network segment range. The default is the address pool range.

Command Mode

Address pool CLASS configuration mode.

Usage Guide

Each CLASS corresponds to one network range which must be from low address to high address, so as to allow the duplication of network segment range between multiple CLASSes. If the CLASS associated with the address pool is specified without configuring the corresponding network segment range, the default network segment range of this CLASS is same as the range of the address pool where this CLASS is.

Configuration Examples

The following example configures the network segment of class1 associated with address pool mypool0 ranging from 172.16.1.1 to 172.16.1.8.

```
FS(config)# ip dhcp pool mypool0
FS(dhcp-config)# class class1
FS (config-dhcp-pool-class)# address range 172.16.1.1 172.16.1.8
```

Related Commands

Command	Description
ip dhcp pool	Defines the name of the DHCP address pool and enters the DHCP address pool configuration mode.
class	Configures the CLASS associated with the DHCP address pool and enters the address pool CLASS configuration mode.

Platform Description

N/A

4.2 address-manage

Use this command to enter the AM rule configuration mode.

address-manage

Parameter

Parameter	Description

Description	N/A	N/A

Defaults N/A

Command Mode Global configuration mode

Usage Guide This command is configured on the DHCP server and used in combination with Super VLAN.

Configuration Examples The following example enters the AM rule configuration mode.

```
FS(config)#address-manage
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.3 Bootfile

Use this command to define the startup mapping file name of the DHCP client. Use the **no** or **default** form of this command to restore the default setting.

bootfile *file-name*

no bootfile

default bootfile

Parameter Description

Parameter	Description
file-name	Startup file name.

Defaults No startup file name is defined by default.

Command Mode DHCP address pool configuration mode

Usage Guide Some DHCP clients need to download the operating system and configure the file during the startup. The DHCP server should provide the mapping file name required for the startup, so that DHCP clients can download the file from the corresponding server (such as TFTP). Other servers are defined by the **next-server** command.

Configuration Examples The following example defines the device.conf as the startup file name.

```
bootfile device.conf
```

Related Commands

Command	Description
ip dhcp pool	Defines the name of the DHCP address pool and enter the DHCP address pool configuration mode.

next-server	Configures the next server IP address of the DHCP client startup process.

Platform Description

N/A

4.4 Class

Use this command to configure the associated CLASS in the DHCP address pool. Use the **no** form of this command to restore the default setting.

class *class-name*

no class

Parameter Description

Parameter	Description
class-name	Class name, which can be the character string or numeric such as myclass or 1.

Defaults

By default, no CLASS is associated with the address pool.

Command Mode

DHCP address pool configuration mode

Usage Guide

Each DHCP address pool performs the address assignment according to the Option82 matching information. We can divide this Option82 information into classes and specify the available network segment range for these classes in the DHCP address pool. These classes are called CLASS. One DHCP address pool can map to multiple CLASSes, and each CLASS can specify different network segment range.

During the address assignment, firstly, ensure the assignable address pool through the network segment where the client is, then according to the Option82 information further ensure the CLASS and assign the IP address from the network segment range corresponding to the CLASS. If one request packet matches multiple CLASSes in the address pool, perform the address assignment according to the sequencing of configuring the CLASS in the address pool. If this CLASS's assigned addresses have been to the upper limit, then continue to assign the address from the next CLASS, and so on. Each CLASS corresponds to one network segment range that must be from low addresses to high addresses and the duplicated network ranges between multiple CLASSes are allowed. If the CLASS corresponding to the address pool is specified and the network segment corresponding to the CLASS is not configured, this CLASS's default network segment range is same as the range of address pool where the CLASS is.

Configuration Examples

The following example configures the address *mypool0* to associate with class1.

```
FS(config)# ip dhcp pool mypool0
FS(dhcp-config)# class class1
```

Related Commands

Command	Description
ip dhcp pool	Defines the name of the DHCP address pool and enters the DHCP address pool configuration mode.

Platform

N/A

Description

4.5 Clear Ip Dhcp Binding

Use this command to clear the DHCP binding table in the privileged user mode.

clear ip dhcp binding { * | *ip-address* }

Parameter Description

Parameter	Description
*	Deletes all DHCP bindings.
ip-address	Deletes the binding of the specified IP addresses.

Defaults N/A.

Command Mode Privileged EXEC mode.

Usage Guide This command can only clear the automatic DHCP binding, but the manual DHCP binding can be deleted by the **no ip dhcp pool** command.

Configuration Examples The following example clears the DHCP binding with the IP address 192.168.12.100.

```
clear ip dhcp binding 192.168.12.100
```

Related Commands

Command	Description
show ip dhcp binding	Displays the address binding of the DHCP server.

Platform Description N/A

4.6 Clear Ip Dhcp Conflict

Use this command to clear the DHCP address conflict record.

clear ip dhcp conflict { * | *ip-address* }

Parameter Description

Parameter	Description
*	Deletes all DHCP address conflict records.
ip-address	Deletes the conflict record of the specified IP addresses.

Defaults N/A.

Command Mode Privileged EXEC mode.

Usage Guide The DHCP server uses the ping session to detect the address conflict, while the DHCP client uses the address resolution protocol (ARP) to detect the address conflict. The **clear ip dhcp conflict** command can be used to delete the history conflict record.

Configuration Examples

The following example clears all address conflict records.

```
clear ip dhcp conflict *
```

Related Commands

Command	Description
ip dhcp ping packets	Defines the number of the data packets sent by the ping operation for the detection of the address conflict when the DHCP server assigns an IP address.
show ip dhcp conflict	Displays the address conflict that the DHCP server detects when it assigns an IP address.

Platform Description

N/A

4.7 Clear Ip Dhcp History

Use this command to clear the address assigned by the DHCP server.

clear ip dhcp history{ * | *mac-address* }

Parameter Description

Parameter	Description
*	Clears all addresses assigned by the DHCP server.
mac-address	Clears the address assigned by the DHCP server corresponding to the specified MAC address.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

This command is configured on the DHCP server.

Configuration Examples

The following example clears all addresses assigned by the DHCP server.

```
FS# clear ip dhcp history *
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.8 Clear Ip Dhcp Relay Statistics

Use this command to clear the DHCP relay statistics.

clear ip dhcp relay statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide The DHCP relay is configured with the counter to count various packets received or transmitted by the relay. This command is used to clear the counters.

Configuration Examples The following example clears the DHCP relay statistics.

```
FS# clear ip dhcp relay statistics
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.9 Clear Ip Dhcp Server Rate

Use this command to clear statistics about the packet processing rate of every module.

clear ip dhcp server rate

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to clear statistics about the packet processing rate of every module, including arp, hot backup, lsm, and socket.

Configuration Examples The following example clears statistics about the packet processing rate of every module.

```
FS# clear ip dhcp server rate
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.10 Clear Ip Dhcp Server Statistics

Use this command to reset the counter of the DHCP server in the privileged user mode.

clear ip dhcp server statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide The DHCP server carries out the statistics counter, records the DHCP address pool, automatic binding, manual binding and expired binding. Furthermore, it also carries out the statistics to the number of sent and received DHCP messages. The **clear ip dhcp server statistics** command can be used to delete the history counter record and carry out the statistics starting from scratch.

Configuration Examples The following example clears the statistics record of the DHCP server.

```
clear ip dhcp server statistics
```

Related Commands

Command	Description
show ip dhcp server statistics	Displays the statistics record of the DHCP server.

Platform Description N/A

4.11 Client-identifier

Use this command to define the unique ID of the DHCP client (indicated in hex, separated by dot) in the DHCP address pool configuration mode. Use the **no** or **default** form of this command to restore the default setting.

client-identifier *unique-identifier*

no client-identifier

default client-identifier

Parameter Description

Parameter	Description
unique-identifier	The DHCP client ID is indicated in hex and separated by dot, for instance, 0100.d0f8.2233.b467.6967.6162.6974.4574.6865.726e.6574.302f.31.

Defaults N/A.

Command Mode DHCP address pool configuration mode.

Usage Guide When some DHCP clients request the DHCP server to assign IP addresses, they use their client IDs rather than their

hardware addresses. The client ID consists of media type, MAC addresses and interface name. For instance, the MAC address is 00d0.f822.33b4, the interface name is GigabitEthernet 0/1, and the corresponding client ID is 0100.d0f8.2233.b467.6967.6162.6974.4574.6865.726e.6574.302f.31, where, 01 denotes the type of the Ethernet media.

The 67.6967.6162.6974.4574.6865.726e.6574.302f.31 is the hex code of GigabitEthernet0/1. For the definition of the media code, refer to the Address Resolution Protocol Parameters section in RFC1700.

This command is used only when the DHCP is defined by manual binding.

Configuration Examples

The following example defines the client ID of the Ethernet DHCP client whose MAC address is 00d0.f822.33b4.

```
client-identifier 0100.d0f8.2233.b467.6967.6162.6974.4574.6865.726e.6574.302f.31
```

Related Commands

Command	Description
hardware-address	Defines the hardware address of DHCP client.
host	Defines the IP address and network mask, which is used to configure the DHCP manual binding.
ip dhcp pool	Defines the name of the DHCP address pool and enters the DHCP address pool configuration mode.

Platform Description

N/A

4.12 Client-name

Use this command to define the name of the DHCP client in the DHPC address pool configuration mode. Use the **no** or **default** form of this command to restore the default setting.

client-name *client-name*

no client-name

default client-name

Parameter Description

Parameter	Description
client-name	Name of DHCP client, a set of standards-based ASCII characters. The name should not include the suffix domain name. For instance, you can define the name of the DHCP client as river, not river.i-net.com.cn.

Defaults

No client name is defined by default.

Command Mode

DHCP address pool configuration mode.

Usage Guide

This command can be used to define the name of the DHCP client only when the DHCP is defined by manual binding. This name should not include the suffix domain name.

Configuration Examples

The following example defines a string river as the name of the client.

```
FS(dhcp-config)# client-name river
```

Related Commands

Command	Description
host	Defines the IP address and network mask, which is used to configure the DHCP manual binding.
ip dhcp pool	Defines the name of the DHCP address pool and enters the DHCP address pool configuration mode.

Platform Description N/A

4.13 Default-router

Use this command to define the default gateway of the DHCP client in the DHPC address pool configuration mode. Use the **no** or **default** form of this command to restore the default setting.

default-router *ip-address* [*ip-address2…ip-address8*]

no default-router

defaut default-router

Parameter Description

Parameter	Description
ip-address	Defines the IP address of the equipment. It is required to configure one IP address at least.
ip-address2…ip-address8	(Optional) Up to 8 gateways can be configured.

Defaults No gateway is defined by default.

Command Mode DHCP address pool configuration mode.

Usage Guide In general, the DHCP client should get the information of the default gateway from the DHCP server. The DHCP server should specify one gateway address for the client at least, and this address should be of the same network segment as the address assigned to the client.

Configuration Examples The following example defines 192.168.12.1 as the default gateway.

```
default-router 192.168.12.1
```

Related Commands

Command	Description
ip dhcp pool	Defines the name of the DHCP address pool and enters the DHCP address pool configuration mode.

Platform Description N/A

4.14 Dns-server

Use this command to define the DNS server of the DHCP client in the DHPC address pool configuration mode. Use

the **no** or **default** form of this command to restore the default setting.

dns-server { *ip-address* [*ip-address2…ip-address8*]

no dns-server

defaut dns-server

Parameter Description

Parameter	Description
ip-address	Defines the IP address of the DNS server. At least one IP address should be configured.
ip-address2…ip-address8	(Optional) Up to 8 DNS servers can be configured.

Defaults No DNS server is defined by default.

Command Mode DHCP address pool configuration mode.

Usage Guide When more than one DNS server is defined, the former will possess higher priory, so the DHCP client will select the next DNS server only when its communication with the former DNS server fails.

Configuration Examples The following example specifies the DNS server 192.168.12.3 for the DHCP client.

```
FS(dhcp-config)# dns-server 192.168.12.3
```

Related Commands

Command	Description
domain-name	Defines the suffix domain name of the DHCP client.
ip address dhcp	Enables the DHCP client on the interface to obtain the IP address information.
ip dhcp pool	Defines the name of the DHCP address pool and enters the DHCP address pool configuration mode.

Platform Description N/A

4.15 Domain-name

Use this command to define the suffix domain name of the DHCP client in the DHPC address pool configuration mode. Use the **no** or **default** form of this command to restore the default setting.

domain-name *domain-name*

no domain-name

defaut domain-name

Parameter Description

Parameter	Description
domain-name	Defines the suffix domain name string of the DHCP client.

Defaults No suffix domain name by default.

Command DHCP address pool configuration mode.

Mode

Usage Guide After the DHCP client obtains specified suffix domain name, it can access a host with the same suffix domain name by the host name directly.

Configuration Examples The following example defines the suffix domain name i-net.com.cn for the DHCP client.

```
FS(dhcp-config)#domain-name fs.com
```

Related Commands

Command	Description
dns-server	Defines the DNS server of the DHCP client.
ip dhcp pool	Defines the name of the DHCP address pool and enter the DHCP address pool configuration mode.

Platform Description N/A

4.16 Hardware-address

Use this command to define the hardware address of the DHCP client in the DHPC address pool configuration mode. Use the **no** or **default** form of this command to restore the default setting.

hardware-address *hardware-address* [*type*]

no hardware-address

defaut hardware-address

Parameter Description

Parameter	Description
hardware-address	Define the MAC address of the DHCP client.
type	To indicate the hardware platform protocol of the DHCP client, use the string definition or digits definition. String option: Ethernet ieee802 Digits option: 1 (10M Ethernet) 6 (IEEE 802)

Defaults No hardware address is defined by default.

If there is no option when the hardware address is defined, it is the Ethernet by default.

Command Mode DHCP address pool configuration mode.

Usage Guide This command can be used only when the DHCP is defined by manual binding.

Configuration The following example defines the MAC address 00d0.f838.bf3d with the type ethernet.

Examples

```
hardware-address 00d0.f838.bf3d
```

Related Commands

Command	Description
client-identifier	Defines the unique ID of the DHCP client (Indicated by the hexadecimal numeral, separated by dot).
host	Defines the IP address and network mask, which is used to configure the DHCP manual binding.
ip dhcp pool	Defines the name of the DHCP address pool and enter the DHCP address pool configuration mode.
default-router	Defines the default route of the DHCP client.

Platform Description

N/A

4.17 Host

Use this command to define the IP address and network mask of the DHCP client host in the DHCP address pool configuration mode. Use the **no** or **default** form of this command to restore the default setting.

host *ip-address* [*netmask*]

no host

defaut host

Parameter Description

Parameter	Description
ip-address	Defines the IP address of DHCP client.
netmask	Defines the network mask of DHCP client.

Defaults

No IP address or network mask of the host is defined.

Command Mode

DHCP address pool configuration mode.

Usage Guide

If the network mask is not defined definitely, the DHCP server will use the natural network mask of this IP address: 255.0.0.0 for class A IP address, 255.255.0 for class B IP address, and 255.255.255.0 for class C IP address.

This command can be used only when the DHCP is defined by manual binding.

Configuration Examples

The following example sets the client IP address as 192.168.12.91, and the network mask as 255.255.255.240.

```
host 192.168.12.91 255.255.255.240
```

Related Commands

Command	Description
client-identifier	Defines the unique ID of the DHCP client (Indicated in hex and separated by dot).
hardware-address	Defines the hardware address of DHCP client.
ip dhcp pool	Defines the name of the DHCP address pool and enters the DHCP address pool configuration mode.

default-router	Define the default route of the DHCP client.	**default-router**

Platform Description N/A

4.18 Ip Address Dhcp

Use this command to make the Ethernet interface or the PPP, HDLC and FR encapsulated interface obtain the IP address information by the DHCP in the interface configuration mode. Use the **no** or **default** form of this command to restore the default setting.

ip address dhcp

no ip address dhcp

defaut ip address dhcp

Parameter Description

Parameter	Description
N/A	N/A

Defaults The interface cannot obtain the ID address by the DHCP by default.

Command Mode Interface configuration mode.

Usage Guide When requesting the IP address, the DHCP client of the FSOS software also requires the DHCP server provide 5 configuration parameter information: 1) DHCP option 1, client subnet mask, 2) DHCP option 3, it is the same as the gateway information of the same subnet, 3) DHCP option 6, the DNS server information, 4) DHCP option 15, the host suffix domain name, and 5) DHCP option 44, the WINS server information (optional).

The client of the FSOS software is allowed to obtain the address on the PPP, FR or HDL link by the DHCP, which should be supported by the server. At present, our server can support this function.

Configuration Examples The following example makes the FastEthernet 0 port obtain the IP address automatically.

```
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1) ip address dhcp
```

Related Commands

Command	Description
dns-server	Defines the DNS server of DHCP client.
ip dhcp pool	Defines the name of the DHCP address pool and enters the DHCP address pool configuration mode.

Platform Description N/A

4.19 Ip Dhcp Class

Use this command to define a CLASS and enter the global CLASS configuration mode. Use the **no** form of this

command to restore the default setting.

ip dhcp class *class-name*

no ip dhcp class *class-name*

Parameter Description

Parameter	Description
class-name	Class name, which can be character string or numeric such as myclass or 1.

Defaults By default, the class is not configured.

Command Mode Global configuration mode.

Usage Guide After executing this command, it enters the global CLASS configuration mode which is shown as "FS (config-dhcp-class)#". In this configuration mode, user can configure the Option82 information that matches the CLASS and the CLASS identification information.

Configuration Examples The following example configures a global CLASS.

```
FS(config)# ip dhcp class myclass
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.20 Ip Dhcp Excluded-address

Use this command to configure excluded IP address. Use the **no** or **default** form of this command to restore the default setting.

ip dhcp excluded-address *low-ip-address* [*high-ip-address*]

no ip dhcp excluded-address *low-ip-address* [*high-ip-address*]

default ip dhcp excluded-address *low-ip-address* [*high-ip-address*]

Parameter Description

Parameter	Description
low-ip-address	Indicates a start IP address.
high-ip-address	Indicates an end IP address.

Defaults By default, the DHCP server assigns all IP addresses of the address pool.

Command Mode Global configuration mode.

Usage Guide Unless otherwise specified, a DHCP server assigns all the addresses from an IP address pool to DHCP clients. To

reserve some addresses(e.g., addresses already assigned to the server or devices), you need to configure these addresses as excluded addresses. To configure a DHCP server, it is recommended to configure excluded addresses to avoid address conflict and shorten detection time during address assignment.

Configuration Examples

The following example configures 192.168.12.100~150 as excluded IP address.

```
FS(config)#ip dhcp excluded-address 192.168.12.100 192.168.12.150
```

The following example restores the default setting.

```
FS(config)#no ip dhcp excluded-address 192.168.12.100 192.168.12.150
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.21 Ip dhcp force-send-nak

Use this command to configure the forcible NAK packet sending function. Use the **no** or **default** form of this command to restore the default setting.

ip dhcp force-send-nak

no ip dhcp force-send-nak

default ip dhcp force-send-nak

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode.

Usage Guide

The DHCP client checks the previously used IP address every time it is started and sends a DHCPREQUEST packet to continue leasing this IP address. If the address is not available, the DHCP server sends an NAK packet to let the client resend a DHCPDISCOVER packet to apply for a new IP address. If no corresponding lease record can be found on the server, the client keeps sending DHCPDISCOVER packets.

Configuration Examples

The following example enables the forcible NAK packet sending function in global configuration mode.

```
FS(config)# ip dhcp force-send-nak
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.22 Ip dhcp monitor-vrrp-state

Use this command in layer-3 configuration mode to enable the DHCP Server to monitor the status of VRRP interfaces so that the DHCP Server processes only those packets sent from a VRRP interface in the Master state. Use the **no** or **default** form of this command to restore the default setting. If it is canceled, the DHCP Server processes packets from VRRP interfaces in the Master or Backup state.

ip dhcp monitor-vrrp-state

no ip dhcp monitor-vrrp-state

default ip dhcp monitor-vrrp-state

Parameter Description

Parameter	Description
N/A	N/A

Defaults The **ip dhcp monitor-vrrp-state** command is disabled by default. .

Command Mode Layer-3 interface configuration mode.

Usage Guide If a VRRP address is configured for an interface, the DHCP Server processes packets sent from the master interface and discards packets sent from the backup interface. If no VRRP address is configured, the DHCP Server does not monitor the status of VRRP interfaces. All DHCP packets will be processed.

Configuration Examples The following example enables the DHCP Server to monitor the status of VRRP interfaces.

```
FS(config-if)# ip dhcp monitor-vrrp-state
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.23 Ip Dhcp Ping Packets

Use this command to configure the times of pinging the IP address when the DHCP server detects address conflict in the global configuration mode. Use the **no** or **default** form of this command to restore the default setting.

ip dhcp ping packets [*number*]

no ip dhcp ping packets

default ip dhcp ping packets

Parameter Description

Parameter	Description
number	(Optional) Number of packets in the range of 0 to 10, where 0 indicates disabling the ping

	operation. The Ping operation sends two packets by default.

Defaults The Ping operation sends two packets by default.

Command Mode Global configuration mode.

Usage Guide When the DHCP server attempts to assign the IP address from the DHCP address pool, use the ping operation to check whether this address is occupied by other hosts. Record it if the address is occupied, otherwise, assign it to the DHCP client. The Ping operation will send up to 10 packets, two packets by default.

Configuration Examples The following example sets the number of the packets sent by the ping operation as 3.

```
FS(config)# ip dhcp ping packets 3
```

Related Commands

Command	Description
clear ip dhcp conflict	Clears the DHCP history conflict record.
ip dhcp ping packet	Configures the timeout time that the DHCP server waits for the Ping response. If all the ping packets are not responded within the specified time, it indicates that this IP address can be assigned. Otherwise, it will record the address conflict.
show ip dhcp conflict	Displays the DHCP server detects address conflict when it assigns an IP address.

Platform Description N/A

4.24 Ip Dhcp Ping Timeout

Use this command to configure the timeout that the DHCP server waits for response when it uses the ping operation to detect the address conflict in the global configuration mode. Use the **no** or **default** form of this command to restore the default setting.

ip dhcp ping timeout *milli-seconds*

no ip dhcp ping timeout

default ip dhcp ping timeout

Parameter Description

Parameter	Description
milli-seconds	Time that the DHCP server waits for ping response in the range 100 to 10000 milliseconds.

Defaults The default is 500 seconds.

Command Mode Global configuration mode.

Usage Guide This command defines the time that the DHCP server waits for a ping response packet.

Configuration Examples The following example configures the waiting time of the ping response packet to 600ms.

```
ip dhcp ping timeout 600
```

Related Commands

Command	Description
clear ip dhcp conflict	Clears the DHCP history conflict record.
ip dhcp ping packets	Defines the number of the data packets sent by the ping operation for the detection of the address conflict when the DHCP server assigns an IP address.
show ip dhcp conflict	Displays the address conflict the DHCP server detects when it assigns an IP address.

Platform Description N/A

4.25 Ip Dhcp Pool

Use this command to define a name of the DHCP address pool and enter the DHCP address pool configuration mode in the global configuration mode. Use the **no** or **default** form of this command to restore the default setting.

ip dhcp pool *pool-name*

no ip dhcp pool *pool-name*

default ip dhcp pool *pool-name*

Parameter Description

Parameter	Description
pool-name	A string of characters and positive integers, for instance, mypool or 1.

Defaults No DHCP address pool is defined by default.

Command Mode Global configuration mode.

Usage Guide Execute the command to enter the DHCP address pool configuration mode:

```
FS(dhcp-config)#
```

In this configuration mode, configure the IP address range, the DNS server and the default gateway.

Configuration Examples The following example defines a DHCP address pool named mypool0.

```
FS(config)#ip dhcp pool mypool0
```

Related Commands

Command	Description
host	Defines the IP address and network mask, which is used to configure the DHCP manual binding.
ip dhcp excluded-address	Defines the IP addresses that the DHCP server cannot assign to the clients.

network (DHCP)	Defines the network number and network mask of the DHCP address pool.

Platform Description N/A

4.26 Ip Dhcp Relay Check Server-id

Use this command to enable the **ip dhcp relay check** *server-id* function. Use the **no** form of this command to restore the default setting.

ip dhcp relay check server-id

no ip dhcp relay check server-id

Parameter Description

Parameter	Description
N/A	N/A

Defaults The **ip dhcp relay check server-id** command is disabled.

Command Mode Global configuration mode.

Usage Guide Switch will select the server to be sent according to server-id option when forwarding DHCP REQUEST via this command. Without this command configured, the switch forwards the DHCP REQUEST to all configured DHCP servers.

Configuration Examples The following example enables the ip dhcp relay check server-id function.

```
FS(config)# ip dhcp relay check server-id
```

The following example disables the ip-dhcp relay check server-id function.

```
FS(config)# no ip dhcp relay check server-id
```

Related Commands

Command	Description
service dhcp	Enables the DHCP Relay.

Platform Description N/A

4.27 Format

Use this command to set the custom string for circuit-id. Use the **no** form of this command to restore the default setting.

ip dhcp relay information circuit-id format {hex | ascii} [*string*]

no ip dhcp relay information circuit-id format {hex | ascii}

Parameter Description

Parameter	Description
hex	Hexadecimal

ascii	ASCII code.
string	Custom string

Defaults This function is disabled by default.

Command Mode Global configuration mode.

Usage Guide This command is configured on the DHCP Relay. When you configure the **ip dhcp relay information circuit-id format** command, the device, as the DHCP Relay, adds the option information in the DHCP request packets.

Configuration Examples The following example sets the custom string for circuit-id.

```
FS(config)# ip dhcp relay information circuit-id format hex abc111
FS(config)# ip dhcp relay information circuit-id format ascii device-test
```

The following example disables this function.

```
FS(config)# no ip dhcp relay information circuit-id format hex
FS(config)# no ip dhcp relay information circuit-id format ascii
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.28 Ip Dhcp Relay Information Circuit-id String

Use this command to set the device name for circuit-id. Use the **no** form of this command to restore the default setting.

ip dhcp relay information circuit-id string [*devicename*]

no ip dhcp relay information option82

Parameter Description

Parameter	Description
devicename	Sets the device name.

Defaults This function is diabled by default.

Command Mode Global configuration mode

Usage Guide This command is configured on the DHCP Relay. When you configure the **ip dhcp relay information circuit-id string** command, the device, as the DHCP Relay, adds the option information in the DHCP request packets.

Configuration The following example sets the device name for circuit-id.

Examples

```
FS(config)# ip dhcp relay information circuit-id string device-name
```

The following example disables this function.

```
FS(config)# no ip dhcp relay information circuit-id string
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.29 Ip Dhcp Relay Information Option82

Use this command to enable the **ip dhcp relay information option82** function. Use the **no** form of this command to restore the default setting.

ip dhcp relay information option82

no ip dhcp relay information option82

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The **ip dhcp relay information option82** command is disabled.

Command Mode

Global configuration mode.

Usage Guide

This command is exclusive with the **option dot1x** command.

Configuration Examples

The following example enables the option82 function on the DHCP relay.

```
FS(config)# Ip dhcp relay information option82
```

The following example disables the option82 function on the DHCP relay.

```
FS(config)# no ip dhcp relay information option82
```

Related Commands

Command	Description
service dhcp	Enables the DHCP Relay.

Platform Description

N/A

4.30 Format

Use this command to set the custom string for remote-id.. Use the **no** form of this command to restore the default setting.

ip dhcp relay information remote-id format { **hex | ascii** } [*string*]

no ip dhcp relay information remote-id format { **hex | ascii** }

Parameter Description

Parameter	Description
hex	Hexadecimal
ascii	ASCII code
string	Custom string

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide This command is configured on the DHCP Relay. When you configure the **ip dhcp relay information remote-id format** command, the device, as the DHCP Relay, adds the option information in the DHCP request packets.

Configuration Examples The following example sets the custom string for circuit-id.

```
FS(config)# ip dhcp relay information remote-id format hex abc111
FS(config)# ip dhcp relay information remote-id format ascii port-test
```

The following example disables this function.

```
FS(config)# no ip dhcp relay information remote-id format hex
FS(config)# no ip dhcp relay information remote-id format ascii
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.31 Ip Dhcp Relay Information Remote-id String

Use this command to set the port name for remote-id. Use the **no** form of this command to restore the default setting.

ip dhcp relay information remote-id string [*portname*]

no ip dhcp relay information remote-id string

Parameter Description

Parameter	Description
portname	Sets the port name.

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide This command is configured on the DHCP Relay. When you configure the **ip dhcp relay information remote-id**

string command, the device, as the DHCP Relay, adds the option information in the DHCP request packets.

Configuration Examples

The following example sets the port name for remote-id.

```
FS(config)# ip dhcp relay information remote-id string port-name
```

The following example disables this function.

```
FS(config)# no ip dhcp relay information remote-id string
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.32 Ip Dhcp Relay Suppression

Use this command to enable the DHCP binding globally. Use the **no** form of this command to disable the DHCP binding globally and enable the **DHCP relay** suppression on the port.

ip dhcp relay suppression

no ip dhcp relay suppression

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The **ip dhcp relay suppression** command is disabled.

Command Mode

Interface configuration mode.

Usage Guide

After executing this command, the system will not relay the DHCP request message on the interface.

Configuration Examples

The following example enables the relay suppression function.

```
FS(config-if)# ip dhcp relay suppression
```

The following example enables the relay suppression function.

```
FS(config-if)# no ip dhcp relay suppression
```

Related Commands

Command	Description
service dhcp	Enables the DHCP Relay.

Platform Description

N/A

4.33 Ip Dhcp Relay-information Remote-id Format

Use this command to set the custom string for remote-id on an interface. Use the **no** form of this command to

restore the default setting.

ip dhcp relay-information remote-id format {hex | ascii} [*string*]

no ip dhcp relay-information remote-id format {hex | ascii}

Parameter Description

Parameter	Description
hex	Hexadecimal
ascii	ASCII code
string	Custom string

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide This command is configured on the DHCP Relay. When you configure the **ip dhcp relay-information remote-id format** command, the device, as the DHCP Relay, adds the option information in the DHCP request packets.

Configuration Examples The following example sets the custom string for circuit-id.

```
FS(config-if-GigabitEthernet 0/2)# ip dhcp relay information remote-id format hex abc111
FS(config-if-GigabitEthernet 0/2)# ip dhcp relay information remote-id format ascii port-test
```

The following example disables this function.

```
FS(config-if-GigabitEthernet 0/2)# no ip dhcp relay information remote-id format hex
FS(config-if-GigabitEthernet 0/2)# no ip dhcp relay information remote-id format ascii
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.34 Ip Dhcp Relay-information Remote-id String

Use this command to set the port name for remote-id on an interface. Use the **no** form of this command to restore the default setting.

ip dhcp relay-information remote-id string [*portname*]

no ip dhcp relay-information remote-id string

Parameter Description

Parameter	Description
portname	Sets the port name.

Defaults This function is disabled by default.

Command Interface configuration mode

Mode

Usage Guide This command is configured on the DHCP Relay. When you configure the **ip dhcp relay-information remote-id string** command, the device, as the DHCP Relay, adds the option information in the DHCP request packets.

Configuration Examples The following example sets the port name for remote-id on an interface.

```
FS(config-if-GigabitEthernet 0/2)# ip dhcp relay-information remote-id string if-port-name
```

The following example disables this function.

```
FS(config-if-GigabitEthernet 0/2)# no ip dhcp relay-information remote-id string
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.35 Ip Dhcp Server Arp-detect

Use this command to enable the user-offline detection. Use the **no** or **default** form this command to restore the default setting.

ip dhcp server arp-detect

no ip dhcp server arp-detect

default ip dhcp server arp-detect

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide This command is used to detect whether the user has gone offline, If the user does not go online within a certain period, the IP address is reclaimed.

Configuration Examples The following example enables the user-offline detection.

```
FS(config)# ip dhcp server arp-detect
```

Related Commands

Command	Description
N/A	N/A

Platform N/A

Description

4.36 Ip Dhcp Use Class

Use this command to enable the CLASS to allocate addresses in the global configuration mode. Use the **no** form of this command can be used to disable the CLASS.

ip dhcp use class

no ip dhcp use class

Parameter Description

Parameter	Description
N/A	N/A

Defaults Enabled

Command Mode This function is enabled by defualt.

Usage Guide N/A

Configuration Examples The following example enables the CLASS to allocate addresses.

```
FS(config)# ip dhcp use class
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.37 Ip Helper-address

Use this command to add an IP address of the DHCP server. Use the **no** form of this command to delete an IP address of the DHCP server.

The server address can be configured globally or on a specific interface. Therefore, this command can run in the global configuration mode or the interface configuration mode to add the DHCP server information.

ip helper-address { cycle-mode |[vrf {vrf-name}] *A.B.C.D* **}**

no ip helper-address { cycle-mode |[vrf {vrf-name}] *A.B.C.D* **}**

Parameter Description

Parameter	Description
cycle-mode	Indicates that DHCP request packets are forwarded to all DHCP servers.
A.B.C.D	Indicates the IP address of a DHCP server.

Defaults N/A

Command Mode Global configuration mode, interface configuration mode.

Usage Guide

DHCP request packets are sent to the DHCP server whose IP address is configured, while DHCP response packets are forwarded to the DHCP client.

Up to 20 DHCP server IP addresses can be configured globally or on a layer-3 interface. When an interface receives a DHCP request packet, the DHCP server configuration on the interface prevails over that configured globally. If the interface is not configured with DHCP server addresses, the global configuration takes effect.

In global configuration mode, you can enable **cycle-mode**. When it is enabled, DHCP request packets are forwarded to all DHCP servers. If it is not enabled, DHCP request packets are sent to the first DHCP server configured under this rule. This parameter can only be enabled in global configuration mode and take effect both globally and on interfaces. By default, **cycle-mode** is enabled.

Configuration Examples

The following example sets the address for a DHCP server, in the interface vlan 1, to 192.168.11.1.

```
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)# interface vlan 1
FS(config-if)# ip helper-address 192.168.11.1
```

The following example deletes the configured address of a DHCP server, 192.168.11.1.

```
FS(config-if)# no ip helper-address 192.168.11.1
```

The following example sets the IP address for the global server to 192.168.100.1.

```
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)# ip helper-address 192.168.100.1
```

The following example deleted the configured IP address for the global server, 192.168.100.1.

```
FS(config)# no ip helper-address 192.168.100.1
```

The following example enables DHCP request packets to be forwarded to all servers.

```
FS(config)# ip helper-address cycle-mode
```

The following example disables DHCP request packets to be forwarded to all servers.

```
FS(config)# no ip helper-address cycle-mode
```

Related Commands

Command	Description
service dhcp	Enables the DHCP relay.

Platform Description

N/A

4.38 Lease

Use this command to define the lease time of the IP address that the DHCP server assigns to the client in the DHCP address pool configuration mode. Use the **no** or **default** form of this command to restore the default setting. A limited lease time ranges from 1 minute to 23 hours and 59 minutes.

lease { *days* [*hours*] [*minutes*] | **infinite** }

no lease

defaut lease

Parameter Description

Parameter	Description
days	Lease time in days
hours	(Optional) Lease time in hours. It is necessary to define the days before defining the hours.
minutes	(Optional) Lease time in minutes. It is necessary to define the days and hours before defining the minutes.
infinite	Infinite lease time.

Defaults The lease time for a static address pool is infinite. The lease time for other address pools is 1 day.

Command Mode DHCP address pool configuration mode.

Usage Guide When the lease is getting near to expire, the DHCP client will send the request of renewal of lease. In general, the DHCP server will allow the renewal of lease of the original IP address.

Configuration Examples The following example sets the DHCP lease to 1 hour.

```
FS(dhcp-config)# lease 0 1
```

The following example sets the DHCP lease to 1 minute.

```
FS(dhcp-config)# lease 0 0 1
```

Related Commands

Command	Description
ip dhcp pool	Defines the name of the DHCP address pool and enters the DHCP address pool configuration mode.

Platform Description N/A

4.39 Lease-threshold

Use this command in DHCP address pool configuration mode to define the DHCP alarm threshold. Use the **default** or **no** form of this command to restore the default setting.

lease-threshold *percentage*

defaut lease-threshold

no lease-threshold

Parameter Description

Parameter	Description
percentage	Usage of the address pool, ranging from 60 to 100 in percentage.

Defaults 90

Command Mode DHCP address pool configuration mode.

Usage Guide If the maximum IP usage of the address pool reaches the threshold, the DHCP Server generates a SYSLOG alarm. The IP usage indicates the ratio of the number of assigned address pools to the total number of assignable address pools. If the number of assigned pools stays above the alarm threshold, an alarm is generated every 5 minutes.

Configuration Examples The following example sets the alarm threshold to 80%.

```
FS(dhcp-config)# lease-threshold 80
```

The following example disables the address pool alarm function.

```
FS(dhcp-config)# no lease-threshold
```

Related Commands

Command	Description
ip dhcp pool	Defines the name of the DHCP address pool and enters the DHCP address pool configuration mode.

Platform Description N/A

4.40 match ip

Use this command to define an AM matching rule.

Use the **no** form of this command to remove the configuration.

Use the clear form of this command to clear all configurations.

match ip ip-address netmask [interface] **[add/remove] vlan** vlan-list

no match ip ip-address netmask [interface] **[add/remove] vlan** vlan-list

clear match ip [interface]

Parameter Description

Parameter	Description
ip-address	IP address
netmask	Subnet mask
interface	Interface ID
add/remove	Adds or removes the specified VLAN.
vlan-list	VLAN ID

Defaults N/A

Command Mode AM rule configuration mode

Usage Guide With this function enabled, all DHCP clients with specified vlan-list and interface obtain addresses in the rule.
If a DHCP client obtains a static address, it is not subject to AM matching rules in whichever Sub VLAN unless the AM rule configuration is based on VLAN instead of Sub VLAN. This type of matching rules applies to only static addresses.

Configuration Examples The following example defines an AM matching rule.

```
FS(config-address-manage)#match ip 192.168.11.0 255.255.255.0 GigabitEthernet 0/10 vlan 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.41 match ip default

Use this command to define a default AM matching rule.
Use the no form of this command to remove the configuration,
match ip default ip-address netmask
no match ip default ip-address netmask

Parameter Description

Parameter	Description
ip-address	IP address
netmask	Subnet mask

Defaults N/A

Command Mode AM rule configuration mode

Usage Guide With this function enabled, all DHCP clients with specified vlan-list and interface obtain addresses in the default rule.

Configuration Examples The following example defines a default AM matching rule.

```
FS(config-address-manage)#match ip default 192.168.12.0 255.255.255.0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.42 Netbios-name-server

Use this command to configure the WINS name server of the Microsoft DHCP client NETBIOS in the DHCP address pool configuration mode. The **no** or **default** form of this command can be used to restore the default setting.

netbios-name-server *ip-address* [*ip-address2…ip-address8*]

no netbios-name-server

defaut netbios-name-server

Parameter Description

Parameter	Description
ip-address	IP address of the WINS server. It is required to configure one IP address at least.
ip-address2…ip-address8	(Optional) IP addresses of WINS servers. Up to 8 WINS servers can be configured.

Defaults No WINS server is defined by default.

Command Mode DHCP address pool configuration mode.

Usage Guide When more than one WINS server is defined, the former has higher priory. The DHCP client will select the next WINS server only when its communication with the former WINS server fails.

Configuration Examples The following example specifies the WINS server 192.168.12.3 for the DHCP client.

```
netbios-name-server 192.168.12.3
```

Related Commands

Command	Description
ip address dhcp	Enables the DHCP client on the interface to obtain the IP address.
ip dhcp pool	Defines the name of the DHCP address pool and enter the DHCP address pool configuration mode.
netbios-node-type	Defines the netbios node type of the client host.

Platform Description N/A

4.43 Netbios-node-type

Use this command to define the node type of the master NetBIOS of the Microsoft DHCP client in the DHCP address configuration mode. Use the **no** or **default** form of this command to restore the default setting.

netbios-node-type *type*

no netbios-node-type

defaut netbios-node-type

Parameter Description

Parameter	Description
type	Type of node in two modes: Digit in hexadecimal form in the range of 0 to FF. Only the following numerals

	are available: 1: b-node. 2: p-node. 4: m-node. 8: h-node. String: b-node: broadcast node p-node: peer-to-peer node m-node: mixed node h-node: hybrid node

Defaults No type of the NetBIOS node is defined by default.

Command Mode DHCP address pool configuration mode.

Usage Guide There are 4 types of the NetBIOS nodes of the Microsoft DHCP client: 1) Broadcast, which carries out the NetBIOS name resolution by the broadcast method, 2) Peer-to-peer, which directly requests the WINS server to carry out the NetBIOS name resolution, 3) Mixed, which requests the name resolution by the broadcast method firstly, and then carry out the name resolution by the WINS server connection, 4) Hybrid, which requests the WINS server to carry out the NetBIOS name resolution firstly, and it will carry out the NetBIOS name resolution by the broadcast method if the response is not received.

By default, the node type for Microsoft operating system is broadcast or hybrid. If the WINS server is not configured, broadcast node is used. Otherwise, hybrid node is used. It is recommended to set the type of the NetBIOS node as Hybrid.

Configuration Examples The following example sets the NetBIOS node of Microsoft DHCP client as Hybrid.

```
FS(dhcp-config)# netbios-node-type h-node
```

Related Commands	Command	Description
	ip dhcp pool	Defines the name of DHCP address pool and enters the DHCP address pool configuration mode.
	netbios-name-server	Configures the WINS name server of the Microsoft DHCP client NETBIOS.

Platform Description N/A

4.44 Network

Use this command to define the network number and network mask of the DHCP address pool in the DHCP address pool configuration mode. Use the **no** or **default** form of this command to restore the default setting.

network *net-number net-mask*[*low-ip-address high-ip-address*]

no network

defaut network

Parameter Description

Parameter	Description
net-number	Network number of the DHCP address pool
net-mask	Network mask of the DHCP address pool. If the network mask is not defined, the natural network mask will be used by default.
low-ip-address	Start IP address.
high-ip-address	End IP address.

Defaults No network number or network mask is defined by default.

Command Mode DHCP address pool configuration mode.

Usage Guide This command defines the subnet and subnet mask of a DHCP address pool, and provides the DHCP server with an address space which can be assigned to the clients. Unless excluded addresses are configured, all the addresses of the DHCP address pool can be assigned to the clients. The DHCP server assigns the addresses in the address pool orderly. If the DHCP server found an IP address is in the DHCP binding table or in the network segment, it checks the next until it assigns an effective IP address.

The **show ip dhcp binding** command can be used to view the address assignment, and the **show ip dhcp conflict** command can be used to view the address conflict detection configuration.

Configuration Examples The following example defines the network number of the DHCP address pool as 192.168.12.0, and the network mask as 255.255.255.240.

```
network 192.168.12.0 255.255.255.240
```

Related Commands

Command	Description
ip dhcp excluded-address	Defines the IP addresses that the DHCP server cannot assign to the clients.
ip dhcp pool	Defines the name of the DHCP address pool and enters the DHCP address pool configuration mode.

Platform Description N/A

4.45 Next-server

Use this command to define the startup sever list that the DHCP client accesses during startup in the DHCP address configuration mode. Use the **no** or **default** form of this command to restore the default setting.

next-server *ip-address* [*ip-address2*…*ip-address8*]

no next-server

defaut next-server

Parameter Description

Parameter	Description
ip-address	Defines the IP address of the startup server, which is usually the TFTP server. It is required to configure one IP address at least.

ip-address2…ip-address8	(Optional) Up to 8 startup servers can be configured.

Defaults N/A

Command Mode DHCP address pool configuration mode.

Usage Guide When more than one startup server is defined, the former will possess higher priory. The DHCP client will select the next startup server only when its communication with the former startup server fails.

Configuration Examples The following example specifies the startup server 192.168.12.4 for the DHCP client.

```
FS(dhcp-config)# next-server 192.168.12.4
```

Related Commands

Command	Description
bootfile	Defines the default startup mapping file name of the DHCP client.
ip dhcp pool	Defines the name of the DHCP address pool and enter the DHCP address pool configuration mode.
ip help-address	Defines the Helper address on the interface.
option	Configures the option of the FSOS software DHCP server.

Platform Description N/A

4.46 Option

Use this command to configure the option of the DHCP server in the DHCP address pool configuration mode. Use the **no** or **default** form of this command to restore the default setting.

option *code* { **ascii** *string* | **hex** *string* | **ip** *ip-address* }

no option

defaut option

Parameter Description

Parameter	Description
code	Defines the DHCP option codes.
ascii *string*	Defines an ASCII string.
hex *string*	Defines a hex string.
ip *ip-address*	Defines an IP address list.

Defaults N/A

Command Mode Global configuration mode

Usage Guide The DHCP provides a mechanism to transmit the configuration information to the host in the TCP/IP network. The

DHCP message has a variable option field that can be defined according to the actual requirement. The DHCP client needs to carry the DHCP message with 32 bytes of option information at least. Furthermore, the fixed data field in the DHCP message is also referred to as an option. For the definition of current DHCP option, refer to RFC 2131.

Configuration Examples

The following example defines the option code 19, which determines whether the DHCP client can enable the IP packet forwarding. 0 indicates to disable the IP packet forwarding, and 1 indicates to enable the IP packet forwarding. The configuration below enable the IP packet forwarding on the DHCP client.

```
FS(dhcp-config)# option 19 hex 1
```

The following example defines the option code 33, which provides the DHCP client with the static route information. The DHCP client will install two static routes: 1) the destination network 172.16.12.0 and the gateway 192.168.12.12, 2) the destination network 172.16.16.0 and the gateway 192.168.12.16.

```
option 33 ip 172.16.12.0 192.168.12.12 172.16.16.0 192.168.12.16
```

Related Commands

Command	Description
ip dhcp pool	Defines the name of the DHCP address pool and enters the DHCP address pool configuration mode.

Platform Description

N/A

4.47 Pool-status

Use this command to enable or disable the DHCP address pool.

pool-status { **enable** | **disable** }

Parameter Description

Parameter	Description
enable	Enables the address pool.
disable	Disables the address pool.

Defaults

By default, the address pool is enabled after it is configured.

Command Mode

DHCP address pool configuration mode

Usage Guide

This command is configured on the DHCP server.

Configuration Examples

The following example disables the address pool.

```
FS(dhcp-config)# pool-status disable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.48 Relay Agent Information

Use this command to enter the Option82 matching information configuration mode in the global CLASS configuration mode. Use the **no** form of this command to delete the Option82 matching information of the CLASS.

relay agent information

no relay agent information

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Global CLASS configuration mode

Usage Guide After executing this command, it enters the Option82 matching information configuration mode which is shown as "FS (config-dhcp-class-relayinfo)#".

In this configuration mode, user can configure the class matching multiple Option82 information.

Configuration Examples The following example configures a global CLASS and enters the Option82 matching information configuration mode.

```
FS(config)# ip dhcp class myclass
FS(config-dhcp-class)# relay agent information
FS(config-dhcp-class-relayinfo)#
```

Related Commands

Command	Description
ip dhcp class	Defines a CLASS and enters the global CLASS configuration mode.

Platform Description N/A

4.49 Relay-information Hex

Use this command to enter the Option82 matching information configuration mode. Use the **no** form of this command to delete a piece of matching information.

relay-information hex *aabb.ccdd.eeff…* [*]

no relay-information hex *aabb.ccdd.eeff…* [*]

Parameter Description

Parameter	Description
aabb.ccdd.eeff…[*]	Hexadecimal Option82 matching information. The '*' symbol means partial matching which needs the front part matching only. Without the '*' means needing full

	matching.

Defaults N/A

Command Mode Global CLASS configuration mode

Usage Guide N/A

Configuration Examples The following example configures a global CLASS which can match multiple Option82 information.

```
FS(config)# ip dhcp class myclass
FS(config-dhcp-class)# relay agent information
FS(config-dhcp-class-relayinfo)# relay-information
 hex 0102256535
FS(config-dhcp-class-relayinfo)# relay-information
 hex 010225654565
FS(config-dhcp-class-relayinfo)# relay-information
 hex 060225654565
FS(config-dhcp-class-relayinfo)# relay-information
 hex 060223*
```

Related Commands

Command	Description
ip dhcp class	Defines a CLASS and enter the global CLASS configuration mode.
relay agent information	Enters the Option82 matching information configuration mode.

Platform Description N/A

4.50 Remark

Use this command to configure the identification which is used to describe the CLASS in this global CLASS configuration mode. Use the **no** form of this command to delete the identification.

remark *class-remark*

no remark

Parameter Description

Parameter	Description
class-remark	Information used to identify the CLASS, which can be the character strings with space in them.

Defaults N/A.

Command Mode Global CLASS configuration mode.

Usage Guide N/A

Configuration Examples The following example configures the identification information for a global CLASS.

```
FS(config)# ip dhcp class myclass
FS(config-dhcp-class)# remark used in #1 build
```

Related Commands

Command	Description
ip dhcp class	Defines a CLASS and enter the global CLASS configuration mode.

Platform Description N/A

4.51 Service dhcp

Use this command to enable the DHCP server and the DHCP relay on the device in global configuration mode. Use the **no** or **default** form of this command to restore the default setting.

service dhcp

no service dhcp

defaut service dhcp

Parameter Description

Parameter	Description
N/A	N/A

Defaults The **service dhcp** command is disabled.

Command Mode Global configuration mode

Usage Guide The DHCP server can assign the IP addresses to the clients automatically, and provide them with the network configuration information such as DNS server and default gateway. The DHCP relay can forward the DHCP requests to other servers, and the returned DHCP responses to the DHCP client, serving as the relay for DHCP packets.

Configuration Examples The following example enables the DHCP server and the DHCP relay feature.

```
FS(config)# service dhcp
```

Related Commands

Command	Description
show ip dhcp server statistics	Displays various statistics information of the DHCP server.
ip helper-address *A.B.C.D*	Adds an IP address of the DHCP server.

Platform Description N/A

4.52 Show Dhcp Lease

Use this command to display the lease information of the IP address obtained by the DHCP client.

show dhcp lease

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide If the IP address is not defined, display the binding condition of all addresses. If the IP address is defined, display the binding condition of this IP address.

Configuration Examples The following example displays the result of the show dhcp lease.

```
FS# show dhcp lease
Temp IP addr: 192.168.5.71 for peer on Interface: FastEthernet0/0
Temp sub net mask: 255.255.255.0
  DHCP Lease server: 192.168.5.70, state: 3 Bound
  DHCP transaction id: 168F
  Lease: 600 secs, Renewal: 300 secs, Rebind: 525 secs
Temp default-gateway addr: 192.168.5.1
  Next timer fires after: 00:04:29
  Retry count: 0 Client-ID: redgaint-00d0.f8fb.5740-Fa0/0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.53 Show Ip Dhcp Binding

Use this command to display the binding condition of the DHCP address.

show ip dhcp binding [*ip-address*]

Parameter Description

Parameter	Description
ip-address	(Optional) Only displays the binding condition of the specified IP addresses.

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide If the IP address is not defined, show the binding condition of all addresses. If the IP address is defined, show the binding condition of this IP address

Configuration Examples The following is the result of the show ip dhcp binding.

```
FS# show ip dhcp binding
Total number of clients     : 4
Expired clients             : 3
Running clients             : 1

IP address      Hardware address      Lease expiration              Type
20.1.1.1        2000.0000.2011        000 days 23 hours 59 mins     Automatic
```

The meaning of various fields in the show result is described as follows.

Field	Description
IP address	The IP address to be assigned to the DHCP client.
Client-Identifier /Hardware address	The client identifier or hardware address of the DHCP client.
Lease expiration	The expiration date of the lease. The Infinite indicates it is not limited by the time. The IDLE indicates the address is in the free status currently for it is not renewed or the DHCP client releases it actively.
Type	The type of the address binding. The Automatic indicates an IP address is assigned automatically, and the Manual indicates an IP address is assigned by manual.

Related Commands

Command	Description
clear ip dhcp binding	Clears the DHCP address binding table.

Platform Description N/A

4.54 Show Ip Dhcp Conflict

Use this command to show the conflict history record of the DHCP sever.

show ip dhcp conflict

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide This command can display the conflict address list detected by the DHCP server.

Configuration Examples The following example displays the output result of the **show ip dhcp conflict** command.

```
FS# show ip dhcp conflict
IP address    Detection Method
 192.168.12.1    Ping
```

The meaning of various fields in the show result is described as follows.

Field	Description
IP address	The IP addresses which cannot be assigned to the DHCP client.
Detection Method	The conflict detection method.

Related Commands

Command	Description
clear ip dhcp conflict	Clears the DHCP conflict record.

Platform Description N/A

4.55 show ip dhcp history

Use this command to display the DHCP lease history.

show ip dhcp history

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Priviledged EXEC mode

Usage Guide This command is configured on the DHCP server.

Configuration Examples The following example displays the DHCP lease history.

```
FS#show ip dhcp history
Expired clients              : 3
IP address        Hardware address        Lease expiration        Vlan/Relay
10.1.1.5          2222.abcd.47ac          IDLE                      4097
10.1.1.4          2222.abcd.47ae          IDLE                      4097
10.1.1.3          2222.abcd.47ad          IDLE                      4097
Running clients              : 0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.56 Show Ip Dhcp Identifier

Use this command to display the DHCP address pool ID and address usage.

show ip dhcp identifier

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the DHCP address pool ID and address usage.

```
FS# show ip dhcp identifier
Pool    name        Identifier          Total        Distributed    Remained
------------    -----------    -----------    -----------    --------
wwp                 597455782       65533            0                  65533
```

Pool name	Address pool name.
Identifier	Address pool ID.
Total	Total number of addresses.
Distributed	Number of allocated addresses.
Remained	Number of remained addresses.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.57 Show Ip Dhcp Pool

Use this command to display the address statistics of an address pool.

show ip dhcp pool [*poolname*]

Parameter Description

Parameter	Description
poolname	(Optional) Address pool whose address statistics are to be displayed.

Defaults Privileged EXEC mode.

Command Mode N/A

Usage Guide Use this command to show the address statistics of an address pool.

Configuration Examples The following example displays the output result of the **show ip dhcp pool** *poolname* command.

```
FS# show ip dhcp pool
FS#sh ip dh pool
Pool    name            Total        Distributed    Remained      Percentage
-------------    -----------    -----------    --------      -----------
net20                253                11                242              4.34782
test                  0                  0                  0               0.00000
```

Related Commands

Command	Description
ip dhcp pool	Defines the name of the DHCP address pool and enters the DHCP address pool configuration mode.

Platform Description N/A

4.58 Show Ip Dhcp Relay-statistics

Use this command to display the statistics of the DHCP relay.

show ip dhcp relay-statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to display the statistics of the DHCP relay.

Configuration Examples The following example displays the statistics of the DHCP relay.

```
FS# show ip dhcp relay-statistics
Cycle mode                    0
```

```
Message                    Count
Discover                   0
Offer                      0
Request                    0
Ack                        0
Nak                        0
Decline                    0
Release                    0
Info                       0
Bad                        0

Direction                  Count
Rx client                  0
Rx client uni              0
Rx client bro              0
Tx client                  0
Tx client uni              0
Tx client bro              0
Rx server                  0
Tx server                  0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.59 Show Ip Dhcp Server Statistics

Use this command to display the statistics of the DHCP server.

show ip dhcp server statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command displays the statistics of the DHCP server.

Configuration Examples

The following example displays the output result of the **show ip dhcp server statistics** command.

```
FS# show ip dhcp server statistics
Address pools                    2
Lease counter                    4
Active    Lease Counter        0
Expired Lease Counter        4
Malformed messages             0
Dropped messages               0

Message                          Received
BOOTREQUEST                    216
DHCPDISCOVER                   33
DHCPREQUEST                    25
DHCPDECLINE                    0
DHCPRELEASE                    1
DHCPINFORM                     150

Message                          Sent
BOOTREPLY                      16
DHCPOFFER                      9
DHCPACK                        7
DHCPNAK                        0
DHCPREQTIMES                   0
DHCPREQSUCTIMES                0
DISCOVER-PROCESS-ERROR 0
LEASE-IN-PINGSTATE             0
NO-LEASE-RESOURCE              0
SERVERID-NO-MATCH              0
--------------------------------------------
recv                                0
send                                0
```

The meaning of various fields in the show result is described as follows.

Field	Description
Address pools	Number of address pools.
Automatic bindings	Number of automatic address bindings.
Manual bindings	Number of manual address bindings.
Expired bindings	Number of expired address bindings.
Malformed messages	Number of malformed messages received by the DHCP.

Message Received or Sent	Number of the messages received and sent by the DHCP server respectively.

Related Commands

Command	Description
clear ip dhcp server statistics	Clears the DHCP server statistics.

Platform Description N/A

4.60 Show Ip Dhcp Socket

Use this command to display the socket used by the DHCP server.

show ip dhcp socket

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the socket used by the DHCP server.

```
FS#show ip dhcp socket
dhcp socket = 47.
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5. DHCPv6 Commands

5.1 clear ipv6 dhcp binding

Use this command to clear the DHCPv6 binding information.

clear ipv6 dhcp binding [*ipv6-address*]

Parameter Description

Parameter	Description
ipv6-address	Sets the IPv6 address or the prefix.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide If the *ipv6-address* is not specified, all DHCPv6 binding information is cleared. If the *ipv6-address* is specified, the binding information for the specified address is cleared.

Configuration Examples The following example clears the DHCPv6 binding information:

```
FS(config)# clear ipv6 dhcp binding
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.2 Clear Ipv6 Dhcp Client

Use this command to reset the DHCPv6 client.

clear ipv6 dhcp client *interface-type interface-number*

Parameter Description

Parameter	Description
interface-type interface-number	Sets the interface type and the interface number.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to reset the DHCPv6 client, which may lead the client to request for the configurations from the server again.

Configuration Examples The following example resets DHCP client VLAN 1.

```
FS# clear ipv6 dhcp client vlan 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.3 clear ipv6 dhcp conflict

Use this command to clear the DHCPv6 address conflicts.

clear ipv6 dhcp conflict { *ipv6-address* | *}

Parameter Description

Parameter	Description
ipv6-address	Specifies IPv6 address or prefix.
*	All IPv6 addresses or prefixes

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide If an IPv6 address conflict is detected, the DHCPv6 client will send the Decline message. Then the DHCPv6 server will add the address in this message into the address conflict queue. The addresses added into the address conflict queue cannot be assigned any longer.

If the * parameter is not specified, all conflicts of IPv6 addresses or prefixes will be deleted.

If the *ipv6-address* parameter is specified, only the specified address conflict will be deleted.

Configuration Examples The following example clears a DHCPv6 address conflict.

```
FS# clear ipv6 dhcp conflict 2008:50::2
```

Related Commands

Command	Description
show ipv6 dhcp conflict	Displays address conflicts.

Platform Description N/A

5.4 Clear Ipv6 Dhcp Relay Statistics

Use this command to clear the packet sending and receiving condition with the DHCPv6 Relay function enabled.

clear ipv6 dhcp relay statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example clears the packet sending and receiving condition with the DHCPv6 Relay function enabled.

```
FS# clear ipv6 dhcp relay statistics
```

Related Commands

Command	Description
show ipv6 dhcp relay statistics	Displays the statistical information.

Platform Description N/A

5.5 Ipv6 Dhcp Client Ia

Use this command to enable DHCPv6 client mode and request the IANA address from the DHCPv6 server. Use the **no** form of this command to restore the default setting.

ipv6 dhcp client ia [**rapid-commit**]

no ipv6 dhcp client ia

Parameter Description

Parameter	Description
rapid-commit	Allows the two-message interaction process.

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide This command is used to enable DHCPv6 client mode and request the IANA address from the DHCPv6 server, The **rapid-commit** key allows the two-message interaction process between the client and the server. After the key is configured, the solicit message transmitted by the client contains the rapid-commit option.

Configuration Examples The following example enables the request for the IANA address on the interface.

```
FS(config)# interface fastethernet 0/1
FS(config-if)# ipv6 dhcp client ia
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.6 Ipv6 Dhcp Client Pd

Use this command to enable the DHCPv6 client and request for the prefix address information.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp client pd *prefix-name* [**rapid-commit**]

no ipv6 dhcp client pd

Parameter Description

Parameter	Description
prefix-name	Defines the IPv6 prefix name.
rapid-commit	Allows the two-message interaction process.

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide With the DHCPv6 client mode disabled, use this command to enable the DHCPv6 client mode on the interface.

With the **ipv6 dhcp client pd** command enabled, the DHCPv6 client sends the prefix request to the DHCPv6 server

The keyword **rapid-commit** allows the client and the server two-message interaction process. With this keyword configured, the solicit message sent by the client includes the **rapid-commit** item.

Configuration Examples The following example enables the prefix information request on the interface.

```
FS(config)# interface fastethernet 0/1
FS(config-if)# ipv6 dhcp client pd pd_name
```

Related Commands

Command	Description
clear ipv6 dhcp client	Resets the DHCPv6 client function on the interface.
show ipv6 dhcp interface	Displays the DHCPv6 interface configuration.

Platform Description N/A

5.7 Ipv6 Dhcp Relay Destination

Use this command to enable the DHCPv6 relay service and configure the destination address to which the messages are forwarded.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp relay destination*ipv6-address* [*interface-type interface-number*]

no ipv6 dhcp relay destination*ipv6-address* [*interface-type interface-number*]

Parameter Description

Parameter	Description
ipv6-address	Sets the DHCPv6 relay destination address.
interface-type interface-number	(Optional) Specifies the forwarding output interface if the forwarding address is the local link address.

Defaults By default, the relay and forward function is disabled, and the forwarding destination address and the output interface are not configured.

Command Mode Interface configuration mode

Usage Guide With the DHCPv6 relay service enabled on the interface, the DHCPv6 message received on the interface can be forwarded to all configured destination addresses. Those received DHCPv6 messages can be from the client, or from another DHCPv6 relay service.

The forwarding output interface configuration is mandatory if the forwarding address is the local link address or the multicast address. And the forwarding output interface configuration is optional if the forwarding address is global or station unicast or multicast address.

Without the forwarding output interface configured, the interface is selected according to the unicast or multicast routing protocol.

The relay reply message can be forwarded without the relay function enabled on the interface.

Configuration Examples The following example enables DHCPv6 Relay and sets the relay destination address on the interface to 3001::2.

```
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)# interface vlan 1
FS(config-if)# ipv6 dhcp relay destination 3001::2
FS(config-if)# end
```

Related Commands

Command	Description
show ipv6 dhcp interface	Displays the DHCPv6 interface information.

Platform Description N/A

5.8 Show Ipv6 Dhcp

Use this command to display the device DUID.

show ipv6 dhcp

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Interface configuration mode/Global configuration mode

Usage Guide The server, client and relay on the same device share a DUID.

Configuration Examples

The following example displays the device DUID.

```
FS# show ipv6 dhcp
This device's DHCPv6 unique identifier(DUID): 00:03:00:01:00:d0:f8:22:33:b0
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.9 Show Ipv6 Dhcp Interface

Use this command to display the DHCPv6 interface information.

show ipv6 dhcp interface [*interface-name*]

Parameter Description

Parameter	Description
interface-name	Sets the interface name.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

If the *interface-name* is not specified, all DHCPv6 interface information isdisplayed. If the *interface-name* is specified, the specified interface information is displayed.

Configuration Examples

The following example displays the DHCPv6 interface information.

```
FS# show ipv6 dhcp interface
VLAN 1 is in server mode
  Server pool dhcp-pool
  Rapid-Commit: disable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.10 Show Ipv6 Dhcp Relay Destination

Use this command to display the destination information about DHCPv6 Relay Agent.

show ipv6 dhcp relay destination { **all** | *interface-type interface-number* }

Parameter description

Parameter	Description
all	Displays information about all configured destination addresses and relay

	exits.
interface-type interface-number	Displays the relay destination address and relay exit configured for a specified interface.

Defaults N/A

Command mode Privileged EXEC mode

Usage guideline Use this command to show the relay destination address to which DHCPv6 packets sent from a client are forwarded through a specified relay exit (optional) by an interface for which the relay function has been enabled by Relay Agent.

Examples The following example displays all the relay destination addresses.

```
FS# show ipv6 dhcp relay destination all
Interface:VLAN 1
Destination address(es)                    Output Interface
3001::2
ff02::1:2                                   VLAN 2
```

Related commands

Command	Description
N/A	N/A

Platform description N/A

5.11 Show Ipv6 Dhcp Relay Statistics

Use this command to display the packet sending and receiving condition with the DHCPv6 Relay function enabled.

show ipv6 dhcp relay statistics

Parameter Description

Parameter	Description
N/A.	N/A.

Defaults N/A.

Command Mode Privileged EXEC mode

Usage Guide N/A.

Configuration Examples

The following example displays the packet sending and receiving condition with the DHCPv6 Relay function enabled.

```
FS# show ipv6 dhcp relay statistics
Packets dropped                    :  2
    Error                          :  2
    Excess of rate limit       :  0
Packets received                   :  28
    SOLICIT                        :  0
    REQUEST                        :  0
    CONFIRM                        :  0
    RENEW                          :  0
    REBIND                         :  0
    RELEASE                        :  0
    DECLINE                        :  0
    INFORMATION-REQUEST            :  14
    RELAY-FORWARD                  :  0
    RELAY-REPLY                    :  14
Packets sent                       :  16
    ADVERTISE                      :  0
    RECONFIGURE                    :  0
    REPLY                          :  8
    RELAY-FORWARD                  :  8
 RELAY-REPLY                   :  0
```

Related Commands

Command	Description
clear ipv6 dhcp relay statistics	Clears the statistical information.

Platform Description

N/A

5.12 clear ipv6 dhcp server statistics

Use this command to clear the DHCPv6 server statistics.

clear ipv6 dhcp server statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

This command is used to clear the DHCPv6 server statistics.

Configuration Examples

The following example clears the DHCPv6 server statistics.

```
FS(config)# clear ipv6 dhcp server statistics
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.13 dns-server

Use this command to set the DNS Server list information for the DHCPv6 Server.

Use the **no** form of this command to restore the default setting.

dns-server *ipv6-address*

no dns-server *ipv6-address*

Parameter Description

Parameter	Description
ipv6-address	Sets the IPv6 address or the DNS server.

Defaults

By default, no DNS server list is configured.

Command Mode

DHCPv6 pool configuration mode

Usage Guide

To configure several DNS Server addresses, use the **dns-server** command for several times. The newly-configured DNS Server address will not overwrite the former ones.

Configuration Examples

The following example configures the DNS server address.

```
FS(config-dhcp)# dns-server 2008:1::1
```

Related Commands

Command	Description
domain-name	Sets the DHCPv6 domain name information.
ipv6 dhcp pool	Sets a DHCPv6 pool.

Platform Description

N/A

5.14 domain-name

Use this command to set the domain name for the DHCPv6 server.

Use the **no** form of this command to restore thedefault setting.

domain-name*domain*

no domain-name *domain*

Parameter Description

Parameter	Description
domain	Sets the domain name.

Defaults By default, no domain name is configured.

Command Mode DHCPv6 pool configuration mode

Usage Guide To configure several domain names, use the domain-name command for several times. The newly-configured domain name will not overwrite the former ones.

Configuration Examples The following example sets the domain name for the DHCPv6 server to example.com.

```
FS(config-dhcp)# domain-name example.com
```

Related Commands

Command	Description
dns-server	Sets the DHCPv6 DNS server list.
ipv6 dhcp pool	Sets the DHCPv6 pool.

Platform Description N/A

5.15 domain-name

Use this command to set the domain name for the DHCPv6 server.

Use the **no** form of this command to restore thedefault setting.

domain-name*domain*

no domain-name *domain*

Parameter Description

Parameter	Description
domain	Sets the domain name.

Defaults By default, no domain name is configured.

Command Mode DHCPv6 pool configuration mode

Usage Guide To configure several domain names, use the domain-name command for several times. The newly-configured domain name will not overwrite the former ones.

Configuration Examples The following example sets the domain name for the DHCPv6 server to example.com.

```
FS(config-dhcp)# domain-name example.com
```

Related Commands

Command	Description
dns-server	Sets the DHCPv6 DNS server list.

ipv6 dhcp pool	Sets the DHCPv6 pool.

Platform Description N/A

5.16 iana-address prefix

Use this command to set the IA_NA address prefix for the DHCPv6 Server. Use the **no** form of this command to restore thedefault setting.

iana-address prefix *ipv6-prefix/prefix-length* [**lifetime** { *valid-lifetime* | *preferred-lifetime* }]

no iana-address prefix

Parameter Description

Parameter	Description
ipv6-prefix/prefix-length	Sets the IPv6 prefix and prefix length.
lifetime	Sets the lifetime of the address allocated to the client. With the keyword **lifetime** configured, both parameters *valid-lifetime*and*preferred-lifetime* shall be configured.
valid-lifetime	Sets the valid lifetime of using the allocated address for the client.
preferred-lifetime	Sets the preferred lifetime of the address allocated to the client.

Defaults By default, no IA_NA address prefix is configured.

The default *valid-lifetime* is 3,600s(1 hour).

The default *preferred-lifetime is* 3,600s(1 hour).

Command Mode DHCPv6 pool configuration mode

Usage Guide This command is used to set the IA_NA address prefix for the DHCPv6 Server, and allocate the IA_NA address to the client.

The Server attempts to allocate a usable address within the IA_NA address prefix range to the client upon receiving the IA_NA address request from the client. That address will be allocated to other clients if the client no longer uses that address again.

Configuration Examples The following example sets the IA_NA address prefix for the DHCPv6 Server.

```
FS(config-dhcp)# iana-address prefix 2008:50::/64 lifetime 2000 1000
```

Related Commands

Command	Description
ipv6 dhcp pool	Sets the DHCPv6 pool.
show ipv6 dhcp pool	Displays the DHCPv6 pool information.

Platform Description N/A

5.17 ipv6 dhcp client ia

Use this command to enable DHCPv6 client mode and request the IANA address from the DHCPv6 server. Use the **no** form of this command to restore the default setting.

ipv6 dhcp client ia [**rapid-commit**]

no ipv6 dhcp client ia

Parameter Description

Parameter	Description
rapid-commit	Allows the two-message interaction process.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

This command is used to enable DHCPv6 client mode and request the IANA address from the DHCPv6 server, The **rapid-commit** key allows the two-message interaction process between the client and the server. After the key is configured, the solicit message transmitted by the client contains the rapid-commit option.

Configuration Examples

The following example enables the request for the IANA address on the interface.

```
FS(config)# interface fastethernet 0/1
FS(config-if)# ipv6 dhcp client ia
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.18 ipv6 dhcp client pd

Use this command to enable the DHCPv6 client and request for the prefix address information.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp client pd *prefix-name* [**rapid-commit**]

no ipv6 dhcp client pd

Parameter Description

Parameter	Description
prefix-name	Defines the IPv6 prefix name.
rapid-commit	Allows the two-message interaction process.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

With the DHCPv6 client mode disabled, use this command to enable the DHCPv6 client mode on the interface.

With the **ipv6 dhcp client pd** command enabled, the DHCPv6 client sends the prefix request to the DHCPv6 server

The keyword **rapid-commit** allows the client and the server two-message interaction process. With this keyword configured, the solicit message sent by the client includes the **rapid-commit** item.

Configuration Examples

The following example enables the prefix information request on the interface.

```
FS(config)# interface fastethernet 0/1
FS(config-if)# ipv6 dhcp client pd pd_name
```

Related Commands

Command	Description
clear ipv6 dhcp client	Resets the DHCPv6 client function on the interface.
show ipv6 dhcp interface	Displays the DHCPv6 interface configuration.

Platform Description

N/A

5.19 ipv6 dhcp pool

Use this command to set the DHCPv6 server pool.

Use the **no** form of this command to restore thedefault setting.

ipv6 dhcp pool *poolname*

no ipv6 dhcp pool *poolname*

Parameter Description

Parameter	Description
poolname	Defines the DHCPv6 pool name.

Defaults

By default, no DHCPv6 server pool is configured.

Command Mode

Global configuration mode

Usage Guide

This command is used to create a DHCPv6 Server configuration pool. After configuring this command, it enters the DHCPv6 pool configuration mode, in which the administrator can set the pool parameters, such as the prefix and the DNS Server information, ect.

After creating the DHCPv6 Server configuration pool, use the **ipv6 dhcp server** command to associate the pool and the DHCPv6 Server on one interface.

Configuration Examples

The following example sets the DHCPv6 server pool.

```
FS# configure terminal
FS(config)# ipv6 dhcp pool pool1
FS(config-dhcp)#
```

Related Commands

Command	Description
ipv6 dhcp server	Enables the DHCPv6 server function on the interface.

show ipv6 dhcp pool	Displays the DHCPv6 pool information.

Platform Description N/A

5.20 ipv6 dhcp relay destination

Use this command to enable the DHCPv6 relay service and configure the destination address to which the messages are forwarded.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp relay destination*ipv6-address* [*interface-type interface-number*]

no ipv6 dhcp relay destination*ipv6-address* [*interface-type interface-number*]

Parameter Description

Parameter	Description
ipv6-address	Sets the DHCPv6 relay destination address.
interface-type interface-number	(Optional) Specifies the forwarding output interface if the forwarding address is the local link address.

Defaults By default, the relay and forward function is disabled, and the forwarding destination address and the output interface are not configured.

Command Mode Interface configuration mode

Usage Guide With the DHCPv6 relay service enabled on the interface, the DHCPv6 message received on the interface can be forwarded to all configured destination addresses. Those received DHCPv6 messages can be from the client, or from another DHCPv6 relay service.

The forwarding output interface configuration is mandatory if the forwarding address is the local link address or the multicast address. And the forwarding output interface configuration is optional if the forwarding address is global or station unicast or multicast address.

Without the forwarding output interface configured, the interface is selected according to the unicast or multicast routing protocol.

The relay reply message can be forwarded without the relay function enabled on the interface.

Configuration Examples The following example enables DHCPv6 Relay and sets the relay destination address on the interface to 3001::2.

```
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)# interface vlan 1
FS(config-if)# ipv6 dhcp relay destination 3001::2
FS(config-if)# end
```

Related Commands

Command	Description
show ipv6 dhcp interface	Displays the DHCPv6 interface information.

Platform Description N/A

5.21 ipv6 dhcp server

Use this command to enable the DHCPv6 server on the interface.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp server *poolname*[**rapid-commit**][**preference** *value*]

no ipv6 dhcp server

Parameter Description

Parameter	Description
poolname	Defines the DHCPv6 pool name.
rapid-commit	Allows the two-message interaction process.
preference *value*	Sets the preference level for the advertise message. The valid range is from 1 to 100 and the default value is 0.

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide Use the **ipv6 dhcp server** command to enable the DHCPv6 service.

Configuring the keyword **rapid-commit** allows the two-message interaction for the server and the client when allocating the address prefix and setting other configurations. With this keyword configured, if the client solicit message includes the **rapid-commit** item, the DHCPv6 Server will send the Reply message immediately.

DHCPv6 Server carries with the **preference** value when sending the advertise message if the **preference** level is not 0.

If the **preference** level is 0, the advertise message will not include this field. If the **preference** value is 255, the client sends the request message to the server to obtain the configurations.

DHCPv6 Client, Server and Relay functions are exclusive, and only one of the functions can be configured on the interface.

Configuration Examples The following example enables the DHCPv6 server on the interface.

```
FS(config)# interface fastethernet 0/1
FS(config-if)# ipv6 dhcp server pool1
```

Related Commands

Command	Description
ipv6 dhcp pool	Sets the DHCPv6 pool.
show ipv6 dhcp pool	Displays the DHCPv6 pool information.

Platform Description N/A

5.22 ipv6 local pool

Use this command to configure the local prefix pool of the DHCPv6 server prefix.

Use the **no** form of this command to restore the default setting.

ipv6 local pool *poolname prefix/prefix-length assigned-length*

no ipv6 local pool *poolname*

Parameter Description

Parameter	Description
poolname	The local prefix pool name
prefix/prefix-length	The prefix and prefix length
assigned-length	The assigned prefix length

Defaults

By default, no local prefix pool of the DHCPv6 server prefix is configured.

Command Mode

Global configuration mode

Usage Guide

The **ipv6 local pool** command is used to create the local prefix pool. If the DHCPv6 server requires prefix delegation, you can use the **prefix-delegation pool** command to specify the local prefix pool and then assign prefixes from the prefix pool.

Configuration Examples

The following example configures the local prefix pool.

```
FS(config)# ipv6 local pool client-prefix-pool 2001::db8::/64 80
```

The following example specifies the local prefix pool.

```
FS(config-dhcp)# prefix-delegation pool client-prefix-pool lifetime 2000 1000
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.23 option52

Use this command to configure the DHCPv6 Server to set the CAPWAP AC IPv6 address.

Use the **no** form of this command to restore the default setting.

option52 *ipv6-address*

no option52 *ipv6-address*

Parameter Description

Parameter	Description
ipv6-address	Sets the CAPWAP AC IPv6 address.

Defaults

By default, no option52 is created after pool configuration on the DHCPv6 server is complete.

Command Mode

DHCPv6 pool configuration mode

Usage Guide This command can be used to set multiple CAPWAP AC IPv6 addresses. The newly added IPv6 address does not overwrite the old one.

Configuration Examples The following example configures the domain-name address.

```
FS(config-dhcp)# option52 2008:1::1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.24 prefix-delegation

Use this command to set the static binding address prefix information for the DHCPv6 server.

Use the **no** form of this command to restore the default setting.

prefix-delegation *ipv6-prefix/prefix-length client-DUID* [*lifetime*]

no prefix-delegation *ipv6-prefix/prefix-length client-DUID* [*lifetime*]

Parameter Description

Parameter	Description
ipv6-prefix/prefix-length	Sets the IPv6 address prefix and the prefix length.
client-DUID	Sets the client DUID.
lifetime	Sets the interval of using the prefix by the client.

Defaults By default, no address prefix information is configured.

The default *lifetime* is 3,600 seconds (one hour).

Command Mode DHCPv6 pool configuration mode

Usage Guide The administrator uses this command to manually set the address prefix information list for the client IA_PD and set the valid lifetime for those prefixes.

The parameter *client-DUID* allocates the address prefix to the first IA_PD in the specified client.

Before receiving the request message for the address prefix from the client, DHCPv6 Server searches for the corresponding static binding first. If it succeeds, the server returns to the static binding; otherwise, the server will attempt to allocate the address prefix from other prefix information sources.

Configuration Examples The following example sets the prefix information for a DHCPv6 client.

```
FS(config-dhcp)# prefix-delegation 2008:2::/64 0003000100d0f82233ac
```

Related Commands

Command	Description
ipv6 dhcp pool	Sets a DHCPv6 pool.
ipv6 local pool	Sets a local prefix pool.

prefix-delegation pool	Specifies the DHCPv6 local prefix pool.
show ipv6 dhcp pool	Displays the DHCPv6 pool information.

Platform Description N/A

5.25 prefix-delegation pool

Use this command to specify the local prefix pool for the DHCPv6 server.

Use the **no** form of this command to restore the default setting.

prefix-delegation pool *poolname* [**lifetime** { *valid-lifetime* | *preferred-lifetime* }]

no prefix-delegation pool *poolname*

Parameter Description

Parameter	Description
poolname	Sets the local prefix pool name.
lifetime	Sets the lifetime of the address prefix allocated to the client. With the keyword **lifetime** configured, both parameters *valid-lifetime* and *preferred-lifetime* shall be configured.
valid-lifetime	Sets the valid lifetime of using the allocated address prefix for the client.
preferred-lifetime	Sets the preferred lifetime of the address prefix allocated to the client.

Defaults By default, no address prefix pool is specified.

The default *valid-lifetime* is 3,600s(1 hour).

The default *preferred-lifetime is* 3,600s(1 hour).

Command Mode DHCPv6 pool configuration mode

Usage Guide Use the **prefix-delegation pool** command to set the prefix pool for the DHCPv6 Server and allocate the prefix to the client. Use the **ipv6 local pool** command to set the prefix pool.

The Server attempts to allocate a usable prefix from the prefix pool to the client upon receiving the prefix request from the client. That prefix will be allocated to other clients if the client no longer uses that prefix again.

Configuration Examples The following example specifies the local prefix pool for the DHCPv6 server.

```
FS(config-dhcp)# prefix-delegation pool client-prefix-pool lifetime 2000 1000
```

Related Commands

Command	Description
ipv6 dhcp pool	Sets a DHCPv6 pool.
ipv6 local pool	Sets a local prefix pool.
prefix-delegation	Statically binds the client with the address prefix.
show ipv6 dhcp pool	Displays the DHCPv6 pool information.

Platform Description N/A

5.26 show ipv6 dhcp

Use this command to display the device DUID.

show ipv6 dhcp

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Interface configuration mode/Global configuration mode

Usage Guide The server, client and relay on the same device share a DUID.

Configuration Examples The following example displays the device DUID.

```
FS# show ipv6 dhcp
This device's DHCPv6 unique identifier(DUID): 00:03:00:01:00:d0:f8:22:33:b0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.27 show ipv6 dhcp binding

Use this command to display the address binding information for the DHCPv6 server.

show ipv6 dhcp binding [*ipv6-address*]

Parameter Description

Parameter	Description
ipv6-address	Sets the IPv6 address or the prefix.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide If the *ipv6-address* is not specified, all prefixes dynamically assigned to the client and IANA address binding information are shown. If the *ipv6-address* is specified, the binding information for the specified address is shown.

Configuration Examples The following example displays the address binding information for the DHCPv6 server.

```
FS# show ipv6 dhcp binding
Client    DUID: 00:03:00:01:00:d0:f8:22:33:ac
  IAPD: iaid 0, T1 1800, T2 2880
```

```
Prefix: 2001:20::/72
        preferred lifetime 3600, valid lifetime 3600
    expires at Jan 1 2008 2:23 (3600 seconds)
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.28 show ipv6 dhcp conflict

Use this command to display the DHCPv6 address conflicts.

show ipv6 dhcp conflict

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the DHCPv6 address conflicts.

```
FS# show ipv6 dhcp conflict
2008:50::2      declined
2108:50::2      declined
2008:50::3      declined
2008:50::4      declined
2108:50::4      declined
2008:50::5      declined
```

Related Commands

Command	Description
clear ipv6 dhcp conflict	Clears address conflicts.

Platform Description N/A

5.29 show ipv6 dhcp interface

Use this command to display the DHCPv6 interface information.

show ipv6 dhcp interface [*interface-name*]

Parameter Description

Parameter	Description
interface-name	Sets the interface name.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide If the *interface-name* is not specified, all DHCPv6 interface information isdisplayed. If the *interface-name* is specified, the specified interface information is displayed.

Configuration Examples The following example displays the DHCPv6 interface information.

```
FS# show ipv6 dhcp interface
VLAN 1 is in server mode
  Server pool dhcp-pool
  Rapid-Commit: disable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.30 show ipv6 dhcp pool

Use this command to display the DHCPv6 pool information.

show ipv6 dhcp pool [*poolname*]

Parameter Description

Parameter	Description
poolname	Defines the DHCPv6 pool name.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide If the *poolname* is not specified, all DHCPv6 interface information isdisplayed. If the *poolname* is specified, the specified interface information is displayed.

Configuration Examples The following example displays the DHCPv6 pool information.

```
FS# show ipv6 dhcp pool
DHCPv6 pool: dhcp-pool
  DNS server: 2011:1::1
  DNS server: 2011:1::2
```

```
Domain name: example.com
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.31 show ipv6 dhcp relay destination

Use this command to display the destination information about DHCPv6 Relay Agent.

show ipv6 dhcp relay destination { **all** | *interface-type interface-number* }

Parameter description

Parameter	Description
all	Displays information about all configured destination addresses and relay exits.
interface-type interface-number	Displays the relay destination address and relay exit configured for a specified interface.

Defaults N/A

Command mode Privileged EXEC mode

Usage guideline Use this command to show the relay destination address to which DHCPv6 packets sent from a client are forwarded through a specified relay exit (optional) by an interface for which the relay function has been enabled by Relay Agent.

Examples The following example displays all the relay destination addresses.

```
FS# show ipv6 dhcp relay destination all
Interface:VLAN 1
Destination address(es)                    Output Interface
3001::2
ff02::1:2                                   VLAN 2
```

Related commands

Command	Description
N/A	N/A

Platform description N/A

5.32 show ipv6 dhcp relay statistics

Use this command to display the packet sending and receiving condition with the DHCPv6 Relay function enabled.

show ipv6 dhcp relay statistics

Parameter Description

Parameter	Description
N/A.	N/A.

Defaults N/A.

Command Mode Privileged EXEC mode

Usage Guide N/A.

Configuration Examples The following example displays the packet sending and receiving condition with the DHCPv6 Relay function enabled.

```
FS# show ipv6 dhcp relay statistics
Packets dropped                    :  2
    Error                          :  2
    Excess of rate limit       :  0
Packets received                   :  28
    SOLICIT                        :  0
    REQUEST                        :  0
    CONFIRM                        :  0
    RENEW                          :  0
    REBIND                         :  0
    RELEASE                        :  0
    DECLINE                        :  0
    INFORMATION-REQUEST            :  14
    RELAY-FORWARD                  :  0
    RELAY-REPLY                    :  14
Packets sent                       :  16
    ADVERTISE                      :  0
    RECONFIGURE                    :  0
    REPLY                          :  8
    RELAY-FORWARD                  :  8
 RELAY-REPLY                   :  0
```

Related Commands

Command	Description
clear ipv6 dhcp relay statistics	Clears the statistical information.

Platform Description N/A

5.33 show ipv6 dhcp server statistics

Use this command to display the DHCPv6 server statistics.

show ipv6 dhcp server statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to display the DHCPv6 server statistics.

Configuration Examples

The following example displays the DHCPv6 server statistics.

```
FS# show ipv6 dhcp server statistics
DHCPv6 server statistics:

Packet statistics:
DHCPv6 packets received:                7
Solicit received:                       7
Request received:                       0
Confirm received:                       0
Renew received:                         0
Rebind received:                        0
Release received:                       0
Decline received:                       0
Relay-forward received:                 0
Information-request received:           0
Unknown message type received:          0
Error message received:                 0

DHCPv6 packet sent:                     0
Advertise sent:                         0
Reply sent:                             0
Relay-reply sent:                       0
Send reply error:                       0
Send packet error:                      0

Binding statistics:
Bindings generated:                     0
IAPD assigned:                          0
IANA assigned:                          0

Configuration statistics:
DHCPv6 server interface:                1
DHCPv6 pool:                            0
DHCPv6 iapd binding:                    0
```

Related Commands

Command	Description
ipv6 dhcp pool	Sets a DHCPv6 pool.

Platform Description

N/A

5.34 show ipv6 local pool

Use this command to display the local prefix pool configuration and usage.

show ipv6 local pool [*poolname*]

Parameter Description

Parameter	Description
poolname	The local prefix pool name

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

This command is used to display the local prefix pool configuration and usage.

Configuration Examples

The following example displays all local prefix pool information.

```
FS#show ipv6 local pool
Pool                                                                    Prefix
Free                In use
client-prefix-pool                                                      2001:db8::/64
65536               0
```

Field	Description
Pool	The local address pool name.
Prefix	The prefix and prefix length.
Free	The available prefix.
In use	The prefix in use.

The following example displays the information about the specified local prefix pool.

```
FS#show ipv6 local pool client-prefix-pool
Prefix is 2001:db8::/64 assign /80 prefix
1 entries in use, 65535 available
Prefix                                                  Interface
2001:db8::/80                                           GigabitEthernet 0/0
```

Filed	Description
Prefix	The assigned prefix and prefix length.
Interface	The assigning interface.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6. DNS Commands

6.1 Clear Host

Use this command to clear the dynamically learned host name.

clear host [* | *host-name*]

Parameter Description

Parameter	Description
host-name	Deletes the specified dynamic domain name buffer.
*	Deletes all dynamic domain name buffer.

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide You can obtain the mapping record of the host name buffer table in two ways: 1) the **ip host** static configuration, 2) the DNS dynamic learning. Execute this command to delete the host name records learned by the DNS dynamically.

Configuration Examples The following configuration deletes the dynamically learned mapping records from the host name-IP address buffer table.

```
FS(config)#clear host *
```

Related Commands

Command	Description
show hosts	Displays the host name buffer table.

Platform Description N/A

6.2 Ip Domain-lookup

Use this command to enable DNS domain name resolution. Use the **no** form of this command to disable the DNS domain name resolution function.

ip domain-lookup

no ip domain-lookup

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Global configuration mode.

Usage Guide This command enables the domain name resolution function.

Configuration Examples The following example disables the DNS domain name resolution function.

```
FS(config)# no ip domain-lookup
```

Related Commands

Command	Description
show hosts	Displays the DNS related configuration information.

Platform Description N/A

6.3 Ip Host

Use this command to configure the mapping of the host name and the IP address. Use the **no** form of the command to remove the host list.

ip host *host-name ip-address*

no ip host *host*-name *ip-address*

Parameter Description

Parameter	Description
host-name	The host name of the equipment
ip-address	The IP address of the equipment

Defaults N/A

Command Mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example configures IPv4 address 192.168.5.243 for domain name www .test.com.

```
FS(config)# ip host www.test.com 192.168.5.243
```

Related Commands

Command	Description
show hosts	Show the DNS related configuration information.

Platform Description N/A

6.4 Ip Name-server

Use this command to configure the IP address of the domain name server. Use the **no** form of this command to delete the configured domain name server.

ip name-server [oob] { *ip-address* | *ipv6-address* }

no ip name-server [oob] [*ip-address* | *ipv6-address*]

Parameter Description

Parameter	Description
oob	Mgmt port
ip-address	The IP address of the domain name server.
ipv6-address	The IPv6 address of the domain name server.

Defaults

No domain name server is configured by default.

Command Mode

Global configuration mode.

Usage Guide

Add the IP address of the DNS server. Once this command is executed, the equipment will add a DNS server. When the device cannot obtain the domain name from a DNS server, it will attempt to send the DNS request to subsequent servers until it receives a response.

Up to 6 DNS servers are supported. You can delete a DNS server with the *ip-address* option or all the DNS servers.

Configuration Examples

N/A

Related Commands

Command	Description
show hosts	Displays the DNS related configuration information.

Platform Description

N/A

6.5 Ipv6 Host

Use this command to configure the mapping of the host name and the IPv6 address by manual. Use the **no** form of the command to remove the host list.

ipv6 host *host-name ipv6-address*

no ipv6 host *host*-name *ipv6-address*

Parameter Description

Parameter	Description
host-name	The host name of the equipment
ipv6-address	The IPv6 address of the equipment

Defaults N/A

Command Mode Global configuration mode.

Usage Guide To delete the host list, use the **no ipv6 host** *host-name ipv6-address* command.

Configuration Examples The following example configures the IPv6 address for the domain name.

```
FS(config)# ipv6 host switch 2001:0DB8:700:20:1::12
```

Related Commands

Command	Description
show hosts	Displays the DNS related configuration information.

Platform Description N/A

6.6 Show Hosts

Use this command to display DNS configuration.

show hosts [*hostname*]

Parameter Description

Parameter	Description
hostname	Displays the specified domain name information,

Defaults All domain name information is displayed by default.

Command Mode Privileged EXEC mode.

Usage Guide This command is used to display the DNS related configuration information.

Configuration Examples

```
FS# show hosts
Name servers are:
192.168.5.134 static

Host            type        Address          TTL(sec)
switch          static      192.168.5.243    ---
www.fs.com      dynamic     192.168.5.123    126
```

Field	Description
Name servers	Domain name server
Host	Domain name
type	Resolution type:

	Static resolution and dynamic resolution.
Address	IP address corresponding to the domain name
TTL	TTL of entries corresponding to the domain name/IP address.

Related Commands

Command	Description
ip host	Configures the host name and IP address mapping by manual.
ipv6 host	Configures the host name and IPv6 address mapping by manual.
ip name-server	Configures the DNS server.

Platform Description

N/A

7. FTP Server Commands

7.1 Ftp-server Enable

Use this command to enable the FTP server. Use the **default** form of this command to restore the default setting.

ftp-server enable

default ftp-server enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

This command is used to enable the FTP server to connect the FTP client to upload/download the files.

To enable the FTP client to access to the FTP server files, this command shall be co-used with the **ftp-server topdir** command.

Configuration Examples

The following example enables the FTP Server and confines the FTP client access to the syslog subdirectory:

```
FS(config)# ftp-server topdir /syslog
FS(config)# ftp-server enable
```

FS(config)# ftp-server enableThe following example disables the FTP Server:

```
FS(config)# no ftp-server enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.2 Ftp-server Login Timeout

Use this command to set the timeout interval for login to the FTP server. Use the **no** or **default** form of this command to restore the default setting.

ftp-server login timeout *time*

no ftp-server login timeout

default ftp-server login timeout

Parameter Description

Parameter	Description
time	Sets the timeout interval for login to the FTP server, in the range from 1 to 30 in the unit of minutes.

Defaults The default is 2 minutes.

Command Mode Global configuration mode

Usage Guide The timeout interval refers to the maximum time when your account is allowed online after you login to the server. If you don't perform authentication again before the timeout interval expires, you will be forced offline.

Configuration Examples The following example sets the timeout interval for login to the FTP server to 5 minutes.

```
FS(config)# ftp-server login timeout 5
```

The following example restores the default setting.

```
FS(config)# no ftp-server login timeout
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.3 Ftp-server Login Times

Use this command to set the number of login attempts. Use the **no** or **default** form of this command to restore the default setting.

ftp-server login times *time*

no ftp-server login times

default ftp-server login times

Parameter Description

Parameter	Description
time	Sets the number of login attempts, in the range from 1 to 10.

Defaults The default is 3.

Command Mode Global configuration mode

Usage Guide The number of login attempts refers to the maximum count you are allowed to perform authentication. If the number of your login attempts exceeds 3, you will be forced offline.

Configuration Examples

The following example sets the number of login attempts to 5.

```
FS(config)# ftp-server login times 5
```

The following example restores the default setting.

```
FS(config)# no ftp-server login times
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.4 Ftp-server Timeout

Use this command to set the FTP session idle timeout. Use the **no** or **default** form of this command to restore the default setting.

ftp-server timeout *time*

no ftp-server timeout

default ftp-server timeout

Parameter Description

Parameter	Description
time	Sets the session idle timeout, in the range from 1 to 3600 in the unit of minutes.

Defaults The default is 10 minutes.

Command Mode Global configuration mode.

Usage Guide Use this command to set the FTP session idle timeout. If the session is idle, the FTP server deems the session connection is invalid and disconnects with the user.

The session idle time refers to the time for the FTP session between two FTP operations.

Configuration Examples

The following example sets the session idle timeout to 5 minutes:

```
FS(config)# ftp-server timeout 5
```

The following example restores the default setting.

```
FS(config)# no ftp-server timeout
```

Related Commands

Command	Description

N/A	N/A

Platform Description N/A

7.5 Ftp-server Topdir

Use this command to set the directory range for the FTP client to access to the FTP server files. Use the **no** or **default** form of this command to restore the default setting.

ftp-server topdir *directory*

no ftp-server topdir

default ftp-server topdir

Parameter Description

Parameter	Description
directory	Sets the top-directory.

Defaults No top-directory is configured by default.

Command Mode Global configuration mode.

Usage Guide The FTP server top directory specifies the directory range of the files accessed by the client. Can the FTP client accesses to the files on the FTP server with the top directory correctly specified.

Without this command configured, FTP client fails to access to any file or directory on the FTP server.

Configuration Examples The following example enables the FTP Server and confines the FTP client access to the syslog subdirectory.

```
FS(config)# ftp-server topdir /syslog
FS(config)# ftp-server enable
```

The following example restores the default setting.

```
FS(config)# no ftp-server topdir
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.6 Ftp-server Username Password

Use this command to set the login username and password for the FTP server. Use the **no** form of this command to restore the default setting.

ftp-server username *username* **password** [*type*] *password*

no ftp-server username *username*

default ftp-server username *username*

Parameter Description

Parameter	Description
username	Sets the login username.
password	Sets the log password

Defaults

No username or password is set by default.

Command Mode

Global configuration mode

Usage Guide

Use this command to set the login username for the FTP server. To log in to the FTP server, the correct username and password shall be provided.

The maximum length of the username is 64 characters and the spaces are not allowed in the middle of the username. The username consists of letters, semiangle number and semiangle mark. Ten usernames can be configured for the FTP server at most.

The password must contain letters or numbers. Spaces before or behind the password are allowed but will be ignored. The spaces within are part of the password.

The plaintext password is in the range from 1 to 25 characters. The encrypted password is in the range from 4 to 52 characters.

The anonymous user login is not supported on the FTP server. The client fails to pass the identity verification if the username is removed.

Configuration Examples

The following example sets the username to user:

```
FS(config)# ftp-server username user password pass
```

The following example restores the default setting:

```
FS(config)# no ftp-server username user
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.7 Show Ftp-server

Use this command to show the status information of the FTP server.

show ftp-server

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

The FTP server status information includes:

- Enabled/Disabled server
- The FTP server top directory
- The FTP server user information, including username, password and connection number. If connection is set up, the IP address, port, transmission type, active/passive mode is shown

Configuration Examples

The following example displays the related status information of the FTP server:

```
FS#show ftp-server
ftp-server information
==================================
enable : Y
topdir : tmp:/
timeout: 10min
username:aaaa          password:(PLAINT)bbbb          connect num[2]
[0]trans-type:BINARY (ctrl)server IP:192.168.21.100[21]
client IP:192.168.21.26[3927]
[1]trans-type:ASCII (ctrl)server IP:192.168.21.100[21]
client IP:192.168.21.26[3929]
username:a1            password:(PLAINT)bbbb          connect num[0]
username:a2            password:(PLAINT)bbbb          connect num[0]
username:a3            password:(PLAINT)bbbb          connect num[0]
username:a4            password:(PLAINT)bbbb          connect num[0]
username:a5            password:(PLAINT)bbbb          connect num[0]
username:a6            password:(PLAINT)bbbb          connect num[0]
username:a7            password:(PLAINT)bbbb          connect num[0]
```

```
username:a8          password:(PLAINT)bbbb          connect num[0]
username:a9          password:(PLAINT)bbbb          connect num[0]
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8. FTP CLIENT Commands

8.1 Copy Flash

Use this command to upload the file from the server to the device through FTP Client.

copy flash:[*local-directory/*] *local-file* **ftp:**//*username*:*password@dest-address* [/*remote-directory*] / *remote-file*

Parameter Description

Parameter	Description
username	The username for logging into FTP Server. It is limited to 40 bytes and must not contain ":", "@", "/" and space, neither can it be omitted.
password	The password for logging into FTP Server. It is limited to 32 bytes and must not contain ":", "@", "/" and space, neither can it be omitted.
dest-address	IP address of the target FTP Server.
remote-directory	File directory of FTP Server. It is optional and limited to 255 bytes. No space or Chinese character is supported. If left blank, it implies the current directory of FTP server.
remote-file	Filename on the remote server. It is limited to 255 bytes and doesn't support space or Chinese character.
local-directory	Directory of local folder (optional). If this directory is specified, this directory must have been created beforehand. This command doesn't support automatic directory creation. If left blank, it implies the current directory on the local device. It is limited to 255 bytes and doesn't support space or Chinese characters.
local-file	Filename on the local device. It is limited to 255 bytes and doesn't support space or Chinese character.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example uploads the file named "local-file" in directory "home" of local device to directory "root" on the FTP Server whose user name is user, password is pass and IP address is 192.168.23.69, and changes the

filename to "remote-file".

```
FS# copy flash:home/local-file ftp://user:pass@192.168.23.69/root/remote-file
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

8.2 Copy Ftp

Use this command to download the file from the server to the device through FTP Client.

copy ftp://*username:password@dest-address* [/*remote-directory*] / *remote-file* **flash:**[*local-directory/*] *local-file*]

Parameter Description

Parameter	Description
username	The username for logging into FTP Server. It is limited to 40 bytes and must not contain ":", "@", "/" and space, neither can it be omitted.
password	The password for logging into FTP Server. It is limited to 32 bytes and must not contain ":", "@", "/" and space, neither can it be omitted.
dest-address	IP address of the target FTP Server.
remote-directory	File directory of FTP Server. It is optional and limited to 255 bytes. No space or Chinese character is supported. If left blank, it implies the current directory of FTP server.
remote-file	Filename on the remote server. It is limited to 255 bytes and doesn't support space or Chinese character.
local-directory	Directory of local folder (optional). If this directory is specified, this directory must have been created beforehand. This command doesn't support automatic directory creation. If left blank, it implies the current directory on the local device. It is limited to 255 bytes and doesn't support space or Chinese characters.
local-file	Filename on the local device. It is limited to 255 bytes and doesn't support space or Chinese character.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples

The following example uses username of "user" and password of "pass" to download a file named "remote-file" from the directory "root" on FTP Server with IP address 192.168.23.69 to directory "home" on the local device, and changes the name to "local-file".

```
FS# copy ftp://user:pass@192.168.23.69/root/remote-file flash:home/local-file
```

The following example uploads a file named “local-file” from directory “home” on the local device to directory “root” on FTP Server, and changes the name to “remote-file”.

```
FS# copy flash:home/local-file ftp://user:pass@192.168.23.69/root/remote-file
```

Related Commands

Command	Description
copy tftp	Uses the TFTP protocol to transfer files.

Platform Description

N/A

8.3 Ftp-client Ascii

Use this command to use ASCII mode for FTP transfer.

Use the **no** or **default** form of this command to restore the default setting.

ftp-client [vrf vrf-name] **ascii**

no ftp-client [vrf vrf-name] **ascii**

default ftp-client [vrf vrf-name]

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The default FTP transfer mode is binary.

Command Mode

Global configuration mode

Usage Guide

The **default** command is used to restore the FTP client setting. Specifically, data connection is in PASV mode and file transfer BINARY. The client source IP address is not bound.

Configuration Examples

The following example configures ASCII FTP transfer.

```
FS (config)# ftp-client ascii
```

The following example configure vrf-name to use text (ASCII) for FTP transfer.

```
FS(config)# ftp-client vrf vrf-name ascii
```

The following example configures binary FTP transfer.

```
FS(config)# no ftp-client ascii
```

The following example configure vrf-name to use BINARY for FTP transfer.

```
FS(config)# no ftp-client vrf vrf-name ascii
```

The following example restores the default setting of the FTP Client.

```
FS(config)# default ftp-client
```

The following example restore the default configuration on FTP Client vrf-name.

```
FS(config)# default ftp-client vrf vrf-name
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.4 Ftp-client Port

Use this command to configure PORT mode used for FTP data connection. Use the **no** or **default** form of this command to restore the default setting.

ftp-client [vrf vrf-name **] port**

no ftp-client [vrf vrf-name] **port**

default ftp-client [vrf vrf-name]

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The default is PASV mode for FTP data connection.

Command Mode

Global configuration mode.

Usage Guide

This command is used to configure the connection mode to PORT mode, in which the server will actively connect with the client.

The **default** command is used to restore the FTP client setting. Specifically, data connection is in PASV mode and file transfer BINARY. The client source IP address is not bound.

Configuration Examples

The following example configures PORT mode used for FTP data connection

```
FS (config)# ftp-client port
```

The following example configure FTPvrf-name to use active (PORT) mode for data connection.

```
FS(config)# ftp-client vrf vrf-name port
```

The following example configures PASV mode for FTP data connection.

```
FS(config)# no ftp-client port
```

The following example configure the FTP vrf-name connection as passive (PASV) mode.

```
FS(config)# no ftp-client vrf vrf-name port
```

The following example restores the default setting of the FTP Client.

```
FS(config)# default ftp-client
```

The following example restore the default configuration on FTP Client vrf-name.

```
FS(config)# default ftp-client vrf vrf-name
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.5 Ftp-client Source-address

Use this command to bind FTP Client with the source IP address of client and use this IP address to communicate with server. Use the **no** form of this command to disable source IP address binding. Use the **default** form of this command to restore the default setting.

ftp-client [vrf vrf-name]**source-address** {*ip-address* | *ipv6-address*}

no ftp-client [vrf vrf-name]**source-address**

default ftp-client [vrf vrf-name]

Parameter Description

Parameter	Description
N/A	N/A

Defaults

By default, the IP address is not bound with the client locally. Instead, it is selected by the route.

Command Mode

Global configuration mode

Usage Guide

The **default** command is used to restore the FTP client setting. Specifically, data connection is in PASV mode and file transfer BINARY. The client source IP address is not bound.

Configuration Examples

The following example binds FTP Client with source IP address 192.168.23.236.

```
FS(config)# ftp-client source-address 192.168.23.236
```

The following example binds FTP Client with source IP address 2003:0:0:0::2.

```
FS(config)# ftp-client source-address 2003:0:0:0::2
```

The following example configure FTP Client vrf-name to bind the source IP of the client to the address 192.168.23.236.

```
FS(config)# ftp-client vrf vrf-name source-address 192.168.23.236
```

The following example configure FTP Client vrf-name to bind the source IP of the client to 2003:0:0:0::2 address.

```
FS(config)# ftp-client vrf vrf-name source-address 2003:0:0:0::2
```

The following example disables source IP address binding.

```
FS(config)# no ftp-client source-address
```

The no command cancels the binding of the client source IP address.

```
FS(config)# no ftp-client vrf vrf-name source-address
```

The following example restores the default setting of the FTP Client.

```
FS(config)# default ftp-client
```

The following example restore the default configuration on FTP Client vrf-name.

```
FS(config)# default ftp-client vrf vrf-name
```

Related Commands

Command	Description
N/A	N/A

Platform

N/A

Description

9. TFTP Server Commands

9.1 Tftp-server Enable

Use this command to enable the TFTP server.

Use the **no** form of this command to disable the TFTP server.

tftp-server enable

no tftp-server enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The TFTP server is disabled by default.

Command Modes

Global configuration mode

Usage Guide

Only with the TFTP server enabled and the top directory configured meanwhile, TFTP clients are able to upload or download files.

Configuration Examples

The following example enables the TFTP server and sets the top directory of the TFTP server to **/syslog**.

```
FS(config)# tftp-server topdir /syslog
FS(config)# tftp-server enable
```

The following example disables the TFTP server.

```
FS(config)# no tftp-server enable
```

Platform Description

N/A

9.2 Tftp-server Topdir

Use this command to configure the top directory for TFTP clients.

Use the **no** or **default** form of this command to restore the default setting.

tftp-server topdir *directory*

no tftp-server topdir

default tftp-server topdir

Parameter Description

Parameter	Description
directory	The top directory for TFTP clients to access. "/" means the root directory.

Defaults

By default, the top directory is **/flash**.

Command

Global configuration mode

Modes

Usage Guide

The top directory on the TFTP server defines what files and folders the client is able to access. And the client cannot access the TFTP server before a top directory is correctly configured for the server.

Configuration Examples

The following example enables the TFTP servicer and sets the top directory for TFTP clients to **/syslog**.

```
FS(config)# tftp-server topdir /syslog
FS(config)# tftp-server enable
```

The following example restores the default top directory.

```
FS(config)# no tftp-server topdir
```

Platform Description

N/A

10. TUNNEL

10.1 Show interfaces tunnel

Display the configuration summary of the tunnel. Use the following command.

show interfaces tunnel [*number*]

Parameter Description

Parameter	Description
number	Display the overview of the tunnel corresponding to the specified number. If this parameter is not specified, the overview of all tunnels will be displayed. Note that if a number is specified, the tunnel requirement corresponding to the number has already been created.

Command Modes

Privileged mode, global mode, interface mode

Defaults

2

Usage Guide

Through this command, you can view all information related to a tunnel.

Configuration Examples

View detailed information of tunnel 1

```
FS#show interfaces tunnel 1
Tunnel source 1.1.1.2, destination 1.1.1.1, routeable
  Tunnel TOS/Traffic Class not set, Tunnel TTL 254
  Tunnel config nested limit is 0, current nested number is 0
  Tunnel protocol/transport is ipv6ip
  Tunnel transport VPN is no set
```

Field	Description
Destination	The destination of the tunnel, when 0.0.0.0 means no configuration.
Tunnel source	The local address of the tunnel can be either an IPv4 address or an IPv6 address. If the configuration is a tunnel source interface, then the address on the interface is taken.
Tunnel TTL	TTL or hoplimit field corresponding to the transmission protocol.
Tunnel TOS	Corresponding to the TOS or traffic class field of the transmission protocol. Special case: If it is 0, and the transmission protocol and the payload protocol are the same, generally copy the corresponding fields of the payload protocol to the transmission protocol.
Tunnel nested-limi	The number of times of nested encapsulation of tunnels is limited, 6to4, isatap tunnels are not displayed, other

	tunnels will display this field.
Tunnel protocol/transport	The encapsulation mode of the tunnel, that is, the mode configured in the tunnel mode.
Key	Set the key for the security key of the tunnel. This field will be displayed only for the gre tunnel, and not for other tunnels.
Checksuming	If checksum is configured, this field will be displayed for gre tunnels, and not for other tunnels.
Tunnel VPN	The vrf to which the tunnel packet is delivered, that is, the vrf configured by tunnel vrf

10.2 Show tunnel statistics

Display the configurable capacity and the number of used tunnels.

show tunnel statistics

Parameter Description

Parameter	Description
N/A	N/A

Command Modes

Privileged mode, global mode, interface mode

Defaults

2

Usage Guide

Through this command, you can view the information of the configured and configurable tunnel ports of the tunnel. Note that for the switch platform, the actual forwarding capability is also limited by the number of chip table entries. It may happen that the tunnel port is successfully created but the actual chip table entries are full. Generally, there will be a syslog prompt in this case.

Configuration Examples

View the information about the configured number of tunnel ports.

```
FS#show tunnel statistics
used: 2,    limit: 1000
```

10.3 Tunnel destination

Set the peer address of the tunnel interface.Delete the peer address.

tunnel destination *ip-address*

no tunnel destination

Parameter Description

Parameter	Description
ip-address	The IP address of the peer, which can be an IPv4 address or an IPv6 address

Defaults The peer address is not configured.

Command Modes Interface mode

Defaults 2

Usage Guide The peer addresses of the three tunnels tunnel mode ipv6ip, tunnel mode ipip, and tunnel mode gre ip need to be configured as IPv4 addresses. The peer addresses of tunnel mode ipv6 and tunnel mode gre ipv6 need to be configured as IPv6 addresses.

Configuration Examples Create a tunnel interface.

```
FS(config)# interface tunnel 1
```

Set the tunnel mode.

```
FS(config-if)# tunnel mode gre ip
```

Set the tunnel peer address.

```
FS(config-if)# tunnel destination 1.1.1.1
```

10.4 Tunnel mode

Modify the tunnel encapsulation mode.Restore the tunnel encapsulation mode. Restore the default configuration.

tunnel mode { **gre** {**ip | ipv6**} | **ipv6 | ipip | ipv6ip** [**6to4 | isatap**] }

no tunnel mode

default tunnel mode

Parameter Description

Parameter	Description
gre ip	The transmission network is an IPv4 network, using GRE encapsulation.
gre ipv6	The transmission network is an IPv6 network, using GRE encapsulation.
ipv6	The transmission network is an IPv6 network and does not use GRE encapsulation.
ipip	The transmission network is an IPv4 network, without GRE encapsulation, and the user network is an IPv4 network.
ipv6ip	The transmission network is an IPv4 network, without GRE encapsulation, and the user network is an IPv6 network.
ipv6ip 6to4	For manual tunnels, the peer IPv4 address needs to be configured.
ipv6ip isatap	The transmission network is an IPv4 network, without GRE encapsulation, and the user network is an IPv6 network.

Defaults The switch is ipv6ip.

Command Modes Interface mode

Defaults 2

Usage Guide The encapsulation mode of the tunnel is the bearer protocol of the tunnel. Users can set the encapsulation mode of the Tunnel interface according to the actual usage.

Configuration Examples

Create a tunnel interface

```
FS(config)# interface tunnel 1
```

Set tunnel mode

```
FS(config-if-Tunnel 1)# tunnel mode ipv6ip
```

10.5 Tunnel source

Configure the source address of the tunnel interface.Delete the source address of the tunnel interface.

tunnel source { *ip-address* | *interface-type interface-number* }

no tunnel source

Parameter Description

Parameter	Description
ip-address	Used to specify the local address of the tunnel, which can be an ipv4 address or an ipv6 address.
interface-type	Common interface types, such as: asynchronous serial interface Async, dialer interface, Ethernet interface Ethernet, fast Ethernet interface FastEthernet, Loopback interface, Null interface, and other tunnel interfaces.
interface-number	Interface number

Defaults The local address is not configured.

Command Modes Interface mode

Defaults 2

Usage Guide

Each type of tunnel needs to configure the local address.

When specifying the local address as the address of an interface, select the primary IP address of this interface or the first IPv6 global unicast address according to the tunnel mode. If there is no global unicast address, select the link local address.

Two automatic tunnels cannot be configured with the same local address.

Configuration Examples

Create a tunnel interface

```
FS(config)# interface tunnel 1
```

Set the tunnel mode

```
FS(config-if)# tunnel mode ipv6ip
```

Configure the local address of the tunnel

```
FS(config-if)# tunnel source 1.1.1.1
```

10.6 Tunnel tos

Configure the ToS byte of the outer transport protocol IPv4, or 8 bits of the traffic class of IPv6.Cancel configuration.

tunnel tos *number*

no tunnel tos

Parameter Description

Parameter	Description
number	The value of the ToS byte of the outer transport protocol IPv4, or the 8-bit value of the traffic class of IPv6. The value range is 0 to 255.

Defaults

If the inner bearer and outer encapsulation of the tunnel are both IPv4 protocols, the tos byte of the inner IPv4 header is copied to the outer IPv4 header by default. If the inner bearer and outer encapsulation of the tunnel are both IPv6 protocols, the traffic class 8 bits of the inner IPv6 header are copied to the outer IPv6 header by default. In other cases, the outer IPv4 tos / IPv6 traffic class is 0.

Command Modes

Interface mode

Defaults

2

Usage Guide

If you want the packet priority of the tunnel to be higher, you can use the tunnel tos command to set it.

Configuration Examples

Create a tunnel interface

```
FS(config)# interface tunnel 1
```

Set the tunnel mode

```
FS(config-if)# tunnel mode ipv6ip
```

Configure the tunnel tos

```
FS(config-if)# tunnel tos 100
```

10.7 Tunnel ttl

Configure the ttl value of the tunnel interface.Restore the default configuration.

tunnel ttl *hop-count*

no tunnel ttl

Parameter Description

Parameter	Description
hop-count	Used to specify the ttl value of the tunnel interface. The range is 1~255, and the default is 254.

Defaults

254。

Command Modes

Interface mode

Defaults 2

Usage Guide Since the Tunnel is a point-to-point link, it appears that there is only one hop when routing for the load protocol, but in fact the routing cost of the transmission protocol may be more than one hop. FS products allow the TTL of the tunnel to be set, that is, the TTL value of the transmission protocol header in the encapsulated packet sent by the tunnel. The router at the intermediate node of the tunnel will decrement the TTL value in the transport protocol header and discard the packets with a TTL of 0.

Configuration Examples

Create a tunnel interface

```
FS(config)# interface tunnel 1
```

Set the tunnel mode

```
FS(config-if)# tunnel mode ipv6ip
```

Configure the tunnel ttl

```
FS(config-if)# tunnel ttl 100
```

11. Network Connectivity Test Tool Commands

11.1 Clear Rping Table All

Use this command to clear Rping entries.

clear rping table [**all** | [**ping-object** *owner test-name*] | [**trace-object** *owner test-name*]]

Parameter Description

Parameter	Description
owner	User index
test-name	Test index

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example clears all Rping entries.

```
FS# clear rping table all
```

The following example clears the specified Rping entry.

```
FS# clear rping table user fs
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.2 Ping

Use this command to test the connectivity of a network to locate the network connectivity problem. The command format is as follows:

ping [oob | vrf vrf-name | **ip**] [*address* [**length** *length*] [**ntimes** *times*] [**timeout** *seconds*] [**data** *data*] [**source** *source*] [**df-bit**] [**validate**] [**detail**]] [**interval** *millisecond*]]

Parameter Description

Parameter	Description
oob	Set to use out-of-band channels. When the MGMT port is designated as the source interface, this parameter must be set. Only supported on devices that support MGMT.
vrf-name	VRF name.

	Only supported on devices that support VRF.
address	Specifies an IPv4 address.
length	Specifies the length of the packet to be sent (range: 36-18024, default: 100).
times	Specifies the number of packets to be sent (range:1- 4294967295).
seconds	Specifies the timeout time (range: 1-10 seconds).
data	Specifies the data to fill in.
source	Specifies the source IPv4 address or the source interface. The loopback interface address (for example: 127.0.0.1) is not allowed to be the source address.
df-bit	Sets the DF bit for the IP address. DF bit=1 indicates not to segment the datagrams. By default, the DF bit is 0.
validate	Sets whether to validate the reply packets or not.
detail	Sets whether to contain details in the echoed message. By default, only "!" and "." are displayed.
millisecond	Specifies the ping interval, in the range from 10 to 300000 milliseconds. Default: 100 milliseconds.

Defaults Five packets with 100Byte in length are sent to the specified IP address within specified time (2s by default).

Command Mode Privileged EXEC mode.

Usage Guide If the device can be pinged, the response information is displayed, and the statistics is listed at the end. For the extension functions of ping, the number, quantity and timeout time of the packets to be sent can be specified, and the statistics is also displayed in the end. To use the domain name function, configure the domain name server firstly. For the concrete configuration, refer to the DNS Configuration section.

Configuration Examples The following example tests the connectivity of a network to locate the network connectivity problem.

```
(regular ping).FS# ping 192.168.21.26
Sending 5, 100-byte ICMP Echoes to 192.168.21.26, timeout is 2 seconds:
  < press Ctrl+C to break >
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/10 ms
```

The following example displays details.

```
FS#ping 192.168.21.26 detail
*Apr 16 09:16:08: %PING-7-DEBUG: Ping vrf index -1.
Sending 5, 100-byte ICMP Echoes to 192.168.21.26, timeout is 2 seconds:
  < press Ctrl+C to break >
Reply from 192.168.21.26: bytes=100 time=4ms TTL=64
```

```
Reply from 192.168.21.26: bytes=100 time=3ms TTL=64
Reply from 192.168.21.26: bytes=100 time=1ms TTL=64
Reply from 192.168.21.26: bytes=100 time=1ms TTL=64
Reply from 192.168.21.26: bytes=100 time=1ms TTL=64
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms.2
```

The following example tests the connectivity of a network to locate the network connectivity problem (extension ping).

```
FS# ping 192.168.21.26 length 1500 ntimes 100 data ffff source 192.168.21.99 timeout 3
Sending 100, 1500-byte ICMP Echoes to 192.168.21.26, timeout is 3 seconds:
   < press Ctrl+C to break >
!!!
```

Platform Description N/A

11.3 Ping Ipv6

Use this command to test the connectivity of a network to locate the network connectivity problem. The command format is as follows:

ping [vrf vrf-name | [oob] **ipv6**] [*ip-address* [**length** *length*] [**ntimes** *times*] [**timeout** *seconds*] [**data** *data*] [**source** *source*] [**detail**] [**interval** *millisecond*]]

Parameter Description

Parameter	Description
oob	Set to use out-of-band channels. When the MGMT port is designated as the source interface, this parameter must be set. Only supported on devices that support MGMT.
vrf-name	VRF name. Only supported on devices that support VRF.
Ip-address	Specifies an IPv6 address.
length	Specifies the length of the packet to be sent (range: 36-18024, default: 100).
times	Specifies the number of packets to be sent (range:1-4294967295).
seconds	Specifies the timeout time (range: 1-10 seconds).
data	Specifies the data to fill in.
source	Specifies the source IPv6 address or the source interface. The loopback interface address (for example: 127.0.0.1) is not allowed to be the source address.
detail	Sets whether to contain details in the echoed message. By default, only "!" and "." are displayed.
millisecond	Specifies the ping interval, in the range from 10 to 300000 milliseconds. Default: 100 milliseconds.

Defaults Five packets with 100Byte in length are sent to the specified IP address within specified time 2 seconds by default

Command Mode Privileged EXEC mode.

Usage Guide If the device can be pinged, the response information is displayed, and the statistics is listed at the end. If the response data does not match the request data, a 'Request receive error.' message is displayed and the statistics is listed in the end. For the extension functions of ping ipv6, the number, quantity and timeout time of the packets to be sent can be specified, and the statistics is also displayed in the end. To use the domain name function, configure the domain name server firstly. For the concrete configuration, refer to the DNS Configuration section.

Configuration Examples The following example tests the connectivity of a network to locate the network connectivity problem.

```
(regular ping) FS# ping ipv6 2001::5
Sending 5, 100-byte ICMP Echoes to 2001::5, timeout is 2 seconds:
```

```
< press Ctrl+C to break >
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/10 ms
```

The following example displays details.

```
FS#ping 2001::1 detail
Sending 5, 100-byte ICMP Echoes to 2001::1, timeout is 2 seconds:
   < press Ctrl+C to break >
Reply from 2001::1: bytes=100 time=1ms
Reply from 2001::1: bytes=100 time=1ms
Reply from 2001::1: bytes=100 time=1ms
Reply from 2001::1: bytes=100 time=1ms
Reply from 2001::1: bytes=100 time=1ms

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms.
```

The following example tests the connectivity of a network to locate the network connectivity problem (extension ping).

```
FS# ping ipv6 2001::5    length 1500 ntimes 100 data ffff source 2001::9 timeout 3
Sending 100, 1500-byte ICMP Echoes to 2000::1, timeout is 3 seconds:
   < press Ctrl+C to break >
!!!!!
```

11.4 Show Rping Detail

Use this command to display Rping information.

show rping detail

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide This command is used to display the Rping information such as numbers of test accounts and users.

Configuration Examples The following example displays Rping information.

```
FS#show rping detail
Total owner number: 2
Total test number: 4
owner: user1
    test name: taget_1          storage type: volatile
test name: taget_2          storage type: nonVolatile
owner: user2
    test name: taget_1          storage type: permanent
test name: taget_2          storage type: readOnly
```

Field	Description
Total owner number	The number of users
Total test number	The number of Rping accounts
owner	Username
test name	Test name
storage type	Storage type

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.5 Traceroute

Use this command to display all gateways passed by the test packets from the source address to the destination address.

traceroute [oob | vrf vrf-name | **ip**] [*address* [**probe** *number*] [**source** *source*] [**timeout** *seconds*] [**ttl** *minimum maximum*]]

Parameter Description

Parameter	Description
oob	Set to use out-of-band channels. When the MGMT port is designated as the source interface, this parameter must be set. Only supported on devices that support MGMT.
vrf-name	VRF name. Only supported on devices that support VRF.
address	Specifies an IPv4 address.
number	Specifies the number of probe packets to be sent (range: 1-255).
source	Specifies the source IPv4 address or the source interface. The loopback interface address (for example: 127.0.0.1) is not allowed to be the source address.
seconds	Specifies the timeout time (range: 1-10 seconds).
minimum maximum	Specifies the minimum and maximum TTL values (range:1-255).

Defaults

By default, *seconds* is 3 seconds, *number* is 3, *minimum* and *maximum* are 1 and 255.

Command Mode

Privileged EXEC mode: enables extended functions.

User EXEC mode: enables basic functions.

Usage Guide

Use the **traceroute** command to test the connectivity of a network to exactly locate the network connectivity problem when the network failure occurs. To use the function domain name, configure the domain name server. For the concrete configuration, refer to the DNS Configuration part.

Configuration Examples

The following is two examples of the application bout traceroute, the one is of the smooth network, and the other is the network in which some gateways aren't connected successfully.

1. When the network is connected smoothly:

```
FS# traceroute 61.154.22.36
  < press Ctrl+C to break >
Tracing the route to 61.154.22.36

1        192.168.12.1        0 msec    0 msec    0 msec
2        192.168.9.2     4 msec    4 msec    4 msec
3        192.168.9.1         8 msec    8 msec    4 msec
4         192.168.0.10       4 msec    28 msec   12 msec
5         192.168.9.2        4 msec    4 msec    4 msec
6         202.101.143.154    12 msec   8 msec    24 msec
```

```
7          61.154.22.36          12 msec    8 msec      22 msec
```

From above result, it's clear to know that the gateways passed by the packets sent to the host with an IP address of 61.154.22.36 (gateways 1~6) and the spent time are displayed. Such information is helpful for network analysis.

2. When some gateways in the network fail:

```
FS# traceroute 202.108.37.42
  < press Ctrl+C to break >
Tracing the route to 202.108.37.42

1          192.168.12.1          0 msec       0 msec    0 msec
2          192.168.9.2           0 msec       4 msec    4 msec
3          192.168.110.1         16 msec    12 msec    16 msec
4          *    *    *
5          61.154.8.129          12 msec      28 msec    12 msec
6          61.154.8.17           8 msec       12 msec    16 msec
7          61.154.8.250          12 msec      12 msec    12 msec
8          218.85.157.222        12 msec      12 msec    12 msec
9            218.85.157.130      16 msec      16 msec    16 msec
10           218.85.157.77       16 msec      48 msec    16 msec
11           202.97.40.65        76 msec      24 msec    24 msec
12           202.97.37.65        32 msec      24 msec    24 msec
13           202.97.38.162       52 msec      52 msec    224 msec
14           202.96.12.38        84 msec      52 msec    52 msec
15           202.106.192.226     88 msec      52 msec    52 msec
16           202.106.192.174     52 msec      52 msec    88 msec
17           210.74.176.158      100 msec     52 msec    84 msec
18           202.108.37.42       48 msec      48 msec    52 msec
```

The above result clearly shown that the gateways passed by the packets sent to the host with an IP address of 202.108.37.42 (gateways 1~17) and the spent time are displayed, and gateway 4 fails.

```
FS# traceroute www.ietf.org
Translating "www.ietf.org"...[OK]
  < press Ctrl+C to break >
Tracing the route to 64.170.98.32

 1          192.168.217.1         0 msec    0 msec    0 msec
 2          10.10.25.1            0 msec    0 msec    0 msec
 3          10.10.24.1            0 msec    0 msec    0 msec
 4          10.10.30.1            10 msec 0 msec    0 msec
 5          218.5.3.254           0 msec    0 msec    0 msec
 6          61.154.8.49           10 msec 0 msec    0 msec
 7          202.109.204.210       0 msec    0 msec    0 msec
 8          202.97.41.69          20 msec 10 msec 20 msec
 9          202.97.34.65          40 msec 40 msec 50 msec
 10         202.97.57.222         50 msec 40 msec 40 msec
 11         219.141.130.122       40 msec 50 msec 40 msec
```

```
12      219.142.11.10      40 msec 50 msec 30 msec
13      211.157.37.14      50 msec 40 msec 50 msec
14      222.35.65.1        40 msec 50 msec 40 msec
15      222.35.65.18       40 msec 40 msec 40 msec
16      222.35.15.109      50 msec 50 msec 50 msec
17      *          *          *
18      64.170.98.32     40 msec 40 msec 40 msec
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.6 Traceroute Ipv6

Use this command to display all gateways passed by the test packets from the source address to the destination address.

traceroute [vrf vrf-name | [oob] **ipv6**] [*address* [**probe** *number*] [**timeout** *seconds*] [**ttl** *minimum maximum*]]

Parameter Description

Parameter	Description
oob	Set to use out-of-band channels. When the MGMT port is designated as the source interface, this parameter must be set. Only supported on devices that support MGMT.
vrf-name	VRF name. Only supported on devices that support VRF.
address	Specifies an IPv6 address.
number	Specifies the number of probe packets to be sent.
seconds	Specifies the timeout time.
minimum maximum	Specifies the minimum and maximum TTL values.

Defaults By default, *seconds* is 3 seconds, *number* is 3, *minimum* and *maximum* are 1 and 255.

Command Mode Privileged EXEC mode: enables extended functions.
User EXEC mode: enables basic functions.

Usage Guide Use the **traceroute ipv6** command to test the connectivity of a network to exactly locate the network connectivity problem when the network failure occurs. To use the function domain name, configure the domain name server. For the concrete configuration, refer to the DNS Configuration part.

Configuration Examples The following is two examples of the application bout traceroute ipv6, the one is of the smooth network, and the other is the network in which some gateways aren't connected successfully.

1. When the network is connected smoothly:

```
FS# traceroute ipv6 3004::1
  < press Ctrl+C to break >
Tracing the route to 3004::1
1        3000::1          0 msec   0 msec   0 msec
2        3001::1          4 msec   4 msec 4 msec
3        3002::1          8 msec   8 msec   4 msec
4        3004::1          4 msec   28 msec   12 msec
```

From above result, it's clear to know that the gateways passed by the packets sent to the host with an IP address of 3004::1 (gateways 1~4) and the spent time are displayed. Such information is helpful for network analysis.

2. When some gateways in the network fail:

```
FS# traceroute ipv6 3004::1
 < press Ctrl+C to break >
Tracing the route to 3004::1
1        3000::1          0 msec   0 msec   0 msec
2        3001::1          4 msec   4 msec 4 msec
3        3002::1          8 msec   8 msec   4 msec
4        * * *
5        3004::1          4 msec   28 msec   12 msec
```

The above result clearly shown that the gateways passed by the packets sent to the host with an IP address of 3004::1 (gateways 1~5) and the spent time are displayed, and gateway 4 fails.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

12. TCP Commands

12.1 Ip Tcp Keepalive

Use this command to enable the TCP keepalive function. Use the **no** form of this command to restore the default setting,

ip tcp keepalive [**interval** *num1*] [**times** *num2*] [**idle-period** *num3*]

Parameter Description

Parameter	Description
interval *num1*	The interval of sending the keepalive packet, in the range from1 to 120 in the unit of seconds, The default is 75.
times *num2*	Keepalive packet sending times, in the range from 1 to 10. The default is 6.
idle-period *num3*	Idle time, the time period during which the peer end does not send any packet to the local end, in the range from 60 to 1800 in the unit of seconds. The default is 900.

Defaults The function is disabled by default.

Command Mode Global configuration mode

Usage Guide The keepalive function enables TCP to detect whether the peer end is operating properly.

Suppose the keepalive function is enabled together with default **interval**, **times** and **idle-period** settings. TCP begins to send the keepalive packet at an interval of 75 seconds if it does not receive any packet from the peer end in 900 seconds. The TCP connection is considered invalid and then disconnected automatically if the device sends the keepalive packet for six consecutive times without receiving any TCP packet from the peer end. This command applies to both IPv4 and IPv6 TCP.

Configuration Examples The following example enables the TCP keepalive function on the device and sets the **idle-period** and **interval** to180 and 60 respectively. If the device sends the keepalive packet for four consecutive times without receiving any TCP packet from the peer end, the TCP connection is considered invalid.

```
FS(config)# ip tcp keepalive interval 60 times 4 idle-period 180
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.2 Ip Tcp Mss

Use this command to set the upper limit of the MSS value. Use the **no** form of this command to restore the default setting.

ip tcp mss *max-segment-size*

no ip tcp mss

Parameter Description

Parameter	Description
max-segment-size	Upper limit of the MSS value in the range from 68 to 10,000 bytes

Defaults

The default MSS = Outgoing IPv4/v6 MTU- IPv4/v6 header-TCP header.

Command Mode

Global configuration mode

Usage Guide

This command is used to limit the maximum value of MSS for the TCP connection to be created. The negotiated MSS cannot exceed the configured value. You can use this command to reduce the maximum value of MSS. However, this configuration is not needed in general. This command applies to both IPv4 and IPv6 TCP.

Configuration Examples

The following example sets the upper limit of the MSS value to 1,300 bytes.

```
FS(config)# ip tcp mss 1300
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

12.3 Ip Tcp Path-mtu-discovery

Use this command to enable Path Maximum Transmission Unit (PMTU) discovery function for TCP in global configuration mode. Use the **no** form of this command to restore the default setting.

ip tcp path-mtu-discovery [**age-timer** *minutes* **|** **age-timer infinite**]

no ip tcp path-mtu-discovery

Parameter Description

Parameter	Description
age-timer *minutes*	The time interval for further discovery after discovering PMTU. Its value ranges from 10 to 30 minutes. The default value is 10.
age-timer infinite	No further discovery after discovering PMTU

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

Based on RFC1191, the TCP path MTU function improves the network bandwidth utilization and data transmission when the user uses TCP to transmit the data in batch.

Enabling or disabling this function takes no effect for existent TCP connections and is only effective for TCP connections to be created. This command applies to only IPv4 TCP. This function is enabled for IPv6 TCP constantly and cannot be disabled.

According to RFC1191, after discovering the PMTU, the TCP uses a greater MSS to detect the new PMTU at a certain interval, which is specified by the parameter **age-timer**. If the PMTU discovered is smaller than the MSS negotiated between two ends of the TCP connection, the device will be trying to discover the greater PMTU at the specified interval untill the PMTU value reaches the MSS or the user stops this timer. Use the parameter **age-timer infinite** to stop this timer.

Configuration Examples

The following example enables PMTU discovery.

```
FS(config)# ip tcp path-mtu-discovery
```

Related Commands

Command	Description
show tcp pmtu	Shows the PMTU value for the TCP connection.

Platform Description

N/A

12.4 Ip Tcp Send-reset

Use this command to enable the device to send the reset packet when receiving the TCP port unreachable packet. Use the **no** form of this command to disable this function,

ip tcp send-reset

no ip tcp send-reset

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default.

Command Mode

Global configuration mode

Usage Guide

In general, when dispatching the TCP packet, the TCP module replies a reset packet automatically to disconnect the TCP connection with the peer end if the TCP connection that this packet belongs to is not found, However, flooding TCP port unreachable packets pose an attack threat to the device, This command can be used to disable the device from sending the reset packet when receiving the TCP port unreachable packet. This command applies to both IPv4 and IPv6 TCP.

Configuration

The following example disables the device from sending the reset packet when receiving the TCP port

Examples

unreachable packet.

```
FS(config)# no ip tcp send-reset
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

12.5 Ip Tcp Synwait-time

Use this command to set the timeout value for SYN packets (the maximum time from SYN transmission to successful three-way handshake). Use the **no** form of this command to restore the default setting.

ip tcp synwait-time *seconds*

no ip tcp synwait-time *seconds*

Parameter Description

Parameter	Description
seconds	Timeout value for SYN packets in the range from 5 to 300 in the unit of seconds.

Defaults

The default is 20.

Command Mode

Global configuration mode

Usage Guide

If there is an SYN attack in the network, reducing the SYN timeout value can prevent resource consumption, but it takes no effect for successive SYN attacks. When the device actively requests a connection with an external device, reducing the SYN timeout value can shorten the time for the user to wait, such as telnet login. For poor network conditions, the timeout value can be increased properly. This command applies to both IPv4 and IPv6 TCP.

Configuration Examples

The following example set the timeout value for SYN packets to 10 seconds.

```
FS(config)# ip tcp syntime-out 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

12.6 Ip Tcp Window-size

Use this command to change the size of receiving buffer and sending buffer for TCP connections. Use the **no** form of this command to restore the default setting.

ip tcp window-size *size*

no ip tcp window-size

Parameter Description

Parameter	Description
size	Size of receiving buffer and sending buffer for TCP connections in the range from 128 to 65535 << 14 bytes.

Defaults

The default is 65535.

Command Mode

Global configuration mode

Usage Guide

The TCP receiving buffer is used to buffer the data received from the peer end. These data will be subsequently read by application programs. Generally, the window size of TCP packets implies the size of free space in the receiving buffer. For connections involving a large bandwidth and mass data, increasing the size of receiving buffer will remarkably improve TCP transmission performance.

Configuration Examples

The following example sets the TCP window size to 16386 bytes.

```
FS(config)# ip tcp window-size 16386
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

12.7 Service Tcp-keepalives-in

Use this command to enable the keepalive function for the TCP server. Use the no form of this command to restore the default setting.

service tcp-keepalives-in [*interval*] [**garbage**]

no service tcp-keepalives-in

Parameter Description

Parameter	Description
interval	The interval of sending keepalive packets, in the range from 1 to 65535 in the unit of seconds. The default is 60.
garbage	The keepalive packet contains one-byte invalid data. The invalid data is not contained by default.

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide The keepalive function enables the TCP server to detect whether the client is operating properly.
If the TCP server sends the keepalive packet for four consecutive times without receiving any TCP packet from the client, the TCP connection is considered invalid and then is disconnected automatically.

Configuration Examples The following example enables the keepalive function for the TCP server and sets the interval of sending the keepalive packet to 10 seconds. The keepalive packet contains one-byte invalid data.

```
FS(config)# service tcp-keepalives-in 10 garbage
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.8 Service Tcp-keepalives-out

Use this command to enable the keepalive function for the TCP client. Use the **no** form of this command to restore the default setting,

service tcp-keepalives-out [*interval*] [**garbage**]

Parameter Description

Parameter	Description
interval	The interval of sending keepalive packets, in the range from 1 to 65535 in the unit of seconds. The default is 60.
garbage	The keepalive packet contains one-byte invalid data. The invalid data is not contained by default.

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide The keepalive function enables the TCP client to detect whether the server is operating properly.
If the TCP client sends the keepalive packet for four consecutive times without receiving any TCP packet from the server, the TCP connection is considered invalid and then is disconnected automatically.

Configuration Examples

The following example enables the keepalive function for the TCP client and sets the interval of sending the keepalive packet to 10 seconds. The keepalive packet contains one-byte invalid data

```
FS(config)# service tcp-keepalives-out 10 garbage
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

12.9 Show Ipv6 Tcp Connect

Use this command to display the current IPv6 TCP connection information.

show ipv6 tcp connect [**local-ipv6** *X:X:X:X::X*] [**local-port** *num*] [**peer-ipv6** *X:X:X:X::X*] [**peer-port** *num*]

Use this command to display the current IPv6 TCP connection statistics.

show ipv6 tcp connect statistics

Parameter Description

Parameter	Description
local-ipv6 *X:X:X:X::X*	Local IPv6 address
local-port *num*	Local port
peer-ipv6 *X:X:X:X::X*	Peer IPv6 address
peer-port *num*	Peer port
statistics	Displays IPv6 TCP connection statistics

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the current IPv6 TCP connection information.

```
FS#show ipv6 tcp connect
Number Local Address        Foreign Address          State          Process name
1      :::22                :::0                     LISTEN         fs-sshd
2      :::23                :::0                     LISTEN         fs-telnetd
3      1000::1:23           1000::2:64201            ESTABLISHED    fs-telnetd
```

The following example displays the current IPv6 TCP connection statistics.

```
FS#show ipv6 tcp connect statistics
State        Count
-----        -----
```

```
ESTABLISHED 1
SYN_SENT     0
SYN_RECV     0
FIN_WAIT1    0
FIN_WAIT2    0
TIME_WAIT    0
CLOSED       0
CLOSE_WAIT   0
LAST_ACK     0
LISTEN       1
CLOSING      0
Total: 2
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.10 Show Ipv6 Tcp Pmtu

Use this command to display information about IPv6 TCP PMTU.

show ipv6 tcp pmtu [**local-ipv6** *X:X:X:X::X*] [**local-port** *num*] [**peer-ipv6** *X:X:X:X::X*] [**peer-port** *num*]

Parameter Description

Parameter	Description
local-ipv6 *X:X:X:X::X*	Local IPv6 address
local-port *num*	Local port
peer-ipv6 *X:X:X:X::X*	Peer IPv6 address
peer-port *num*	Peer port

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example information about IPv6 TCP PMTU.

```
FS# show ipv6 tcp pmtu
Number    Local Address              Foreign Address          PMTU
1         1000::1:23                 1000::2.13560
```

Field	Description

Number	Number
Local Address	Local address and port number. The number after the last colon is the port number.
Foreign Address	Remote address and port number. The number after the last colon is the port number.
PMTU	Path MTU.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.11 Show Ipv6 Tcp Port

Use this command to display the current IPv6 TCP port status.

show ipv6 tcp port [*num*]

Parameter Description

Parameter	Description
num	Port number

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the current IPv6 TCP port status.

```
FS#show ipv6 tcp port
TCP connections on port 23:
Number    Local Address Foreign Address        State
1             1000::1:23        1000::2:64571            ESTABLISHED
Total: 1

TCP connections on port 2650:
Number    Local Address Foreign Address        State
Total: 0
```

Field	Description
Number	Number
Local Address	Local address and port number.

Foreign Address	Remote address and port number.
State	Current status of the TCP connection. There are eleven possible states: CLOSED: The connection has been closed. LISTEN: Listening state SYNSENT: In the three-way handshake phase when the SYN packet has been sent out. SYNRCVD: In the three-way handshake phase when the SYN packet has been received. ESTABLISHED: The connection has been established. FINWAIT1: The local end has sent the FIN packet. FINWAIT2: The FIN packet sent by the local end has been acknowledged. CLOSEWAIT: The local end has received the FIN packet from the peer end. LASTACK: The local end has received the FIN packet from the peer end, and then sent its own FIN packet. CLOSING: The local end has sent the FIN packet from the peer end, and received the FIN packet from the peer end before the ACK packet for the peer end to respond with this FIN packet is received. TIMEWAIT: The FIN packet sent by the local end has been acknowledged, and the local end has also acknowledged the FIN packet.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.12 Show Tcp Connect

Use this command to display basic information about the current TCP connections.

show tcp connect [**local-ip** *a.b.c.d*] [**local-port** *num*] [**peer-ip** *a.b.c.d*] [**peer-port** *num*]

Use this command to display the current IPv4 TCP connection statistics.

show tcp connect statistics

Parameter Description

Parameter	Description
local-ip *a.b.c.d*	Local IP address.
local-port *num*	Local port.
peer-ip *a.b.c.d*	Peer IP address.
peer-port *num*	Peer port.
statistics	Displays IPv4 TCP connection statistics.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the current IPv4 TCP connection information.

```
FS#show tcp connect
Number Local Address      Foreign Address          State        Process name
1      0.0.0.0:22         0.0.0.0:0                LISTEN       fs-sshd
2      0.0.0.0:23         0.0.0.0:0                LISTEN       fs-telnetd
3      1.1.1.1:23         1.1.1.2:64201            ESTABLISHED fs-telnetd
```

Field	Description
Number	Sequence number.
Local Address	The Local address and port number. The number after the last "." is the port number. For example, in "2002::2.23" and "192.168.195.212.23" , "23" is the port number.
Foreign Address	The remote address and port number. The number after the last "." is the port number. For example, in "2002::2.23" and "192.168.195.212.23" , "23" is the port number.
State	Current status of the TCP connection. There are eleven possible states: CLOSED: The connection has been closed. LISTEN: Listening state SYNSENT: In the three-way handshake phase when the SYN packet has been sent out. SYNRCVD: In the three-way handshake phase when the SYN packet has been received. ESTABLISHED: The connection has been established. FINWAIT1: The local end has sent the FIN packet. FINWAIT2: The FIN packet sent by the local end has been acknowledged. CLOSEWAIT: The local end has received the FIN packet from the peer end. LASTACK: The local end has received the FIN packet from the peer end, and then sent its own FIN packet. CLOSING: The local end has sent the FIN packet from the peer end, and received the FIN packet from the peer end before the ACK packet for the peer end to respond with this FIN packet is received. TIMEWAIT: The FIN packet sent by the local end has been acknowledged, and the local end has also acknowledged the FIN packet.
Process name	Process name.

The following example displays the current IPv4 TCP connection statistics.

```
FS#show tcp connect statistics
```

```
State        Count
-----        -----
ESTABLISHED 1
SYN_SENT     0
SYN_RECV     0
FIN_WAIT1    0
FIN_WAIT2    0
TIME_WAIT    0
CLOSED       0
CLOSE_WAIT   0
LAST_ACK     0
LISTEN       1
CLOSING      0
Total: 2
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

12.13 Show Tcp Parameter

Use this command to show TCP parameters.

show tcp parameter

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example shows TCP parameters.

```
FS#show tcp parameter
Hash table information:
  Established hash bucket size: 16384
  Bind hash bucket size: 16384
```

```
Memory information:
    Global memory limit: low=92160, pressure=122880, high=184320 (unit: pages)
    Per-socket receive buffer size: min=4096, default=87380, max=3932160 (unit: bytes)
    Per-socket send buffer size: min=4096, default=16384, max=3932160 (unit: bytes)
    Current allocated memory: 0
    Current memory pressure flag: 0
SYN specific information:
    Max SYN_RECV sockets per LISTEN socket: 65535
    Max SYN retries: 5
    Max SYN ACK retries: 5
Timewait specific information:
    Max timewait sockets: 180000
    Current timewait sockets: 0
    Timewait recycle: 0
    Reuse timewait port: 0
Keepalive information:
    Keepalive on: 0
    Idle period: 900 seconds
    Interval: 75 seconds
    Max probes: 6
MTU probing:
    Enable mtu probing: 0
FIN specific information:
    FIN_WAIT_2 timeout: 60 seconds
Orphan socket information:
    Max orphans: 16384
    Max orphan retries: 0
Current orphans: 0
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

12.14 Show Tcp Pmtu

Use this command to display information about TCP PMTU.

show tcp pmtu [**local-ip** *a.b.c.d*] [**local-port** *num*] [**peer-ip** *a.b.c.d*] [**peer-port** *num*]

Parameter Description

Parameter	Description
local-ip *a.b.c.d*	Local IP address.

local-port *num*	Local port.
peer-ip *a.b.c.d*	Peer IP address.
peer-port *num*	Peer port.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays PMTU of IPv4 TCP connection.

```
FS# show tcp pmtu
Number    Local Address          Foreign Address          PMTU
1         192.168.195.212.23     192.168.195.112.13560    1440
```

Field	Description
Number	Sequence number.
Local Address	The local address and the port number. The number after the last "." is the port number. For example, in "2002::2.23" and "192.168.195.212.23" , "23" is the port number.
Foreign Address	The remote address and the port number. The number after the last "." is the port number. For example, in "2002::2.23" and "192.168.195.212.23" , "23" is the port number.
PMTU	PMTU value.

Related Commands

Command	Description
ip tcp path-mtu-discovery	Enables the TCP PMTU discovery function.

Platform Description N/A

12.15 Show Tcp Port

Use this command to display information about the current TCP port.

show tcp port [*num*]

Parameter Description

Parameter	Description
num	Port number

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the current IPv4 TCP port status.

```
FS#show tcp port
TCP connections on port 23:
Number    Local Address Foreign Address       State
1             1.1.1.1:23        1.1.1.2:64571        ESTABLISHED
Total: 1

TCP connections on port 2650:
Number    Local Address Foreign Address       State
Total: 0
```

Tcpv6 listen on 23 have total 1 connections.

Field	Description
Foreign Address	Remote address
State	Status of the current TCP connection. There are eleven possible states: CLOSED: The connection has been closed. LISTEN: Listening state SYNSENT: In the three-way handshake phase when the SYN packet has been sent. SYNRCVD: In the three-way handshake phase when the SYN packet has been received. ESTABLISHED: The connection has been established. FINWAIT1: The local end has sent the FIN packet. FINWAIT2: The FIN packet sent by the local end has been acknowledged. CLOSEWAIT: The local end has received the FIN packet from the peer end. LASTACK: The local end has received the FIN packet from the peer end, and then sent its own FIN packet. CLOSING: The local end has sent the FIN packet from the peer end, and received the FIN packet from the peer end before the ACK packet for the peer end to respond with this FIN packet is received. TIMEWAIT: The FIN packet sent by the local end has been acknowledged, and the local end has also acknowledged the FIN packet.

Related Commands

Command	Description
N/A	N/A

Platform N/A

Description

12.16 Show Tcp Statistics

Use this command to show TCP statistics on received packets, three way handshake and time-wait.

show tcp parameter

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example shows TCP parameters.

```
FS#show tcp statistics
TCP Packets
  Received: 1103
  Errors    : 0(checksum: 0)
Three way handshake
  Request queue overflow: 0
  Accept backlog full: 0
  Web authentication limit per user: 0
  Failed to alloc memory for request sock: 0
  Failed to create open request child: 0
  SYN ACK retransmits: 0
  Timeouted requests: 0
Time-wait
  Time-wait bucket table overflow: 0
```

Field Description

Field	Description
TCP Packets	Normal packets and error packets
Three way handshake	Three way handshake information, including session request count, server-client connection count, three way handshake failure count caused by Web authentication limit, TCP socket failure count caused by memory shortage, sub-session failure count, packet retransmission count and session failure count caused by retransmission timeout.
Time-wait	Session in TIMEWAIT state

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

13. IPv4/IPv6 REF Commands

13.1 Clear Ip Ref Packet Statistics

Use this command to clear IPv4 FS Express Forwarding (REF) packet statistics.

clear ip ref packet statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example clears IPv4 REF packet statistics.

```
FS #clear ip ref packet statistics
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.2 Clear Ipv6 Ref Packet Statistics

Use this command to clear IPv6 REF packet statistics.

clear ipv6 ref packet statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example clears IPv6 REF packet statistics.

```
FS #clear ipv6 ref packet statistics
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.3 ip ref load-sharing original

Use this command to configure the algorithm that is used for load balancing during forwarding based on the source and destination IPv4 addresses. Use the **no** form of this command to restore the default setting.

ip ref load-sharing original

no ip ref load-sharing original

Parameter Description

Parameter	Description
N/A	N/A

Defaults The default algorithm is based on the destination IPv4 address.

Command Mode Global configuration mode

Usage Guide The REF is responsible for data forwarding and supports two load balancing algorithms. One is based on destination IP addresses and the other is based on the source and destination IP addresses. When IP packets are forwarded on multiple paths, for example, when load balancing based on destination IP addresses is configured, the REF forwards packets based on a path matching the destination IP address of packets. By default, load balancing based on destination IP addresses is used.

Configuration Examples The following example configures the load balancing algorithm based on source and destination IP addresses.

```
FS(config)# ip ref load-sharing original
```

The following example configures the load balancing algorithm based on destination IP addresses of packets.

```
FS(config)# no ip ref load-sharing original
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.4 ipv6 ref load-sharing original

Use this command to configure the algorithm that is used for load balancing during forwarding based on the source and destination IPv6 addresses. Use the **no** form of this command to restore the default setting.

ipv6 ref load-sharing original

no ipv6 ref load-sharing original

Parameter Description

Parameter	Description
N/A	N/A

Defaults The default algorithm is based on the destination IPv6 address.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example restores the algorithm that is used for load balancing during forwarding to the default setting.

```
FS(config)#no ipv6 ref load-sharing original
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A.

13.5 Show Ip Ref Adjacency

Use this command to display the information about the specified adjacent node or all adjacent nodes.

show ip ref adjacency [**glean** | **local** | *ip-address* | **interface** *interface_type interface_number* | **discard** | **statistics**]

Parameter Description

Parameter	Description
glean	Aggregate adjacent node, which is used for a direct route
local	Local adjacent node, which is used by the local host
Ip-address	Next-hop IP address
interface_type	Interface type
interface_number	Interface number
discard	Displays discarded adjacent nodes.
statistics	Statistics

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command can be used to display the information about the adjacent node table in the current REF module. By specifying parameters, the information about the aggregate adjacent node, local adjacent node, adjacent node of the specified IP address, adjacent node associated with the specified interface, and all adjacent nodes can be displayed.

Configuration Examples The following example displays the information about all adjacent nodes in the adjacent node table.

```
FS#show ip ref adjacency
```

```
id state        type      rfct chg  ip                interface            linklayer(header data)
1   unresolved mcast    1      0    224.0.0.0
9   resolved     forward 1      0    192.168.50.78     GigabitEthernet 0/0   00 25 64 C5 9D 6A 00 D0 F8 98 76 54
08 00
7   resolved     forward 1      0    192.168.50.200    GigabitEthernet 0/0   00 04 5F 87 69 66 00 D0 F8 98 76 54 08
00
6   unresolved   glean   1      0    0.0.0.0           GigabitEthernet 0/0
4   unresolved   local   3      0    0.0.0.0           Local 1
```

Description of fields:

Field	Description
id	Adjacent node ID
state	Adjacent node state: Unresolved Resolved
type	Adjacent node type Local: local adjacency Forward: forward adjacency Discard: discard adjacency Glean: glean adjacency Mcast: multicast adjacency
rfct	Reference count of the adjacent node
chg	Whether the adjacent node is on the changing link.
ip	IP address of the adjacent node
interface	Interface
linklayer	Layer 2 head

Related Commands

Command	Description
show ip ref route	Displays all route information in the current REF module.

Platform Description

N/A

13.6 Show Ip Ref Exact-route

This command is used to display the IPv4 REF exact route.

show ip ref exact-route [oob | vrf vrf_name] *source_ipaddress dest_ipaddress*

Parameter Description

Parameter	Description
oob	Set to use out-of-band channels. When the MGMT port is designated as the source interface, this parameter must be set. Only supported on devices that support MGMT.
vrf-name	VRF name.

	Only supported on devices that support VRF.
source_ipaddress	Source IP address of the packet
dest_ipaddress	Destination IP address of the packet

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to specify the source and the destination IP address of the IP packets, and to display the path of forwarding the current packet with REF

Configuration Examples The following example displays the IPv4 REF exact route from 192.168.217.74 to 192.168.13.1.

```
FS# show ip ref exact-route 192.168.217.74 192.168.13.1
192.168.217.74    --> 192.168.13.1:
id state       type       rfct chg    ip                interface                linklayer(header data)
9    resolved forward 1          0      192.168.17.1    GigabitEthernet 0/0 00 25 64 C5 9D 6A 00 D0 F8 98 76 54 08 00
```

Description of fields:

Field	Description
id	Adjacency ID
state	Adjacency state: Unresolved Resolved
type	Adjacency type Local: local adjacency Forward: forward adjacency Discard: discard adjacency Glean: glean adjacency Mcast: multicast adjacency
rfct	Reference count of the adjacency
chg	Whether the adjacency is on the changing link.
ip	Adjacency IP address
interface	Interface
linklayer	Layer 2 head

Related Commands

Command	Description
show ip ref route	Displays all routing information in the current REF module.

Platform Description N/A

13.7 Show Ip Ref Packet Statistics

Use this command to display IPv4 REF packet statistics.

show ip ref packet statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays IPv4 REF packet statistics.

```
FS #show ip ref pkt-statistic
ref packet statistic:
    bad head          : 0
    lookup fib fail : 0
    local adj         : 0
    glean adj         : 0
    forward           : 0
    redirect          : 0
    punt adj          : 0
    outif not in ef : 0
    ttl expiration    : 0
    no ip routing     : 0
```

Field	Description
total recved	Number of total packets received by REF
bad head	Number of the packets with false header
lookup fib fail	Number of the packets with failed REF routing
drop adj	Number of the packets matching the dropped adjacency
local adj	Number of the packets matching the local adjacency
glean adj	Number of the packets matching the gleaned adjacency
forward	Number of the packets matching the forwarded adjacency
no ip routing	Number of the packets not allowed to be forwarded and sent to local.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.8 Show Ip Ref Resolve-list

Use this command to display the IPv4 REF resolution information.

show ip ref resolve-list

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays IPv4 REF resolution information.

```
FS#show ip ref resolve-list
IP                    res_state flags interface
1.1.1.1               unres     1     GigabitEthernet 0/0
```

Field	Description
IP	IP address
res_state	unres: unresolved res: resolved
flags	0: related to adjacency 1: unrelated to adjacency
interface	Interface

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.9 Show Ip Ref Route

Use this command to display all the routing information in the IPv4 REF table.

show ip ref route [oob | vrf vrf_name] [**default** | *ip mask* | **statistics**]

Parameter Description

Parameter	Description
oob	Set to use out-of-band channels. When the MGMT port is designated as the source interface, this parameter must be set. Only supported on devices that support MGMT.
vrf-name	VRF name. Only supported on devices that support VRF.
default	Specifies the default route.
ip	Specifies the destination IP address of the route
mask	Specifies the mask of the route.
statistics	Statistics

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

This command is used to display the related routing information on the current REF table, and specify the default route and all the routing information matching IP/MASK.

Configuration Examples

The following example displays all the routing information in the IPv4 REF table.

```
FS#show ip ref route
Codes: * - default route
       # - zero route
ip          mask        weight   path-id          next-hop          interface
255.255.255.255 255.255.255.255 1    4      0.0.0.0         Local 0
224.0.0.0               240.0.0.0                1    1      224.0.0.0
224.0.0.0           255.255.255.0        1    4         0.0.0.0         Local 0
192.168.50.0    255.255.255.0           1    6      0.0.0.0 FastEthernet 0/0
192.168.50.255    255.255.255.255 1    2             0.0.0.0
192.168.50.200 255.255.255.255 1 7 192.168.50.200 FastEthernet 0/0
192.168.50.122    255.255.255.255 1 4 0.0.0.0                Local 0
192.168.50.78    255.255.255.255 1 9 192.168.50.78    FastEthernet 0/0
```

Field	Description
ip	Destination IP address
mask	Mask
path-id	Adjacent identity
next-hop	Address of next hop
weight	Routing weight
interface	Egress

Related

Command	Description

Commands

show ip ref exact-route	Displays the accurate REF forwarding path of an IP packet.

Platform Description N/A

13.10 Show Ipv6 Ref Adjacency

Use this command to display the information about the IPv6 adjacent node.

show ipv6 ref adjacency [**glean** | **local** | *ipv6-address* | **interface** *interface_type interface_number* | **discard** | **statistics**]

Parameter Description

Parameter	Description
glean	Aggregate adjacent node, which is used for a direct route
local	Local adjacent node, which is used by the local host
ipv6-address	Next-hop IP address
interface_type	Interface type
interface_number	Interface number
discard	Displays discarded adjacent nodes.
statistics	Statistics

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command can be used to display the information about the adjacent node table in the privileged EXEC mode and global configuration mode.

Configuration Examples The following example displays the information about the IPv6 adjacent node..

```
FS#show ipv6 ref adjacency
id    state        type    rfct chg ip    interface                linklayer(header data)
1     unresolved   glean   1    0    ::    GigabitEthernet 0/0
2     unresolved   local   2    0    ::1   Local 1
```

Description of fields:

Field	Description
id	Adjacent node ID
state	Adjacent node state: Unresolved Resolved

type	Adjacent node type Local: local adjacency Forward: forward adjacency Discard: discard adjacency Glean: glean adjacency Mcast: multicast adjacency
rfct	Reference count of the adjacent node
chg	Whether the adjacent node is on the changing link.
ip	IP address of the adjacent node
interface	Interface
linklayer(header data)	Layer 2 head

For distributed routers, id is divided into two fields, namely, gid and lid, standing for global adjacent node ID and local adjacent node ID respectively.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

13.11 Show Ipv6 Ref Exact-route

This command is used to display the IPv6 REF exact route.

show ipv6 ref exact-route [oob | vrf vrf-name] *source-ipv6-address destination-ipv6-address*

Parameter Description

Parameter	Description
oob	Set to use out-of-band channels. When the MGMT port is designated as the source interface, this parameter must be set. Only supported on devices that support MGMT.
vrf-name	VRF name. Only supported on devices that support VRF.
source-ipv6-address	Source IP address of the packet
destination-ipv6-address	Destination IP address of the packet

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the IPv4 REF exact route from 2001:db8:1::1 to 3001:db8:2::2.

```
FS#show ipv6 exact-route 2001:db8:1::1 3001:db8:2::2
2001:db8:1::1 --> 3001:db8:2::2:
ID   state      type    rfct chg ip interface          linklayer(header data)
3    unresolve  glean   1    0   :: GigabitEthernet 0/0
```

Description of fields:

Field	Description
id	Adjacent node ID
state	Adjacent node state: Unresolved Resolved
type	Adjacent node type Local: local adjacency Forward: forward adjacency Discard: discard adjacency Glean: glean adjacency Mcast: multicast adjacency
rfct	Reference count of the adjacent node
chg	Whether the adjacent node is on the changing link.

ip	IP address of the adjacent node
interface	Interface
linklayer(header data)	Layer 2 head

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.12 Show Ipv6 Ref Packet Statistics

Use this command to display IPv6 REF packet statistics.

show ipv6 ref packet statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays IPv6 REF packet statistics.

```
FS#show ipv6 ref packet statistics
ref packet statistic:
    bad head              : 0
    lookup fib fail : 0
    local adj             : 0
    glean adj             : 0
    forward               : 0
    redirect              : 0
    hop-limit expiration    : 0
    no ipv6 unicast-routing      : 0
```

Field	Description
bad head	Number of the packets with false header
lookup fib fail	Number of the packets with failed REF routing
drop adj	Number of the packets matching the dropped adjacency

local adj	Number of the packets matching the local adjacency
glean adj	Number of the packets matching the gleaned adjacency
forward	Number of the packets matching the forwarded adjacency
no ip routing	Number of the packets not allowed to be forwarded and sent to local.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.13 Show Ipv6 Ref Resolve-list

This command is used to display the IPv6 REF resolution information.

show ipv6 ref resolve-list

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays IPv6 REF resolution information.

```
FS#show ipv6 ref resolve-list
IP                    res_state flags interface
1000::1               unres     1     GigabitEthernet 0/0
```

Field	Description
IP	IPv6 address
res_state	unres: unresolved res: resolved
flags	0: related to adjacency 1: unrelated to adjacency

interface	Interface

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.14 Show Ipv6 Ref Route

Use this command to display all the routing information in the IPv6 REF table.

show ipv6 ref route [oob | vrf vrf-name] [default | statistics | prefix/len]

Parameter Description

Parameter	Description
oob	Set to use out-of-band channels. When the MGMT port is designated as the source interface, this parameter must be set. Only supported on devices that support MGMT.
vrf-name	VRF name. Only supported on devices that support VRF.
default	Specifies the default route.
statistics	Statistics
prefix/len	Displays the route with the specified prefix (X:X:X:X::X/<0-128>).

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide The command can also be used to display information about the default route, the route with the specified prefix, and statistics of all types of routes.

Configuration Examples The following example displays all the routing information in the REF IPv6 table.

```
FS#show ipv6 ref route
Codes: * - default route
 prefix/len                          weight path_id   next_hop interface
 2001:da8:ffe:2::/64                 1      3         ::       GigabitEthernet 0/0
 2001:da8:ffe:2::3/128               1      2         ::1      Local 1
 fe80::/10                           1      6         ::       Null 0
 fe80::21a:a9ff:fe3b:fa41/128        1      2         ::1      Local 1
```

Field	Description
prefix/len	IPv6 prefix and prefix length.

path-id	Adjacent identity
next-hop	Address of next hop
weight	Routing weight
interface	Interface

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

Chapter 4 IP Routing Commands

1. RIP Commands
2. OSPF v2 Commands
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1. RIP Commands

1.1 Address-family

Use this command to configure the RIP protocol in address family configuration sub-mode. Use the **no** form of this command to restore the default setting.

address-family ipv4 vrf *vrf-name*

no address-family ipv4 vrf *vrf-name*

Parameter Description

Parameter	Description
vrf *vrf-name*	Specifies the VRF name associated with the sub-mode command.

Defaults

The address family of the RIP protocol is not configured by default.

Command Mode

Route configuration mode

Usage Guide

Use the **address-family** command to enter the address family configuration sub-mode. The prompt is (config-router-af) #. When you specify the VRF associated with the sub-mode for the first time, the RIP instance corresponding to the VRF will be created. In the sub-mode, you can configure the VRF RIP routing information. To remove the address family sub-mode and return to the route configuration mode, use the **exit-address-family** or **exit** command.

Configuration Examples

The following example creates a VRF with the name of vpn1 and creates its RIP instance.

```
FS(config)# ip vrf vpn1
FS(config-vrf)# exit
FS(config)# interface fastEthernet 1/0
FS(config-if-FastEthernet 0/1)# ip vrf forwarding vpn1
FS(config-if-FastEthernet 0/1)# ip address 192.168.1.1 255.255.255.0
FS(config)# router rip
FS(config-router)# address-family ipv4 vrf vpn1
FS(config-router)# network 192.168.1.0
FS(config-router)# exit-address-family
```

Related Commands

Command	Description
exit-address-family	Exits the address family configuration sub-mode.
ip vrf	Creates a VRF.

Platform Description

N/A

1.2 Auto-summary

Use this command to enable automatic summary of RIP routes. Use the **no** form of this command to disable this

function

auto-summary

no auto-summary

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Automatic summary of RIP routes is enabled by default

Command Mode

Routing progress configuration mode

Usage Guide

Automatic RIP route summary means the subnet routes will be automatically summarized into the routes of the classified network when they traverse through the subnet. Automatic route summary is enabled by default for RIPv1 and RIPv2.

Automatic RIP route summary improves the flexibility and effectiveness of the network. If the summarized route exists, the sub-routes contained in the summarized route cannot be seen in the routing table, reducing the size of the routing table significantly.

Advertising the summarized route is more efficient than advertising individual routes in light of the following factors:

- The summarized route is always processed preferentially when you query the RIP database.
- Any sub-route is ignored when you query the RIP database, reducing the processing time.
- If you want to learn the specific sub-routes instead of the summarized route, disable the automatic route summary function. Only when RIPv2 is configured, the automatic route summary function can be disabled. For the RIPv1, the automatic route summary function is always enabled.

The range of the supernet route is wider than that of the classful network. Therefore, this command takes no effect on the supernet route.

Configuration Examples

The following example disables automatic route summary of RIPv2.

```
FS (config)# router rip
FS (config-router)# version 2
FS (config-router)# no auto-summary
```

Related Commands

Command	Description
version	Defines the RIP software versions: v1 or v2. Both v1 and v2 are supported by default.

Platform Description

N/A

1.3 Bdf all-interfaces

Use this command to enable all interfaces running RIP to use the BDF function. Use the **no** form of this command to restore the default setting.

bdf all-interfaces

no bdf all-interfaces

Parameter Description

Parameter	Description
N/A	N/A

Defaults

BFD is not configured by default.

Command Mode

Routing process configuration mode

Usage Guide

With the BFD function enabled on the RIP, one BFD session will be established for the RIP routing information source (the source address of the RIP route update packet). Once the BFD neighbor fails, the RIP routing information will be invalid directly and no longer join routing or forwarding.

You can also use the interface configuration mode command **ip rip bfd [disable]** to enable or disable the BFD function on the specified interface, which takes precedence over the command **bfd all-interfaces** in the routing progress configuration mode.

Configuration Examples

N/A

Related Commands

Command	Description
route ip	Creates the RIP routing progress and enters the routing process configuration mode.
ip rip bfd [**disable**]	Configures a specified interface running RIP to enable or disable link detection using the BFD.

Platform Description

N/A

1.4 Default-information Originate

Use this command to generate a default route in the RIP progress. Use the **no** form of this command to delete the generated default route.

default-information originate [**always**] **[metric** *metric-value*] [**route-map** *map-name*]

no default-information originate [**always**] [**metric**] [**route-map** *map-name*]

Parameter Description

Parameter	Description
always	(Optional) Enables RIP to generate the default route, no matter whether the

	default route exists or not.
metric *metric-value*	(Optional) The original metric value of the default route with the value range 115 of metric-value.
route-map *map-name*	(Optional) Name of the associated route-map. Route-map is not associated by default.

Defaults

No default route is generated by default.

The default metric value is 1.

Command Mode

Routing process configuration mode

Usage Guide

By default, RIP will not advertise the default route if the default route exists in the routing table of the router. In this case, use the **default-information originate** command to notify the neighbor of the default route.

With the parameter always configured, no matter whether the default route exists in the RIP routing process or not, the default route will be advertised to the neighbor but is not shown in the local routing table. You can use the **show ip rip database** command to view the RIP routing information database to confirm whether the default route is generated.

Use the parameter **route-map** to control more about the default route advertised to RIP. For example, use the **set metric** command to set the metric value of the default route.

The route-map set metric rule takes precedence over the parameter metric value configuration of the default route. If the parameter metric is not configured, the default metric value is used by the default route.

If the default route can be generated in the RIP process by using this command, RIP will not learn the default route advertised from the neighbor.

For the default route generated by using the ip default-network command, the default-information originate command is required to add the default route to RIP.

Configuration Examples

The following example generates a default route to the RIP routing table.

```
FS(config-router)# default-information originate always
```

Related Commands

Command	Description
ip rip default-information	Notifies the default route through an interface.
redistribute	Redistributes the routes from other protocols to RIP.

Platform Description

N/A

1.5 Default-metric

Use this command to define the default RIP metric value. Use the **no** form of this command to restore the default setting.

default-metric *metric-value*

no default-metric

Parameter Description

Parameter	Description
metric-value	Indicates the default metric value with the range from 1 to 16. If the metric value is greater than or equal to 16, the FSOS regards the route unreachable.

Defaults

The default is 1.

Command Mode

Routing process configuration mode

Usage Guide

This command needs to work with the command **redistribute**. When the routes are redistributed to the RIP routing process from a routing protocol process, the route metric value cannot be converted due to the incompatibility of the metric calculation mechanisms for different protocols. During the conversion, therefore, it is required to redefine the metric values of redistributed routes in the RIP routing domain. If there is no clear definition of the metric value in redistributing a routing protocol process, the RIP uses the metric value defined with **default-metric**. If the metric value is defined, this value overwrites the metric value defined with default-metric. If this command is not configured, the default value of default-metric is 1.

Configuration Examples

The following example enables the RIP routing protocol to redistribute the routes learned by the OSPF routing protocol, whose initial RIP metric value is set to 3.

```
FS (config)# router rip
FS (config-router)# default-metric 3
FS (config-router)# redistribute ospf 100
```

Related Commands

Command	Description
redistribute	Redistributes the routes from one routing domain to another routing domain.

Platform Description

N/A

1.6 Distance

Use this command to set the management distance of the RIP route. Use the **no** form of this command to restore the default setting.

distance *distance* [*ip-address wildcard*]

no distance [*distance ip-address wildcard*]

Parameter Description

Parameter	Description
distance	Sets the management distance of a RIP route, an integer in the range from 1 to 255.
ip-address	Indicates the prefix of the source IP address of the route.

wildcard	Defines the comparison bit of the IP address, where 0 means accurate matching and 1 means no comparison.

Defaults

The default is 120.

Command Mode

Routing process configuration mode

Usage Guide

Use this command to set the management distance of the RIP route.

You can use this command to create several management distances with source address prefixes. When the source address of the RIP route is within the range specified by the prefixes, the corresponding management distance is applied; otherwise, the route uses the management distance configured by the RIP.

Configuration Examples

The following example sets the management distance of the RIP route to 160, and specifies the management distance of the route learned from 192.168.2.1 as 123.

```
FS(config)# router rip
FS(config-router)# distance 160
FS(config-router)# distance 123 192.168.12.1 0.0.0.0
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.7 Distribute-list in

Use this command to control route update for route filtering. Use the **no** form of this command to restore the default setting.

distribute-list { [*access-list-number* | *name*] | **prefix** *prefix-list-name* [**gateway** *prefix-list-name*] | [**gateway** *prefix-list-name*] } **in** [*interface-type interface-number*]

no distribute-list { [*access-list-number* | *name*] | **prefix** *prefix-list-name* [**gateway** *prefix-list-name*] | [**gateway** *prefix-list-name*] } **in** [*interface-type interface-number*]

Parameter Description

Parameter	Description
access-list-number | *name*	Specifies the ACL. Only the routes that are allowed by the ACL can be accepted.
prefix *prefix-list-name*	Uses the prefix list to filter the routes.
gateway *prefix-list-name*	Uses the prefix list to filter the source of the routes.
interface-type interface-number	(Optional) Applies the distribution list only to a specified interface.

Defaults

The distribution list is not defined by default.

Command Mode

Routing process configuration mode

Usage Guide

To deny receiving some specified routes, you can process all the received route update packets by configuring the route distribute control list.

Without any interface specified, the system will process the route update packets received on all the interfaces.

Configuration Examples

The following example enables RIP to control the routes received from the Fastethernet 0/0, only permitting the routes starting with 172.16.

```
FS (config)# router rip
FS (config-router)# network 200.168.23.0
FS (config-router)# distribute-list 10 in fastethernet 0/0
FS (config-router)# no auto-summary
FS (config-router)# access-list 10 permit 172.16.0.0 0.0.255.255
```

Related Commands

Command	Description
access-list	Defines the ACL rule.
prefix-list	Defines the prefix list.

Platform Description

N/A

1.8 Distribute-list out

Use this command to configure filtering redistribution routes. The function is similar to that of the **redistribute** command. Use the **no** form of this command to restore the default setting.

distribute-list *{ [access-list-number | name] |* **prefix** *prefix-list-name }* **out** [**bgp** | **connected** | **isis** *[area-tag] |* **ospf** *process-id* | **rip** | **static**]

no distribute-list *{ [access-list-number | name] |* **prefix** *prefix-list-name }* **out** [**bgp** | **connected** |**isis** *[area-tag]* | **ospf** *process-id* | **rip** | **static**]

Parameter Description

Parameter	Description
access-list-number | name	Uses the ACL filtering rule.
prefix prefix-list-name	Uses the prefix-list filtering rule.
bgp | connected | isis [area-tag] **| ospf** process-id| **rip | static**	Source of the routes to be filtered

Defaults No filtering is configured by default.

Command Mode Routing process configuration mode

Usage Guide Similar to the redistribute route-map command, the distribute-list out command filters the routes that other protocols redistribute to the OSPF. However, the distribute-list out command does not redistribute routes by itself. It works with the redistribute command in most cases. The ACL filtering rule and the prefix-list filtering rule cannot coexist in the configuration, that is, the two rules cannot be configured at the same time for routes from the same source.

Configuration Examples The following example filters the redistributed static routes.

```
FS(config)# routerospf1
FS(config)# redistribute static subnets
FS(config-router)# distribute-list 22 outstatic
FS(config-router)# distribute-list prefix jjj out static
% Access-list filter exists, please de-config first
```

Related Commands

Command	Description
distribute-list in	Configures LSA filtering.
redistribute	Redistributes routes of other routing processes.

Platform Description N/A

1.9 Enable Mib-binding

Use this command to bind a MIB with a specified RIP instance. Use the **no** form of this command to restore the

default setting

enable mib-binding

no enable mib-binding

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Command Mode

Routing process configuration mode.

Usage Guide

As RIP MIB does not have RIP instance information, you can only operate only one RIP instance using SNMP.

Configuration Examples

N/A

Related Commands

Command	Description
show ip rip	Displays the global configuration of RIP.

Platform Description

N/A

1.10 Exit-address-family

Use this command to exit the address family configuration mode

exit-address-family

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Address family configuration mode

Usage Guide

Use this command to exit the address family configuration mode.

The abbreviation of this command is exit.

Configuration Examples

The following example enters or exits the address family configuration mode.

```
FS(config-router)# address-family ipv4 vrf vpn1
FS(config-router-af)# exit-address-family
```

Related Commands

Command	Description
address-family	Enters the address family configuration sub-mode.

Platform Description

N/A

1.11 Fast-reroute

Use this command to enable the RIP FRR (Fast Reroute) function for the device. Use the **no** form of this command to restore the default setting.

fast-reroute route-map *route-map-name*

no fast-reroute

Parameter Description

Parameter	Description
route-map-name	Specifies the backup path through the route map.

Defaults

This function is disabled by default.

Command Mode

Routing process configuration mode

Usage Guide

Use the **route-map** command to specify the backup path for the matched routes.

It is recommended to enable the BFD function when the RIP fast reroute function is enabled. BFD allows the device to detect the link fault faster, so as to reduce the interruption time. In the scenario where the port is up/down, it is recommended to configure **carrier-delay** *0* in interface configuration mode to achieve the fastest switchover speed, reducing the interruption time.

Currently, the restrictions of the RIP FRR are as follows:

Only one backup next hop is generated for each route.

The backup next hop is not generated for the ECMP route.

Configuration Examples

The following example enables FRR for RIP instance 1 and associates route map *fast reroute*.

```
FS(config)# route-map fast-reroute
match interface gigabitEthernet 0/2
set fast-reroute backup-interface GigabitEthernet 0/1 backup-nexthop 192.168.1.1
FS(config)# router rip
FS(config-router)# fast-reroute route-map fast-reroute
```

Related Commands

Command	Description
N/A	N/A

Platform

N/A

Description

1.12 Graceful-restart

Use this command to configure the RIP graceful restart (GR) function for a device. Use the **no** form of this command to restore the default configuration.

graceful-restart [**grace-period** *grace-period*]

no graceful-restart [**grace-period**]

Parameter Description

Parameter	Description
graceful-restart	Enables the GR function.
grace-period	(Optional) Configures the grace period.
grace-period	(Optional) Indicates the user-defined GR period. The default value is the smaller value between twice the update time and 60 seconds. The range is from 1 to 1,800. The unit is second.

Defaults This function is enabled by default.

Command Mode Routing process configuration mode

Usage Guide The GR function is configured on the RIP instances. Different parameters can be configured for different RIP instances.

The GR period refers to the time from the startup to the end of RIP GR. During this period, the forwarding table remains unchanged and the RIP route is restored to the state before protocol restart. When the GR period expires, RIP exits the GR state and performs normal RIP operation.

The **graceful-restart grace-period** command enables users to modify GR period. Note: Make sure that GR is completed before the RIP route is validate and after an RIP route update cycle elapses. If an improper value is configured, non-stop data forwarding cannot be ensured during the GR process. For example, if the GR period is longer than the time when the neighbor's route is unavailable and GR is not completed before the route is validated, then the neighbor is not re-informed of the route and forwarding of the neighbor's route is terminated when it is validated, which results in data forwarding interruption. Therefore, unless otherwise specified, it is not recommended to adjust the GR period. If the period needs to changed, determine that the grace period is longer than the route update cycle and shorter than the time when the route is unavailable in combination with the configuration of the **timers basic** command.

During the RIP GR period, the network must be stable.

Configuration Examples The following example enables the RIP GR function and configures the GR period parameters of the GR function.

```
FS(config)# router rip
FS(config-router)# graceful-restart grace-period 90
```

Related Commands

Command	Description
timers basic	Configures RIP timers.

Platform Description

N/A

1.13 Ip Rip Authentication Key-chain

Use this command to enable RIP authentication and specify the keychain used for RIP authentication. Use the **no** form of this command to restore the default setting.

ip rip authentication key-chain *name-of-keychain*

no ip rip authentication key-chain

Parameter Description

Parameter	Description
name-of-keychain	Indicates the name of the keychain, which specifies the keychain used for RIP authentication.

Defaults

The keychain is not associated by default.

Command Mode

Interface configuration mode

Usage Guide

If the keychain is specified in the interface configuration, use the key chain global configuration command to define the keychain. Otherwise, RIP data packet authentication fails.

RIPv2 instead of RIPv1 supports authentication of the RIP data packet.

Configuration Examples

The following example enables RIP authentication on the fastEthernet 0/1 with the associated keychain ripchain.

```
FS (config)#interface fastEthernet 0/1
FS (config-if-FastEthernet 0/1)#ip rip authentication key-chain ripchain
```

Meanwhile, use the **key chain** command to define this keychain in global configuration mode.

```
FS(config)#key chain ripchain
FS(config-keychain)#key 1
FS(config-keychain-key)#key-string Hello
```

Related Commands

Command	Description
ip rip authentication mode	Defines the RIP authentication mode.
ip rip authentication text-password	Enables RIP authentication, and sets the password string of RIP plaintext authentication. RIP data packet authentication is supported only by RIPv2.
ip rip receive version	Defines the version of RIP packets received on the interface.
ip rip send version	Defines the version of RIP packets sent on the

	interface.
key chain	Defines the keychain and enters keychain configuration mode.

Platform Description N/A

1.14 Ip Rip Authentication Mode

Use this command to define the RIP authentication mode. Use the **no** form of this command to restore the default setting.

ip rip authentication mode { **text** | **md5** }

no ip rip authentication mode

Parameter Description

Parameter	Description
text	Configures RIP authentication as plaintext authentication.
md5	Configures RIP authentication as MD5 authentication.

Defaults It is plaintext authentication by default.

Command Mode Interface configuration mode

Usage Guide During the RIP authentication configuration process, the RIP authentication modes of all devices requiring exchange of RIP routing information must be the same. Otherwise, RIP packet exchange will fail.

If the plaintext authentication mode is adopted, but the password string of the plaintext authentication or the associated keychain is not configured, no authentication occurs. In the same way, if the MD5 authentication mode is adopted, but the associated keychain is not configured, no authentication occurs.

RIPv2 instead of RIPv1 supports authentication of the RIP data packet.

Configuration Examples The following example configures the RIP authentication mode on the fastEthernet 0/1 as MD5.

```
FS (config)#interface fastEthernet 0/1
FS (config-if-FastEthernet 0/1)# ip rip authentication mode md5
```

Related Commands

Command	Description
ip rip authentication key-chain	Enables the RIP authentication mode and specifies the keychain used for RIP authentication. Only RIPv2 supports authentication of the RIP data packet.
ip rip authentication text-password	Enables the RIP authentication mode, and sets the password string of RIP plaintext authentication. Only RIPv2 supports authentication of the RIP data packet.
key chain	Defines the keychain and enters the keychain configuration mode

Platform Description N/A

1.15 Ip Rip Authentication Text-password

Use this command to enable RIP authentication and set the password string of RIP plaintext authentication. Use the **no** form of this command to restore the default setting.

ip rip authentication text-password [**0** | **7**] *password-string*

no ip rip authentication text-password

Parameter Description

Parameter	Description
0	Specifies that the key is displayed as plaintext.
7	Specifies that the key is displayed as cipher text.
password-string	Indicates the password string of the plaintext authentication, in the length of 1-16 bytes.

Defaults No password string of RIP plaintext authentication is configured by default.

Command Mode Interface configuration mode

Usage Guide This command works only in plaintext authentication mode.

To enable the RIP plaintext authentication function, use this command to configure the corresponding password string, or use the associated key chain to obtain the password string. The latter takes the precedence over the former one.

RIPv1 does not support RIP authentication but RIPv2 does.

Configuration Examples The following example enables the RIP plaintext authentication on fastEthernet 0/1 and sets the password string to hello.

```
FS(config)#interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# ip rip authentication text-password hello
```

Related Commands

Command	Description
ip rip authentication mode	Defines the RIP authentication mode.
ip rip authentication key-chain	Enables the RIP authentication mode and specifies the keychain used for RIP authentication. Only RIPv2 supports authentication.

Platform Description N/A

1.16 Ip Rip Bfd

Use the ip rip bfd [**disable**] command to configure the specified interface running RIP to enable or disable link detection using the BFD. Use the **no** form of this command to restore the default setting.

ip rip bfd [**disable**]

no ip rip bfd

Parameter Description

Parameter	Description
disable	Disables the specified interface running RIP and uses the BFD mechanism to perform link detection.

Defaults

Interfaces running RIP are not configured by default. The BFD configuration in RIP process configuration mode is a reference.

Command Mode

Interface configuration mode

Usage Guide

The priority of the interface is higher that of the bfd all-interfaces command in process configuration mode. You can use the **ip rip bfd** command to enable the BFD to perform link detection on the specified interface according to the actual environment or use the **bfd all-interfaces** command to configure all interfaces running RIP and enable the BFD to perform link detection. In addition, you can use the **ip rip bfd disable** command to disable the BFD detection function on the specified interface.

Configuration Examples

N/A

Related Commands

Command	Description
route ip	Enables the RIP routing process and enters the routing process configuration mode.
bdf all-interfaces	Configures all interfaces running RIP to use the BFD to perform link detection.

Platform Description

N/A

1.17 Ip Rip Default-information

Use this command to advertise the default route through a RIP interface. Use the **no** form of this command to restore the default setting.

ip rip default-information { **only** | **originate** } [**metric** *metric-value*]

no ip rip default-information

Parameter Description

Parameter	Description
only	Notifies the default route rather than other routes.

originate	Notifies the default route and other routes.
metric *metric-value*	Specifies the metric value of the default route, in the range from1 to 15.

Defaults No default route is configured by default. The default metric value is 1.

Command Mode Interface configuration mode

Usage Guide After you configure this command on a specified interface, a default route is generated and notified through the interface. If the **ip rip default-information** command of the interface and the **default-information originate** command of the RIP process are configured at the same time, only the default route of the interface is advertised.

RIP will no longer learn the default route notified by the neighbor if any interface is configured with the ip rip default-information command.

Configuration Examples The following example creates a default route which is notified on ethernet0/1 only.

```
FS(config)#interface ethernet 0/1
FS(config-if-Ethernet 0/1)#ip rip default-information only
```

Related Commands

Command	Description
default-information originate	Generates a default route in the RIP process.

Platform Description N/A

1.18 Ip Rip Receive Enable

Use this command to enable RIP to receive the RIP data package on a specified interface. Use the **no** form of this command to restore the default setting.

ip rip receive enable

no ip rip receive enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults RIP packages can be received through the interface by default.

Command Mode Interface configuration mode

Usage Guide To prevent an interface from receiving RIP packets, use the no form of this command in interface configuration mode. This command works on interfaces configured with this command. You can use the **default** form of this

command to enable the interface to receive the RIP data package.

Configuration Examples

The following example prohibits receiving RIP data packages on fastEthernet 0/1.

```
FS (config)# interface fastEthernet 0/1
FS (config-if-FastEthernet 0/1)# no ip rip receive enable
```

Related Commands

Command	Description
ip rip send enable	Enables or disables the interface to send RIP data packages.
passive-interface	Configures a passive RIP interface.

Platform Description

N/A

1.19 Ip Rip Receive Version

Use this command to define the version of RIP packets received on an interface. Use the **no** form of this command to restore the default setting.

ip rip receive version [**1**] [**2**]

no ip rip receive version

Parameter Description

Parameter	Description
1	(Optional) Receives only RIPv1 packets.
2	(Optional) Receives only RIPv2 packets.

Defaults

The default behavior depends on the configuration with the version command.

Command Mode

Interface configuration mode

Usage Guide

This command overwrites the default configuration of the **version** command. It affects only RIP packet receiving through the interface and allows RIPv1 and RIPv2 packets to be received on the interface at the same time. If the command is configured without parameters, data package receiving depends on the configuration of the version.

Configuration Examples

The following example enables receiving both RIPv1 and RIPv2 data packages.

```
FS (config)#interface fastEthernet 0/1
FS (config-if-FastEthernet 0/1)# ip rip receive version 1 2
```

Related Commands

Command	Description
version	Defines the default version of the RIP packets received/sent on the interface.

Platform

N/A

Description

1.20 Ip Rip Send Enable

Use this command to enable RIP to send a RIP data package on a specified interface. Use the **no** form of this command to restore the default setting.

ip rip send enable

no ip rip send enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

RIP packages can be sent through the interface by default.

Command Mode

Interface configuration mode

Usage Guide

To prevent an interface from sending RIP packets, use the **no** form of this command in interface configuration mode. This command works on interfaces configured with this command. You can use the **default** form of this command to enable the interface to send the RIP data package.

Configuration Examples

The following example prohibits sending RIP data packages on fastEthernet 0/1.

```
FS (config)# interface fastEthernet 0/1
FS (config-if-FastEthernet 0/1)# no ip rip send enable
```

Related Commands

Command	Description
ip rip receive enable	Enables or disables receiving RIP packets on the interface.
passive-interface	Configures a passive RIP interface.

Platform Description

N/A

1.21 Ip Rip Send Supernet-routes

Use this command to enable RIP to send the supernet route on a specified interface. Use the **no** form of this command to disable this function.

ip rip send supernet-routes

no ip rip send supernet-routes

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default.

Command Mode

Interface configuration mode

Usage Guide

When the RIPv1 router monitors a RIPv2 router response packet and if the supernet routing information is monitored, incorrect route information is learned because the RIPv1 ignores the subnet mask of the routing information. In this case, you are advised to use the no form of this command on the RIPv2 router to disable advertising the supernet route on the corresponding interface. This command works only on interfaces configured with this command.

This command is only valid upon sending the RIPv2 packets on the interface and it is used to control sending the supernet route.

Configuration Examples

The following example disables sending RIP supernet routes on the fastEthernet 0/1 interface.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# no ip rip send supernet-routes
```

Related Commands

Command	Description
version	Defines the RIP version
ip rip send enable	Enables or disables sending the RIP package on the interface.

Platform Description

N/A

1.22 Ip Rip Send Version

Use this command to define the version of the RIP packets sent on the interface. Use the **no** form of this command to restore the default setting.

ip rip send version [**1**] [**2**]

no ip rip send version

Parameter

Parameter	Description

Description

1	(Optional) Receives only RIPv1 packets.
2	(Optional) Receives only RIPv2 packets.

Defaults The default behavior depends on the configuration with the version command.

Command Mode Interface configuration mode

Usage Guide This command overwrites the default configuration of the **version** command. It affects only RIP packet sending through the interface and allows RIPv1 and RIPv2 packages sent on the interface at the same time. If the command is configured without parameters, package receiving depends on the configuration of the version.

Configuration Examples The following example enables sending both RIPv1 and RIPv2 packages on the fastEthernet 0/1 interface.

```
FS (config)# interface fastEthernet 0/1
FS (config-if-FastEthernet 0/1)# ip rip send version 1 2
```

Related Commands

Command	Description
version	Defines the default version of the RIP packets received/sent on the interfaces.

Platform Description N/A

1.23 Ip Rip Split-horizon

Use this command to enable split horizon. Use the **no** form of this command to disable this function.

ip rip split-horizon [**poisoned-reverse**]

no ip rip split-horizon [**poisoned-reverse**]

Parameter Description

Parameter	Description
poisoned-reverse	(Optional) Enables split horizon with poisoned reverse.

Defaults This function is enabled by default.

Command Mode Interface configuration mode

Usage Guide When multiple devices are connected to the IP broadcast network and run a distance vector routing protocol, the split horizon mechanism is required to prevent loop. The split horizon prevents the device from advertising routing information from the interface that learns that information, which optimizes routing information exchange between multiple devices.

For non-broadcast multi-path access networks (such as frame relay and X.25), split horizon may cause some devices to be unable to learn all routing information. Split horizon may need to be disabled in this case. If an interface is configured the secondary IP address, attentions shall be paid also for split horizon.

If the **poisoned-reverse** parameter is configured, split horizon with poisoned reverse is enabled. In this case, devices still advertise the route information through the interface from which the route information is learned. However, the metric value of the route information is set to unreachable.

The RIP routing protocol is a distance vector routing protocol, and the split horizon issue shall be cautioned in practical applications. If it is unsure whether split horizon is enabled on the interface, use the show ip rip command to judge. This function makes no influence on the neighbor defined with the **neighbor** command.

Configuration Examples

The following example disables the RIP split horizon function on the interface fastethernet 0/0.

```
FS (config)# interface fastethernet 0/1
FS (config-if)# no ip rip split-horizon
```

Related Commands

Command	Description
neighbor (RIP)	Defines the IP address of the neighbor of RIP.
validate-update-source	Enables the source address authentication of the RIP route update message.

Platform Description

N/A

1.24 Ip Rip Summary-address

Use this command to configure port-level convergence through an interface. Use the **no** form of this command to disable this function.

ip rip summary-address *ip-address ip-network-mask*

no ip rip summary-address *ip-address ip-network-mask*

Parameter Description

Parameter	Description
ip-address	Indicates the IP addresses to be converged.
ip-network-mask	Indicates the subnet mask of the specified IP address for route convergence.

Defaults

The RIP routes are automatically converged to the classful network edge by default.

Command Mode

Interface configuration mode

Usage Guide

The **ip rip summary-address** command converges an IP address or a subnet on a specified port. RIP routes are automatically converged to the classful network edge. The classful subnet can be configured through only port convergence.

The summary range configured by this command cannot be a super class network, that is, the configured

mask length is greater than or equal to the natural mask length of the network.

Configuration Examples

The following example disables the automatic route convergence function of RIPv2. Interface convergence is configured so that fastEthernet 0/1 advertises the converged route 172.16.0.0/16.

```
FS (config)# interface fastEthernet 0/1
FS (config-if-FastEthernet 0/1)# ip rip summary-address 172.16.0.0 255.255.0.0
FS (config-if-FastEthernet 0/1)# ip address 172.16.1.1 255.255.255.0
FS (config)# router rip
FS (config-router)# network 172.16.0.0
FS (config-router)# version 2
FS (config-router)# no auto-summary
```

Related Commands

Command	Description
auto-summary	Enables the automatic convergence of RIP routes.

Platform Description

N/A

1.25 Ip Rip Triggered

Use this command to enable triggered RIP based on links. Use the **no** form of this command to restore the default setting.

ip rip triggered

ip rip triggered retransmit-timer *timer*

ip rip triggered retransmit-count *count*

no ip rip triggered

no ip rip triggered retransmit-timer

no ip rip triggered retransmit-count

Parameter Description

Parameter	Description
retransmit-timer *timer*	Configures the interval at which the Update Request and Update Response packets are retransmitted. The range is from 1 to 3,600. The unit is second. The default is five.
retransmit-count *count*	Configures the maximum times that the Update Request and Update Response packets are retransmitted. The range is from 1 to 3600. The default is 36.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

Triggered RIP (TRIP) is the extension of RIP on the wide area network (WAN), mainly used for demand-based links.

With the TRIP function enabled, RIP no longer sends route updates periodically and sends route updates to the WAN interface only if:

Update Request packets are received.

RIP routing information is changed.

Interface state is changed.

The router is started.

As periodical RIP update is disabled, the confirmation and retransmission mechanism is required to ensure that update packets are sent and received successfully over the WAN. The **retransmit-timer** and **retransmit-count** commands can be used to specify the retransmission interval and maximum retransmission times for request and update packets.

The function can be enabled in the case of the following conditions: a) The interface has only one neighbor. b) There are multiple neighbors but they interact information using unicast packets. You are advised to enable the function for link layer protocols such as PPP, frame relay, and X.25.

You are advised to enable split horizon with poison reverse on the interface enabled with the function; otherwise invalid routing information might be left.

Make sure that the function is enabled on all routers on the same link; otherwise the function will be invalid and the routing information cannot be exchanged correctly.

To enable the function, make sure that the RIP configuration is the same on both ends of the link, such as RIP authentication and the RIP version supported by the interface.

If this function is enabled on this interface, the source address of packets on this interface will be checked no matter whether the source IP address verification function (validate-update-source) is enabled.

Configuration Examples

The following example enables TRIP and sets the retransmission interval and maximum retransmission time to 10 seconds and 18 respectively for Update Request and Update Response packets.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# ip rip triggered
FS(config-if-FastEthernet 0/1)# ip rip triggered retransmit-timer 10
FS(config-if-FastEthernet 0/1)# ip rip triggered retransmit-count 18
```

Related Commands

Command	Description
show ip rip database	Displays the summarized routing information of the RIP database.
show ip rip interface	Displays the RIP interface information.
ip rip split-horizon	Configures RIP split horizon.

Platform Description

N/A

1.26 Ip Rip v2-broadcast

Use this command to send RIPv2 packets in broadcast rather than multicast mode. Use the **no** form of this

command to restore the default setting.

ip rip v2-broadcast

no ip rip v2-broadcast

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The default behavior depends on the configuration of the version command.

Command Mode

Interface configuration mode

Usage Guide

This command overwrites the default of the **version** command. This command affects only sending RIP packets on the interface. This command allows RIPv1 and RIPv2 packages sent on the interface simultaneously. If this command is configured without parameters, package receiving depends on the version setting.

Configuration Examples

The following example sends RIPv2 packets in broadcast mode on the fastEthernet 0/1 interface.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# no ip rip split-horizon
```

Related Commands

Command	Description
version	Defines the default version of the RIP packets received and sent on the interface.

Platform Description

N/A

1.27 Neighbor

Use this command to define the IP address of a RIP neighbor. Use the **no** form of this command to restore the default setting.

neighbor *ip-address*

no neighbor *ip-address*

Parameter Description

Parameter	Description
ip-address	Indicates the IP address of the neighbor. The IP address must be that of the network connected to the local device.

Defaults

The neighbor is not defined by default.

Command Mode

Routing process configuration mode

Usage Guide

By default, RIPv1 uses the IP broadcast address (255.255.255.255) to advertise routing information, and RIPv2 uses the multicast address 224.0.0.9 to do so. If you do not want to allow all the devices on the broadcast network or non-broadcast multi-path access network to receive routing information, use the **passive-interface** command to configure related interfaces as passive interfaces and then define only some neighbors who can receive the routing information. This command has no impact on the receiving of RIP information. The passive interface is configured. No request packet is sent after the interface is enabled.

Configuration Examples

The following example creates a VRF with the name of vpn1 and creates its RIP instance.

```
FS(config)# router rip
FS(config-router)# passive-interface default
FS(config-router)# neighbor 192.168.1.2
```

Related Commands

Command	Description
passive-interface	Configures the interface as a passive interface.

Platform Description

N/A

1.28 Network

Use this command to define the list of networks to be advertised in the RIP routing process. Use the **no** form of this command to delete the defined network.

network *network-number* [*wildcard*]

no network *network-number* [*wildcard*]

Parameter Description

Parameter	Description
network-number	Indicates the network number of the directly-connected network. The network number is a natural one. All interfaces whose IP addresses belong to that natural network can send/receive RIP packages.
wildcard	Defines the IP address comparing bit: 0 refers to accurate matching, and 1 refers to no comparison.

Defaults

N/A

Command Mode

Routing process configuration mode

Usage Guide

The *network-number* and *wildcard* parameters can be configured simultaneously to enable the IP address of the interface within the IP address range to join RIP running.

Without the *wildcard* parameter, FSOS make the interface IP address within the classful address range join the RIP running.

Only when the IP address of an interface is in the network list defined by RIP, RIP route update packets can be received and sent on the interface.

Configuration Examples

The following example defines two network numbers associated with RIP and allows the interface IP address between 192.168.12.0/24 and 172.16.0.0/24 to join RIP running.

```
FS (config)# router rip
FS (config-router)# network 192.168.12.0
FS(config-router)# network 172.16.0.0 0.0.0.255
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.29 Offset-list

Use this command to increase the metric value of received or sent RIP routes. Use the **no** form of this command to restore the default setting.

offset-list { access-list-number | name } { **in** | **out** } offset [interface-type interface-number]

no offset-list { access-list-number | name { **in** | **out** } offset [interface-type interface-number]

Parameter Description

Parameter	Description
access-list-number | *name*	Specifies the ACL.
in	Modifies the metric of the received routes using the ACL.
out	Modifies the metric of the sent routes using the ACL.
offset	Indicates the offset of changed metric values. The value is in the range from 0 to16.
interface-type	Applies the ACL to a specified interface.
interface-number	Specifies the interface number.

Defaults

No offset is specified by default.

Command Mode

Routing process configuration mode

Usage Guide

If a RIP route matches against both the offset-list of the specified interface and the global offset-list, it will increase the metric value of the offset-list of the specified interface.

Configuration Examples

The following example increases the metric of the RIP routes by 7 in the range specified by ACL 7.

```
FS (config-router)# offset-list 7 out 7
```

The following example increases the metric of the RIP routes by 7 in the range specified by ACL 7 and learned by fastethernet 0/1.

```
FS (config-router)# offset-list 8 in 7 fastethernet 0/1
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.30 Output-delay

Use this command to modify the delay to send RIP update packets. Use the **no** form of this command to restore the default setting.

output-delay *delay*

no output-delay

Parameter Description

Parameter	Description
delay	Sets the delay to send RIP update packets, in the range from 8 to 50 in the unit of milliseconds.

Defaults

No sending delay is configured by default.

Command Mode

Routing process configuration mode

Usage Guide

In normal cases, the size of a RIP update packet is 512 bytes including 25 routes. If the number of updated routes is greater than 25, update packets will be sent through multiple routes. Note that the update packets should be sent as fast as possible.

However, when a high-speed device sends a large number of packets to a low-speed device, the low-speed device may not process all the packets timely, resulting in packet loss. In this case, you can use this command to increase the delay to send packets on the high-speed device so that the low-speed device can process all the update packets.

Configuration Examples

The following example sets the delay to send RIP update packets to 30 milliseconds.

```
FS(config)# router rip
FS(config-router)# output-delay 30
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.31 Passive-interface

Use this command to disable the function of sending update packets on an interface. Use the **no** form of this command to restore the default setting.

passive-interface { **default** | *interface-type interface-num* }

no passive-interface { **default** | *interface-type interface-num* }

Parameter Description

Parameter	Description
default	Sets all interfaces to the passive interfaces.
interface-type interface-num	Indicates the interface type and number.

Defaults

Interfaces are set to the non passive interfaces by default.

Command Mode

Routing process configuration mode

Usage Guide

The **passive-interface default** command sets all interfaces to the passive interfaces. You can use **no passive-interface** *interface-type interface-num* command to set specified interfaces as non-passive interfaces. After you set an interface to the passive interface, RIP route update packets will no longer be sent but can be received through the interface. In this case, route update packets can be sent to a specified neighbor through the interfaces by using the **neighbor** command. You can use the **ip rip send enable** and **ip rip receive enable** commands to control whether route update packets can be sent or received through the interface.

Configuration Examples

The following example sets all interfaces to the passive interfaces and then sets ethernet0/1 to the non-passive interface.

```
FS(config-router)# passive-interface default
FS(config-router)# no passive-interface gigabitEthernet 0/1
```

Related Commands

Command	Description
ip rip receive enable	Enables or disables receiving RIP packets on the interface.
ip rip send enable	Enables or disables sending RIP packets on the interface.

Platform Description

N/A

1.32 Redistribute

Use this command to redistribute external routes in route configuration mode. Use the **no** form of this command to restore the default setting.

redistribute { **bgp** | **connected** | **isis** [*area-tag*] | **ospf** *process-id* | **static** } [{ **level-1** | **level-1-2** | **level-2** }] [**match** { **internal** | **external** [**1|2**] | **nssa-external** [**1|2**] }] [**metric** *metric-value*] [**route-map** *route-map-name*]

no redistribute { **bgp** | **connected** | **isis** [*area-tag*] | **ospf** *process-id* | **static** } [{ **level-1** | **level-1-2** | **level-2** }]

[**match** { **internal** | **external** [**1|2**] | **nssa-external** [**1|2**] }] [**metric** *metric-value*] [**route-map** *route-map-name*]

Parameter Description

Parameter	Description
bgp	Is redistributed from bgp.
connected	Is redistributed from a connected route.
isis *area-tag*	Is redistributed from ISIS and specifies an ISIS instance through area-tag.
ospf *process-id*	Is redistributed from OSPF and specifies an OSPF instance through process-id. The value is in the range from 1 to 65535.
static	Is redistributed from static routes.
level-1 | level-1-2 | level-2	Is used when ISIS route redistribution is configured and specifies a route with a specific level for redistribution.
match	Is used when OSPF route redistribution is configured and filters a route with a specific level for redistribution.
metric *metric-value*	Sets the metric value of the redistributed route and specifies the metric value by using the metric-value parameter. The value is in the range from 1 to 16.
route-map *route-map-name*	Sets the redistribution filtering rule.

Defaults

By default:

All the routes of the sub types of the instance are redistributed when you configure redistributing OSPF.

The routes of Level-2 sub-types of the instance are redistributed when you configure ISIS redistribution.

All the routes of the protocol are redistributed for other routing protocols.

The metric of the redistributed routes is 1 by default.

The route-map is not associated.

Command Mode

Routing process configuration mode

Usage Guide

This command is executed to redistribute external routes to RIP.

It is unnecessary to convert the metric of one routing protocol into that of another routing protocol for route redistribution, since different routing protocols use different metric measurement methods. For RIP, the metric value is calculated based on hop counts; for OSPF, the metric value is calculated based on bandwidths. Therefore, their metrics are not comparable. However, a symbolic metric value must be set for route redistribution. Otherwise, route redistribution will fail.

When you configure ISIS route redistribution without the level parameter, only level-2 routes are redistributed by default. If the redistribution configuration is initialized with the level parameter, then all routes with level configured are redistributed. When the configuration is saved and level 1 and level 2 are configured at the same time, level 1 and level 2 are combined into the level-1-2 parameter to be saved.

When you configure redistribution of OSPF routes without the match parameter, the OSPF routes of all sub types are redistributed by default. Then the first configured match parameter is used as the original one. Only the routes matching the specific type can be redistributed. The no form of this command restores the setting to the default value.

The rule of configuring the no form of the redistribute command is as follows:

1. If the no form of this command specifies certain parameters, the parameters must be restored to the default

configuration.

2. If the **no** form of this command does not specify any parameter, the command must be deleted.

Assume that the following configurations are available.

redistribute isis 112 level-2

You can use the no redistribute isis 112 level-2 command to modify the configuration.

According to the preceding rule, this command only restores the level-2 parameter to the default value. However, level-2 is also the default parameter value. Therefore, the configuration is still be saved as redistribute isis 112 level-2 after you use the no form of this command.

To delete this command, use the following command:

no redistribute isis 112

The redistribute command cannot redistribute the default route of other protocol to the RIP process. To this end, use the **default-information originate** command.

Configuration Examples

The following example redistributes static routes to RIP.

```
FS(config-router)# redistribute static
```

Related Commands

Command	Description
default-metric *metric*	Sets the default metric of the route to be redistributed.
default-information originate	Generates the default route in the RIP process.

Platform Description

N/A

1.33 Router Rip

Use this command to create the RIP routing process and enter the routing process configuration mode. Use the **no** form of this command to restore the default setting.

router rip

no router rip

Parameter Description

Parameter	Description
N/A	N/A

Defaults

No RIP process is running by default.

Command Mode

Global configuration mode

Usage Guide

One RIP routing process must be defined with one network number. If a dynamic routing protocol runs on asynchronous lines, configure the **async default routing** command on the asynchronous interface.

Configuration Examples

The following example creates the RIP routing process and enters the routing process configuration mode.

```
FS (config)# router rip
FS(config-router)#
```

Related Commands

Command	Description
network (RIP)	Defines the network number of the RIP process.

Platform Description

N/A

1.34 Show Ip Rip

Use this command to display the RIP process information.

show ip rip [vrf vrf-name]

Parameter Description

Parameter	Description
N/A	

Defaults

N/A

Command Mode

Privileged EXEC mode/ Global configuration mode/ Routing process configuration mode

Usage Guide

It is used to display the three timers, routing distribution status, routing re-distribution status, interface RIP version, RIP interface and network range, metric, and distance of the RIP process quickly.

Configuration Examples

The following example displays the basic information of the RIP process such as the update time and management distance.

```
FS#show ip rip
Routing Protocol is "rip"
  Sending updates every 10 seconds,
  Invalid after 20 seconds, flushed after 10 seconds
  Outgoing update filter list for all interface is: not set
  Incoming update filter list for all interface is: not set
  Default redistribution metric is 2
  Redistributing: connected
  Default version control: send version 2, receive version 2
    Interface             Send  Recv
    FastEthernet 0/1      2     2
    FastEthernet 0/2      2     2
  Routing for Networks:
    192.168.26.0 255.255.255.0
```

```
    192.168.64.0 255.255.255.0
  Distance: (default is 50)
    Graceful-restart enabled
    Restart grace period 60 secs
    Current Restart remaining time 16 secs
```

Specify vrf to display the basic information of the corresponding RIP instance.

```
FS(config-router)# sh ip rip vrf 1
VRF 1    VRF-id:1
Routing Protocol is "rip"
Sending updates every 30 seconds
Invalid after 180 seconds, flushed after 120 seconds
Outgoing update filter list for all interface is: not set
Incoming update filter list for all interface is: not set
Default redistribution metric is 1
Redistributing:
Default version control: send version 1, receive any version
Routing for Networks:
Distance: (default is 120)
Graceful-restart disabled
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.35 Show Ip Rip Database

Use this command to display the route summary information in the RIP routing database.

show ip rip database [vrf vrf-name] [*network-number network-mask*] [**count**]

Parameter Description

Parameter	Description
vrf vrf-name	Specify the RIP routing information of the VRF
network-number	(Optional) Indicates the ID of the subnet on which route information is to be displayed.
network-mask	Indicates the subnet mask. It must be specified if the network number is specified.
count	(Optional) Displays the abstract of the route statistics in the RIP database.

Command Mode

Privileged EXEC mode/ Global configuration mode/ Routing process configuration mode

Usage Guide

Only when the related sub-routes are converged, the converged address entries appear in the RIP routing database. When the last sub-route information in the converged address entries becomes invalid, the converged address information will be deleted from the database.

Configuration Examples

The following example displays all converged address entries in the RIP routing database.

```
FS# show ip rip database
192.168.1.0/24      auto-summary
192.168.1.0/30      directly connected, Loopback 3
192.168.1.8/30      directly connected, FastEthernet 0/1
192.168.121.0/24      auto-summary
192.168.121.0/24      redistributed
[1] via 192.168.2.22, FastEthernet 0/2
192.168.122.0/24      auto-summary
192.168.122.0/24
[1] via 192.168.4.22, Serial 0/1    00:28      permanent
```

The following example displays the converged address entries related with 192.168.121.0/24 in the RIP routing database.

```
FS# show ip rip database 192.168.121.0 255.255.255.0
192.168.121.0/24      redistributed
[1] via 192.168.2.22, FastEthernet 0/1
```

The following example displays the statistical information summary of various routes in the RIP routing database.

```
FS# show ip rip database count
                    All      Valid    Invalid
database            5         5         0
auto-summary        5         5         0
```

```
connected        1        1        0
rip              4        4        0
```

Related Commands

Command	Description
show ip rip	Displays the information of the currently-running routing protocol process.

Platform Description N/A

1.36 Show Ip Rip External

Use this command to display the information of the external routes redistributed by the RIP protocol.

show ip rip external [bgp | connected | isis [process-id] | ospf process-id | static] [vrf vrf-name]

Parameter Description

Parameter	Description
bgp	Displays redistributed BGP routes.
connected	Displays redistributed directly-connected routes.
isis ***process-id***	Displays redistributed ISIS routes. The process-id parameter indicates ISIS process ID.
ospf ***process-id***	Displays redistributed OSPF routes. The process-id parameter indicates OSPF process ID. The range is from 1 to 65535.
static	Displays redistributed static routes.
vrf *vrf-name*	Displays the RIP external route of the specified VRF (optional).

Defaults N/A

Command Mode Privileged EXEC mode/ Global configuration mode/ Routing process configuration mode

Usage Guide N/A

Configuration Examples The following example displays direct routes redistributed by the RIP process.

```
FS# show ip rip external
Protocol connected route:
[connected] 192.100.3.0/24 metric=0
        nhop=0.0.0.0, if=2
 [connected] 192.101.1.0/24 metric=0
        nhop=0.0.0.0, if=3
Protocol static route:
 [static] 10.1.1.1/32 metric=0
        nhop=0.0.0.0, if=4096
```

```
 [static] 10.1.2.1/32 metric=0
        nhop=0.0.0.0, if=4096
Protocol ospf 1 route:
 [ospf] 1.1.1.1/32 metric=2
        nhop=192.100.3.2, if=2
 [ospf] 90.1.1.1/32 metric=2
        nhop=192.100.3.2, if=2
```

Related Commands

Command	Description
show ip rip	Displays the information of the currently running routing protocol process.
ip vrf	Creates a VRF.

Platform Description N/A

1.37 Show Ip Rip Interface

Use this command to display the RIP interface information.

show ip rip interface [vrf vrf-name] [interface-type interface-number]

Parameter Description

Parameter	Description
vrf vrf-name	Specify the RIP interface of the VRF.
[*interface-type interface-number*]	Displays the specified interface type and interface number (optional).

Defaults N/A

Command Mode Privileged EXEC mode/ Global configuration mode/ Routing process configuration mode

Usage Guide This command is used to display the information about RIP interfaces. If no RIP interface exists, no information is displayed.

Configuration Examples The following example displays the RIP interface information.

```
FS# show ip rip interface
FastEthernet 0/1 is up, line protocol is up
Routing Protocol: RIP
Receive RIPv2 packets only
Send RIPv2 packets only
Recv RIP packet total: 0
Send RIP packet total: 3
Passive interface: Disabled
```

```
Split Horizon with Poisoned Reverse: Enabled
Triggered RIP Enabled:
Retransmit-timer: 5, Retransmit-count: 36
V2 Broadcast: Disabled
Multicast registe: Registed
Interface Summary Rip:
Not Configured
Authentication mode: Text
Authentication key-chain: ripk1
Authentication text-password: FS
Default-information: only, metric 5
IP interface address:
192.168.64.100/24, next update due in 14 seconds
2.2.1.1/24, next update due in 24 seconds
    neighbor 2.2.1.6, next update due in 3 seconds
    neighbor 2.2.1.77, next update due in 13 seconds
2.2.2.57/24, next update due in 16 seconds
```

Related Commands

Command	Description
show ip rip	Displays the information of the currently running routing protocol process.

Platform Description N/A

1.38 Show Ip Rip Peer

Use this command to show the RIP peer information. RIP records a summary for the RIP routing information source learnt (source addresses of RIP route update packets) for the convenience of user monitoring. This routing information source is called RIP neighbor information.

show ip rip peer [*ip-address*] [vrf vrf-name]

Parameter Description

Parameter	Description
ip-address	Displays the IP address of a specified RIP neighbor.
vrf vrf-name	Specify the RIP interface of the VRF

Defaults N/A

Command Mode Privileged EXEC mode/ Global configuration mode/ Routing process configuration mode

Usage Guide This command is used to display the RIP neighbor information. If no RIP neighbor exists, no information will be

displayed.

Configuration Examples

The following example displays the RIP neighbor information.

```
FS# show ip rip peer
Peer 192.168.3.2:
  Local address: 192.168.3.1
  Input interface: GigabitEthernet 0/2
  Peer version: RIPv1
  Received bad packets: 3
  Received bad routes: 0
  BFD session state up
```

Related Commands

Command	Description
show ip rip	Displays the information of the routing protocol process that is running.

Platform Description

N/A

1.39 Timers Basic

Use this command to adjust the RIP clock. Use the **no** form of this command to restore the default setting.

timers basic *update invalid flush*

no timers basic

Parameter Description

Parameter	Description
update	Indicates the route update time in seconds. The update keyword defines the period at which the device sends route update packets. Each time an update packet is received, the "Invalid" and "Flush" clocks are reset. By default, a route update packet is sent every 30 seconds.
invalid	Indicates the route invalid time in seconds, starting from the last valid update packet. The "invalid" defines the period when the route in the routing table becomes invalid due to no update. The invalid period of route shall be at least three times the route update period. If no update packet is received within the route invalid period, the related route becomes invalid and enters into the "invalid" state. If an update packet is received within the period, the clock resets. By default, the Invalid time is 180 seconds.
flush	Indicates the route flushing time in seconds, starting when a RIP route enters into the invalid status. When the flush time is due, the routes in the invalid status will be cleared out of the routing table. The default Flush time is 120 seconds.

Defaults

By default, the update time is 30 seconds, the invalid time is 180 seconds, and the flushing time is 120 seconds.

Command Mode

Routing process configuration mode

Usage Guide

Adjusting the above clocks may speed up routing protocol convergence and fault recovery. Devices connected to the same network must have consistent RIP clock values. Adjustment of RIP clocks is not recommended unless otherwise specified.

To check the current RIP clock parameters, use the **show ip rip** command.

If you set the clock to a small value on low-speed links, some risks will be caused because numerous update packets may use up the bandwidth. In general, the clocks can be configured with smaller values on Ethernet or the lines of above 2 Mbit/s to reduce the convergence time of routes.

Configuration Examples

The following example enables the RIP update packets that are sent every 10 seconds. If no update packet is received within 30 seconds, related routes become invalid and enter the invalid status. When another 90s elapses, they will be cleared.

```
FS (config)# router rip
FS (config-router)# timers basic 10 30 90
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.40 Validate-update-source

Use this command to validate the source address of the received RIP route update packet. Use the **no** form of the command to disable this function.

validate-update-source

no validate-update-source

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default.

Command Mode

Routing process configuration mode

Usage Guide

You can validate the source address of the RIP route update packet. The validation aims to ensure that the RIP routing process receives only the route update packets from the same IP subnet neighbor.

Disabling split horizon on the interface causes the RIP routing process to enable update message source address

validation, no matter whether it has been configured with the **validate-update-source** command in routing process configuration mode.

In addition, for the ip unnumbered interface, the RIP routing process does not implement update message source address validation, no matter whether it has been configured with the command **validate-update-source**.

Configuration Examples

The following example disables verification of the source IP address of the update packet.

```
FS (config)# router rip
FS (config-router)# no validate-update-source
```

Related Commands

Command	Description
ip split-horizon	Enables split horizon.
ip unnumbered	Defines the IP unnumbered interface.
neighbor (RIP)	Defines the IP address of a RIP neighbor.

Platform Description

N/A

1.41 Version

Use this command to define the RIP version of a device. Use the **no** form of this command to restore the default setting.

version { **1** | **2** }

no version

Parameter Description

Parameter	Description
1	Defines the RIP version 1.
2	Defines the RIP version 2.

Defaults

The route update packets of RIPv1 and are received by default, but only the RIPv1 route update packets are sent.

Command Mode

Routing process configuration mode

Usage Guide

This command defines the RIP version running on the device. It is possible to redefine the messages of which RIP version are processed on every interface by using the **ip rip receive version** and **ip rip send version** commands.

Configuration Examples

The following example configures the RIP version as version 2.

```
FS (config)# router rip
FS (config-router)# version 2
```

Related Commands

Command	Description
ip rip receive	Defines the version of RIP packets received on the

version	interface.
ip rip send version	Defines the version of RIP packets sent on the interface.
show ip rip	Displays RIP information.

Platform Description N/A

2. OSPFv2 Commands

2.1 Area

Use this command to configure the specified OSPF area. Use the **no** form of this command to restore the default setting.

area *area-id*

no area *area-id*

Parameter Description

Parameter	Description
area-id	ID of the OSPF area. The value can be a decimal integer or an IP address.

Defaults

No OSPF area is configured by default.

Command Mode

Routing process configuration mode

Usage Guide

Use the no form of this command to remove the specified OSPF area and its configuration, including the area-based **area authentication, area default-cost, area filter-list, and area nssa** commands.

- Do not remove the OSPF area configuration under the following conditions:
- Virtual links exist in the backbone area. The virtual links must be removed at first.
- The corresponding network area command exists in any area. All network segment commands added to an area must be removed at first.

Configuration Examples

The following example removes the configuration of OSPF area 2.

```
FS(config)# router ospf 2
FS(config-router)# no area 2
```

Related Commands

Command	Description
network area	Defines the interface where OSPF runs and the belonging area of the interface.

Platform Description

N/A

2.2 Area Authentication

Use this command to enable OSPF area authentication. Use the **no** form of this command to restore the default setting.

area *area-id* **authentication** [**message-digest**]

no area *area-id* **authentication**

Parameter

Parameter	Description

Description

area-id	Specifies ID of the area enabled with OSPF. The value can be a decimal integer or an IP address.
message-digest	(Optional) Enables MD5 (message digest 5) authentication mode.

Defaults

No authentication is enabled by default.

Command Mode

Routing process configuration mode

Usage Guide

The FSOS software supports three authentication types:

1) 0, no authentication. The authentication type in the OSPF packet is 0when this command is not executed to enable OSPF authentication. 2) 1, plain text authentication mode. When this command is configured, the message-digest option is not used.3) 2, MD5 authentication mode. When this command is configured, the message-digest option is used.

All devices in the same OSPF area must use the same authentication type. If authentication is enabled, the authentication password must be configured on an interface connecting neighbors. You can use the **ip ospf authentication-key** command to configure the plain text authentication password, and the **ip ospf message-digest-key** command to configure the MD5 authentication password in interface configuration mode.

Configuration Examples

The following example uses MD5 authentication and the authentication password backbone in area 0 (backbone area) of the OSPF routing process.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# ip address 192.168.12.1 255.255.255.0
FS(config-if-FastEthernet 0/1)# ip ospf message-digest-key 1 md5 backbone
FS(config)# router ospf 1
FS(config-router)# network 192.168.12.0 0.0.0.255 area 0
FS(config-router)# area 0 authentication message-digest
```

Related Commands

Command	Description
ip ospf authentication-key	Defines the OSPF plain text authentication password.
ip ospf message-digest-key	Defines the OSPF MD5 authentication password.
area virtual-link	Defines a virtual link.

Platform Description

N/A

2.3 Area Default-cost

Use this command to define the cost (OSPF metric) of the default aggregate route advertised to the stub area or not-so-stubby area (NSSA) in routing process configuration mode. Use the **no** form of this command to restore the default setting.

area *area-id* **default-cost** *cost*

no area *area-id* **default-cost**

Parameter Description

Parameter	Description
area-id	ID of the stub area or NSSA
cost	Cost of the default aggregate route advertised to the stub area or NSSA. The range is from 0 to 16777215.

Defaults

The default is 1.

Command Mode

Routing process configuration mode

Usage Guide

This command takes effect only on the Area Border Router (ABR) of the stub area or the ABR/Autonomous System Border Router (ASBR) of the NSSA.

The ABR can advertise a Link State Advertisement (LSA) indicating the default route in the stub area. The ABR/ASBR can advertise an LSA indicating the default route in the NSSA. You can use the **area default-cost** command to modify the LSA cost.

Configuration Examples

The following example sets the cost of the default aggregate route to 50.

```
FS(config)# router ospf 1
FS(config-router)# network 172.16.0.0 0.0.255.255 area 0
FS(config-router)#network 192.168.12.0 0.0.0.255 area 1
FS(config-router)# area 1 stub
FS(config-router)# area 1 default-cost 50
```

Related Commands

Command	Description
area stub	Sets an OSPF area as a stub area.
area nssa	Sets an OSPF area as an NSSA.

Platform Description

N/A

2.4 Area Filter-list

Use this command to filter the inter-area routes on the ABR. Use the **no** form of this command to restore the default setting.

area *area-id* **filter-list** { **access** *acl-name*| **prefix** *prefix-name* } { **in** | **out** }

no area *area-id* **filter-list** { **access** *acl-name* | **prefix** *prefix-name* } { **in** | **out** }

Parameter Description

Parameter	Description
area-id	Area ID

acl-name	Name of an Access Control List (ACL)
prefix-name	Prefix-list name
in | **out**	Applies the ACL rule to the routes incoming/outgoing the area.

Defaults No filtering is configured by default.

Command Mode Routing process configuration mode

Usage Guide This command can be configured only on an ABR.

You can use this command when it is required to filter the inter-area routes on the ABR.

Configuration Examples The following example sets area 1 to learn only the inter-area routes of 172.22.0.0/8.

```
FS# configure terminal
FS(config)# access-list 1 permit 172.22.0.0 0.255.255.255
FS(config)# router ospf 100
FS(config-router)# area 1 filter-list access 1 in
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.5 Area Nssa

Use this command to set an OSPF area as an NSSA in routing process configuration mode. Use the **no** form of this command to delete the NSSA or the NSSA configuration.

area *area-id* **nssa** [**no-redistribution**] [**default-information-originate** [**metric** *value*] [**metric-type** *type*]] [**no-summary**] [**translator** [**stability-interval** *seconds* | **always**]]

no area *area-id* **nssa** [**no-redistribution**] [**default-information-originate** [**metric** *value*] [**metric-type** *type*]] [**no-summary**] [**translator** [**stability-interval** | **always**]]

Parameter Description

Parameter	Description
area-id	NSSAID
no-redistribution	Imports the routing information to a common area other than the NSSA for the NSSA ABR.
default-information originate	Generates and imports the default Type 7 LSA to the NSSA. This option takes effect only on the NSSA ABR or ASBR.
metric *value*	Sets the metric of the generated default LSA. The range is from 0 to 16777214. The default value is 1.
metric-type *type*	Sets the type of the generated LSA to N-1 or N-2. The default value is N-2.
no-summary	Prevents the NSSA ABR from sending summary LSAs (Type-3 LSA).

translator	Configures the translator for the NSSA ABR.
stability-interval *seconds*	Configures the stability interval in seconds for the NSSA ABR that functions as a translator to change to a non-translator. The range is from 0 to 2147483647. The default value is 40.
always	Configures that an NSSA ABR always functions as a translator. The NSSA ABR is the backup translator by default.

Defaults

No NSSA is defined by default.

Command Mode

Routing process configuration mode

Usage Guide

The default-information-originate parameter is used to generate the default Type-7 LSA. However, on the NSSA ABR, the default Type-7 LSA will always be generated; On the ASBR (which is not an ABR at the same time), the default Type-7 LSA is generated only when the default route exists in the routing table.

The no-redistribution parameter prevents the OSPF from advertising the external routes imported with the redistribute command to the NSSA on the ASBR. This option is generally used when the NSSA device is both an ASBR and an ABR.

To reduce the number of LSAs sent to the NSSA, you can configure the no-summary parameter on the ABR to prevent it from advertising summary LSAs (Type-3 LSAs) to the NSSA. In addition, you can use the area default-cost command on the NSSA ABR to configure the cost of the default route advertised to the NSSA. By default, this cost is 1.

If an NSSA has multiple ABRs, the ABR with the greatest ID is selected as the Type-7 or Type-5 translator. To configure that an NSSA ABR always functions as a translator, you can use the translator always parameter. If the translator role of an ABR is taken away by another ABR, the ABR still possesses the conversion capability within stability-interval. If the ABR fails to take back its translator role when stability-interval expires, the LSA that changes from Type-7 to Type-5 will be removed from the autonomous domain.

To avoid route loops, Type-5 LSAs generated from Type-7 convergence will be eliminated immediately after the current device stopped serving as a translator, with no need to wait until the stability-interval expires.

In a same NSSA, you are recommended to configure the **translator always** parameter on only one ABR.

Configuration Examples

The following example sets area 1 as an NSSA on all routers of the area.

```
FS(config)#router ospf1
FS(config-router)#network 172.16.0.0 0.0.255.255 area0
FS (config-router)#network 192.168.12.0 0.0.0.255 area 1
FS(config-router)# area1nssa
```

Related Commands

Command	Description
area default-cost	Defines the cost (OSPF metric) of the default aggregate route advertised to the NSSA.

Platform Description N/A

2.6 Area Range

Use this command to configure inter-area route aggregation for OSPF. Use the **no** form of this command to delete route aggregation. Use the **no** form with the cost parameter to restore the default metric of the aggregate route, but not delete route aggregation.

area *area-id* **range** *ip-address net-mask* [**advertise** | **not-advertise**] [c**ost** *cost*]

no area *area-id* **range** *ip-address net-mask* [cost]

Parameter Description

Parameter	Description
area-id	ID of the area where the aggregate route is injected into. The value can be a decimal integer or an IP address.
ip address net-mask	Network segment whose routes are to be aggregated
advertise | not-advertise	Whether to advertise the aggregate route
cost *cost*	Sets the priority of the interface. The range is from 0 to 16777215.

Defaults

No inter-area route aggregation is configured by default.

The configured aggregation range is advertised by default.

The default metric of the aggregate route depends on whether the device is compatible with RFC1583. If yes, the default metric is the smallest cost of the aggregate route. If no, the default metric is the largest cost of the aggregate route.

Command Mode Routing process configuration mode

Usage Guide

This command takes effect only on the ABR to aggregate multiple routes of an area into a route and advertise it to other areas. Route combination occurs only on the border of an area. The devices inside an area see the specific routing information, but the devices outside the area see only one aggregate route. The advertise and not-advertise options can set whether to advertise the aggregate route for filtering and masking. The aggregate route is advertised by default.

You can use the cost option to set the metric of the aggregate route.

You can define route aggregate in multiple areas to simplify the routes in the whole OSPF routing area. This improves the network forwarding performance, especially in large networks.

The area range of route aggregation is determined according to the longest match when multiple aggregate routes with direct inclusion relationships are configured.

Configuration Examples

The following example aggregate the routes of area 1 into a route 172.16.16.0/20.

```
FS(config)#router ospf 1
FS(config-router)#network 172.16.0.0 0.0.15.255area0
FS((config-router)#network 172.16.17.0 0.0.15.255area1
FS(config-router)#area1range 172.16.16.0 255.255.240.0
```

Related Commands

Command	Description
discard-route	Enables a discarded route to be added to a routing table.
summary-address	Configures the OSPF external route aggregation.

Platform Description

N/A

2.7 Area Stub

Use this command to set an OSPF area as a stub area or full stub area. Use the **no** form of this command to restore the default setting.

area *area-id* **stub** [**no-summary**]

no area *area-id* **stub** [**no-summary**]

Parameter Description

Parameter	Description
area-id	Stub area ID
no-summary	(Optional) Prevents the ABR from advertising the network summary link to the stub area. Here the stub area is called the full stub area. Only the ABR needs this parameter.

Defaults

No stub area is defined by default.

Command Mode

Routing process configuration mode

Usage Guide

All devices in the OSPF stub area must be configured with the area stub command. The ABR only sends three types of link state advertisement (LSA) to the stub area: 1) type 1, device LSA; 2) type 2, network LSA; 3) type 3, network summary LSA. For the routing table, the devices in the stub area can learn only the routes inside the OSPF routing domain, including the internal default routes generated by the ABR.

To configure a full stub area, use the area stub command with the no-summary keyword on the ABR. The devices in the full stub area can learn only the routes in the local area and the internal default routes generated by the ABR.

Two commands can configure an OSPF area as a stub area: the area stub and area default-cost commands. All devices connected to the stub area must be configured with the area stub command, but the area default-cost command can be executed only on the ABR. The area default-cost command defines the initial cost (metric) of the internal default route.

Configuration Examples

The following example sets area 1 as the stub area on all devices in area 1.

```
FS(config)# router ospf1
FS(config-router)# network172.16.0.0 0.0.255.255 area 0
FS (config-router)# network 192.168.12.0    0.0.0.255 area 1
FS(config-router)# area 1 stub
```

Related Commands

Command	Description
area default-cost	Defines the cost (OSPF metric value) of the default aggregate route advertised to the stub area.

Platform Description

N/A

2.8 Area Virtual-link

Use this command to define the OSPF virtual link in routing process configuration mode. Use the **no** form of this command to restore the default setting.

area *area-id* **virtual-link** *router-id* [**authentication** [**message-digest** | **null**]] [**dead-interval** *{ seconds* | **minimal hello-multiplier** *multiplier }*] [**hello-interval** *seconds]* [**retransmit-interval** *seconds]* [**transmit-delay** *seconds*] [[**authentication-key** [**0|7**] *key*] | [**message-digest-key** *key-id* **md5** [**0|7**] *key*]]

no area *area-id* **virtual-link** *router-id* [**authentication**] [**dead-interval**] [**hello-interval**] [**retransmit-interval**] [**transmit-delay**] [[**authentication-key**] | [**message-digest-key** *key-id]]*

Parameter Description

Parameter	Description
area-id	ID of the OSPF transition area. The value can be a decimal integer or an IP address.
router-id	ID of the router neighboring to the virtual link. It can be viewed with the show ip ospf command.
dead-interval *seconds*	(Optional) Defines the time to declare neighbor loss in seconds. The range is 0 to 2147483647.This value must be consistent with that of the neighbor.
minimal	Enables the Fast Hello function and sets the death clock to 1 second.
hello-multiplier	Multiplies dead-interval with hello-interval in the Fast-Hello function.
multiplier	Specifies the number of Hello packets that are sent every second in the Fast Hello function. The range is from 3 to 20.
hello-interval *seconds*	(Optional)Defines the interval at which the HELLO packet is sent by the OSPF to the virtual link in seconds. The range is from1 to 65535.This value must be consistent with that of the neighbor.
retransmit-interval *seconds*	(Optional) OSPF LSA retransmission interval in seconds. The range is from 0 to 65535. The parameter setting must consider the round-trip time of packets on the link.
transmit-delay *seconds*	(Optional) OSPF LSA transmission delay in seconds. The range is from 0 to 65535. This value adds the LSA keep alive period. When the LSA keep alive period reaches a threshold, the LSA will be refreshed.
authentication-key [0|7]*key*	(Optional) Defines the OSPF plain text authentication key. The plain text authentication key between neighbors must be the same. The service password-encryption command enables the key to be displayed in encrypted manner. 0 indicates that the key is displayed in plain text.

	7 indicates that the key is displayed in cipher text.
message-digest-key *key-id***md5 [0|7]***key*	(Optional) Defines the OSPF MD5 authentication key and key ID. The MD5 authentication key ID and key between neighbors must be the same. The service password-encryption command enables the key to be displayed in encrypted manner. 0 indicates that the key is displayed in plain text. 7 indicates that the key is displayed in cipher text.
authentication	Sets the authentication type to plain text.
message-digest	Sets the authentication type to MD5.
null	Sets the authentication type to no authentication.

Defaults

The following are the default values:

dead-interval: 40seconds

hello-interval: 10seconds

retransmit-interval: 5seconds

transmit-delay: 1second

authentication: null

The Fast Hello function is disabled by default.

The other parameters do not have default values.

Command Mode

Routing process configuration mode

Usage Guide

A virtual link can connect an area to the backbone area, or another non-backbone area. In the OSPF routing domain, all areas must connect to the backbone area. If an area disconnects from the backbone area, a virtual link to the backbone area is required. Otherwise, the network communication will become abnormal. The virtual link is created between two ABRs. The area that belongs to both ABRs is called the transition area, which can never be a stub area or NSSA.

The router-id parameter indicates the ID of OSPF neighbor router and can be displayed with the show ip ospf neighbor command. You can configure the loopback address as the router ID.

The area virtual-link command defines only the authentication key for a virtual link. You can use the area authentication command to enable the OSPF packet authentication in areas connected over the virtual link in routing process configuration mode.

OSPF supports the Fast Hello function.

If the Fast Hello function is enabled, the OSPF can discover neighbors and detects invalid neighbors quickly. You can enable the OSPF Fast Hello function by specifying the keywords minimal and hello-multiplier, and the multiplier parameter. You can set the death clock to 1 second in minimal and hello-multiplier to a value equal to or greater than 2. In this case, the Hello packet sending interval is less than 1 second.

The hello-interval field of a Hello packet received by a virtual link is omitted if the Fast Hello function is enabled on the virtual link and the hello-interval field is set to 0 for Hello packets advertised from the virtual link.

No matter the Fast Hello function is enabled or not, the values of dead-interval must be consistent on both ends of a virtual link. The values of hello-multiplier on both ends can be different if at least one Hello packet can be received within dead-interval. You can use the show ip ospf virtual-links command to monitor dead-interval and hello-interval configured for a virtual link.

For the Fast Hello function, you can only configure either the **dead-interval minimal hello-multiplier** parameter or the **hello-interval** parameter.

Configuration Examples

The following example sets area 1 as the transition area to establish virtual link with neighbor *2.2.2.2*.

```
FS(config)# router ospf 1
FS(config-router)# network 172.16.0.0 0.0.15.255 area0
FS(config-router)# network 172.16.17.0 0.0.15.255 area1
FS(config-router)#area1 virtual-link2.2.2.2
```

The following example sets area 1 as the transition area to establish a virtual link with neighbor *1.1.1.1*. This virtual link connects area 10 and the backbone area, and works with the OSPF packet authentication inMD5 mode.

```
FS(config)# routerospf1
FS(config-router)# network172.16.17.0 0.0.15.255area1
FS(config-router)# network172.16.252.0 0.0.0.255 area10
FS(config-router)# area 0 authentication message-digest
FS(config-router)# area1virtual-link 1.1.1.1message-digest-key1md5hello
```

The following example sets area 1 as the transition area to establish a virtual link with neighbor 1.1.1.1, enables the Fast Hello function on this virtual link, and sets the multiplier to 3.

```
FS(config)# routerospf1
FS(config-router)# network172.16.17.0 0.0.15.255 area1
FS(config-router)# network 172.16.252.0 0.0.0.255 area10
FS(config-router)# area1 virtual-link1.1.1.1dead-interval minimal hello-multiplier 3
```

Related Commands

Command	Description
area authentication	Enables the OSPF area packet authentication and define the authentication mode.
show ip ospf	Displays the OSPF process information, including the router ID.
show ip ospf virtual-links	Monitors information about a virtual link.

Platform Description

N/A

2.9 Auto-cost

Use this command to enable the auto-cost function and set the reference bandwidth according to the reference bandwidth. Use the **no** form of this command to restore the default setting.

auto-cost [**reference-bandwidth** *ref-bw*]

no auto-cost [**reference-bandwidth**]

Parameter Description

Parameter	Description
ref-bw	Reference bandwidth, in the range from1 to 4294967 Mbps.

Defaults

The default is 100Mbps.

Command Mode

Routing process configuration mode

Usage Guide

By default, the cost of an OSPF interface is equal to the reference value of the auto cost divided by the interface bandwidth.

Run the **auto-cost** command to obtain the reference value of the auto cost. The default value is 100 Mbps.

Run the **bandwidth** command to set the interface bandwidth.

The costs of OSPF interfaces on several typical lines are as follows:

64Kbps serial line: The cost is 1562.

E1 line: The cost is 48.

10M Ethernet: The cost is 10.

100M Ethernet: The cost is 1.

If you run the **ip ospf cost** command to configure the cost of an interface, the configured cost will automatically overwrite the cost that is computed based on the auto cost.

Configuration Examples

The following example configures the reference bandwidth as 10 Mbps.

```
FS(config)# routerospf1
FS(config-router)# network172.16.10.0 0.0.0.255 area0
FS(config-router)# auto-costreference-bandwidth10
```

Related Commands

Command	Description
show ip ospf	Displays the OSPF global configuration information
ip ospf cost	Sets the cost value of the OSPF interface.
bandwidth	Sets the interface bandwidth. This setting does not affect data transmission rate.

Platform Description

N/A

2.10 Bdf All-interfaces

Use this command to enable Bidirectional Forwarding Detection (BFD) on all OSPF interfaces. Use the **no** form of this command to restore the default setting.

bdf all-interfaces

no bdf all-interfaces

Parameter Description

Parameter	Description
N/A	N/A

Defaults

BDF is disabled by default.

Command Mode

Routing process configuration mode

Usage Guide

OSPF dynamically discovers the neighbors through Hello packets. With the BFD function enabled, one BFD session will be established for the neighbors that match the FULL rules and the status of the neighbors will be detected through the BFD mechanism. Once the BFD neighbor fails, the OSPF will converge with the network immediately.

You can also use the **ip ospf bfd** [**disable**] command in interface configuration mode to enable or disable the BFD function on the specified interface, which takes precedence over the **bfd all-interfaces** command in routing process configuration mode.

Configuration Examples

```
FS(config)# router ospf 1
FS(config-router)# bfd all-interfaces
```

Related Commands

Command	Description
router ospf	Creates the OSPF routing process and enters routing process configuration mode.
ip ospf bfd]	Enables the specified interface running OSPF or disabling BFD for link detection.

Platform Description

N/A

2.11 Capability Opaque

Use this command to enable Opaque LSA. Use the **no** form of this command to disable this function.

capability opaque

no capability opaque

Parameter Description

Parameter	Description
N/A	N/A

Defaults Opaque LSA is enabled by default.

Command Mode Routing process configuration mode.

Usage Guide N/A

Configuration Examples The following example disables Opaque LSA capability.

```
FS(config)# router ospf 1
FS(config-router)# no capability opaque
```

Related Commands

Command	Description
show ip ospf	Displays the global configuration of OSPF.

Platform Description N/A

2.12 Clear Ip Ospf Process

Use this command to clear and restart the OSPF instance.

clear ip ospf *(process-id)* **process**

Parameter Description

Parameter	Description
process-id	OSPF instance ID. When the ID is specified, the command clears data related to the specified instance and restarts the OSPF instance. When no ID is specified, the command clears data related to all running OSPF instances and restarts all the running OSPF instances.

Defaults The rule recommended in the RFC 1583 is used by default.

Command Mode Privileged EXEC mode

Usage Guide Resetting the entire OSPF process causes that all neighbors are re-established and OSPF is greatly affected. Therefore, you are prompted to confirm the execution for deliberation.

Configuration Examples The following example clears data of OSPF instance 1 and restarts OSPF instance 1.

```
FS#clearipospf1process
```

Related Commands

Command	Description

N/A	N/A

Platform Description N/A

2.13 Compatible Rfc1583

Use this command to determine the RFC 1583 or RFC 2328 rule for selecting the optimal route among route table several routes to the same destination out of the Autonomous System (AS).

compatible rfc1583

no compatible rfc1583

Parameter Description

Parameter	Description
N/A	N/A

Defaults The RFC 1583 rule is used by default.

Command Mode Routing process configuration mode

Usage Guide N/A

Configuration Examples The following example determines the best route with the RFC 2328 rule.

```
FS(config)# routerospf1
FS(config-router)# nocommpatiblerfc1583
```

Related Commands

Command	Description
show ip ospf	Displays the OSPF global configuration information

Platform Description N/A

2.14 Default-information Originate

Use this command to generate a default route to be injected into the OSPF routing domain in routing process configuration mode. Use the **no** form of this command to restore the default setting.

default-information originate [**always**] [**metric** *metric*] [**metric-type** *type*] [**route-map** *map-name*]

no default-information originate [**always**] [**metric**] [**metric-type**] [**route-map** *map-name*]

Parameter Description

Parameter	Description
always	(Optional) Generates the default route unconditionally, no matter whether the default route exists locally or not.

metric *metric*	(Optional) Initial metric of the default route in the range from0 to 16777214
metric-type *type*	(Optional) Type of the default route. There are two type of OSPF external routes: type 1, different metrics on different devices; type 2, same metric on different devices. An external route of type 1 is more trustworthy than that of type 2.
route-map *map-name*	Associated route map name. No route map is associated by default.

Defaults

No default route is generated by default.

The default value of metric is 1.

The default value of metric-type is 2.

Command Mode

Routing process configuration mode

Usage Guide

When the **redistribute** or **default-information** command is executed, the OSPF-enabled device automatically turns into the ASBR. The ASBR cannot generate the default route automatically or advertise it to all the devices in the OSPF routing domain. The ASBR can generate the default route with the **default-information originate** command in routing process configuration mode.

If the always parameter is used, the OSPF routing process advertises an external default route to neighbors, no matter the default route exists or not. However, the local device does not display the default route. To make sure whether the default route is generated, use the **show ip ospf database** command to display the OSPF link state database. The external link identified with 0.0.0.0 indicates the default route. You can use the show ip route command on the OSPF neighbor to display the default route.

The metric of the external default route can be defined only with the **default-information originate** command.

There are two types of OSPF external routes: type 1 external routes have changeable routing metrics, while type 2 external routes have constant routing metrics. For two parallel routes with the same route metric to the same destination network, the type 1 route takes precedence over the type 2 route. As a result, the **show ip route** command displays only the type 1 route.

This command generates a default route of Type-5 LSA, which will not be flooded to the NSSA area.

To generate a default route in the NSSA area, use the **area nssa default-information-originate** command.

The routers in the stub area cannot generate external default routes.

The range of set metric is 0 to 16777214 for the associated route map. If the value exceeds the range, introducing a route fails.

Configuration Examples

The following example configures that OSPF generates an external default route and injects it to the OSPF routing domain. The default route is of type 1 and the metric 50.

```
FS(config)#routerospf 1
FS(config-router)#network172.16.24.0 0.0.0.255 area 0
FS(config-router)#default-information originate
alwaysmetric50metric-type1
```

Related Commands

Command	Description

show ip ospf database	Displays OSPF link state database.
show ip route	Displays the IP route table.
redistribute	Redistributes routes of other routing processes.

Platform Description N/A

2.15 Default-metric

Use this command to set the **default metric** of OSPF redistribution route. Use the **no** form of this command to restore the default setting.

default-metric *metric*

no default-metric

Parameter Description

Parameter	Description
metric	Default metric of the OSPF redistribution route in the range from1 to 16777214

Defaults The default metric is not configured by default.

Command Mode Routing process configuration mode

Usage Guide The **default-metric** command must work with the **redistribute** command in routing process configuration mode to modify the initial metric of all redistributed routes.

The configuration result of the **default-metric** command does not take effect for the external routes injected into the OSPF routing domain with the **default-information originate** command.

Configuration Examples The following example configures the default metric of the OSPF redistribution route as 50.

```
Switch(config)# router rip
FS(config-router)# network192.168.12.0
Switch(config-router)# version 2
FS(config-router)# exit
FS(config)# routerospf1
FS(config-router)# network172.16.10.0 0.0.0.255area0
Switch(config-router)# default-metric 50
FS(config-router)# redistribute rip subnets
```

Related Commands

Command	Description
redistribute	Redistributes the routes of other routing processes.
show ip ospf	Displays the OSPF global configuration information.

Platform N/A

Description

2.16 Discard-route

Use this command to enable adding the discard-route into the core route table. Use the **no** form of this command to disable this function.

discard-route { **internal | external** }

no discard-route { **internal** | **external** }

Parameter Description

Parameter	Description
internal	Enables adding the discard-route generated with the area range command
external	Enables adding the discard-route generated with the summary-address command.

Defaults Adding the discard-route is enabled by default.

Command Mode Routing process configuration mode

Usage Guide After route aggregation, the range may exceed the actual network range of the route table, and sending the data to the nonexistent network may cause loops or increase router loads. To prevent this situation, the discard-route is added to the route table on the ABR or the ASBR. The discard-route is generated automatically and will not be transmitted.

Configuration Examples The following example disables adding the discard routes generated with the area range command.

```
FS(config)# router ospf 1
FS(config-router)# no discard-route internal
```

Related Commands

Command	Description
area range	Configures the route aggregation between OSPF areas.
summary-address	Configures the route aggregation out of the OSPF routing domain.

Platform Description N/A

2.17 Distance Ospf

Use this command to set the Administration Distance (AD) of different types of OSPF routes. Use the **no** form of this command to restore the default setting.

distance { *distance* | **ospf** { [**intra-area** *distance*] [**inter-area** *distance*] [**external** *distance*] } }

no distance [**ospf**]

Parameter Description

Parameter	Description
distance	Sets the route AD in the range from1 to 255.
intra-area *distance*	Sets the AD of the intra-area route in the range from1 to 255.
inter-area *distance*	Sets the AD of the inter-area route in the range from1 to 255.
External *distance*	Sets the AD of the external route in the range from1 to 255.

Defaults

The default value is 110.

The default intra-area distance is 110.

The default inter-area distance is 110.

The default external distance is 110.

Command Mode

OSPF Routing process configuration mode

Usage Guide

This command is used to specify different ADs for different types of OSPF routes.

Configuration Examples

The following example sets the OSPF external route AD to 160.

```
FS(config)# routerospf1
FS(config-router)# distance ospf external 160
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.18 Distribute-list In

Use this command to configure LSA filtering. Use the **no** form of this command to restore the default setting.

distribute-list *{ [access-list-number | name] | prefix prefix-list-name [* **gateway** *prefix-list-name] |* **route-map** *route-map-name } in [interface-type interface-number]*

no distribute-list *{ [access-list-number | name] | prefix prefix-list-name [* **gateway** *prefix-list-name] |* route-map *route-map-name } in [interface-type interface-number]*

Parameter Description

Parameter	Description
access-list-number | **name**	Uses the ACL filtering rule.
gateway *prefix-list-name*	Uses the gateway filtering rule.
Prefix *prefix-list-name*	Uses the prefix-list filtering rule.
route-map *route-map-name*	Uses the route-map filtering rule.
interface-type interface-number	Configures the LSA route filtering on the interface.

Defaults

No filtering is configured by default.

Command Mode Routing process configuration mode

Usage Guide This configuration filters the received LSAs, and only those matching the filtering conditions are involved in the Shortest Path First (SPF) calculation to generate the corresponding routes. It does not affect the link status database or the route table of the neighbors. It only affects the routing entries calculated by local OSPF. This function is used to control routes that enter the ABR or ASBR.

The following route-map rules will be supported if the route-map parameter is configured:

match interface

match ip address

match ip address prefix-list

match ip next-hop

match ip next-hop prefix-list

match metric

match tag

match route-type

Filtering routes by using the **distribute-list in** command affects forwarding of local routes, but does not affect route computation based on LSAs. Therefore, if route filtering is configured on the ABR, Type 3 LSAs will still be generated and advertised to other areas because routes can still be computed based on LSAs. As a result, black-hole routes are generated. In this case, you can run the **area filter-list** or **area range** (containing the **not-advertise** parameter) command on the ABR to prevent generation of black-hole routes.

Configuration Examples The following example configures LSA filtering.

```
FS(config)# access-list3permit172.16.0.00.0.127.255
FS(config)# router ospf 25
FS(config-router)# distribute-list 3 in ethernet 0/1
```

Related Commands

Command	Description
distribute-list out	Filters redistribution routes.

Platform Description N/A

2.19 Distribute-list Out

Use this command to configure filtering redistribution routes. The function is similar to that of the **redistribute** command. Use the **no** form of this command to restore the default setting.

distribute-list *{ [access-list-number | name] |* **prefix** *prefix-list-name }* **out** [**bgp** | **connected** | **isis** *[area-tag] |* **ospf** *process-id* | **rip** | **static**]

no distribute-list *{ [access-list-number | name] |* **prefix** *prefix-list-name }* **out** [**bgp** | **connected** |**isis** *[area-tag]* | **ospf** *process-id* | **rip** | **static**]

Parameter

Parameter	Description

Description

access-list-number | name	Uses the ACL filtering rule.
prefix prefix-list-name	Uses the prefix-list filtering rule.
bgp | connected | isis [area-tag] **| ospf** process-id| **rip | static**	Source of the routes to be filtered

Defaults No filtering is configured by default.

Command Mode Routing process configuration mode

Usage Guide Similar to the redistribute route-map command, the distribute-list out command filters the routes that other protocols redistribute to the OSPF. However, the distribute-list out command does not redistribute routes by itself. It works with the redistribute command in most cases. The ACL filtering rule and the prefix-list filtering rule cannot coexist in the configuration, that is, the two rules cannot be configured at the same time for routes from the same source.

Configuration Examples The following example filters the redistributed static routes.

```
FS(config)# routerospf1
FS(config)# redistribute static subnets
FS(config-router)# distribute-list 22 outstatic
FS(config-router)# distribute-list prefix jjj out static
% Access-list filter exists, please de-config first
```

Related Commands

Command	Description
distribute-list in	Configures LSA filtering.
redistribute	Redistributes routes of other routing processes.

Platform Description N/A

2.20 Enable Mib-binding

Use this command to bind the Management Information Base (MIB) with the specified OSPFv2 process. Use the **no** form of this command to restore the default setting.

enable mib-binding

no enable mib-binding

Parameter Description

Parameter	Description
N/A	N/A

Defaults The MIB is bound with the OSPFv2 process with the smallest ID by default.

Command Mode Routing process configuration mode

Usage Guide OSPFv2 MIB has no OSPFv2 process information, so the user operates a sole OSPFv2 process by SNMP. By default, OSPFv2 MIB is bound with the OSPFv2 process with the smallest ID. User operations take effect for this process. To operate the specified OSPF process over Simple Network Management Protocol(SNMP), use this command to bind the MIB to SNMP.

Configuration Examples The following example operates OSPFv2 process 100 over SNMP:

```
FS(config)# routerospf100
FS(config-router)# enable mib-binding
```

Related Commands

Command	Description
show ip ospf	Displays the OSPF global configuration information.
enable traps	Configures the OSPF TRAP function.

Platform Description N/A

2.21 Enable Traps

The OSPFv2 process supports 16 kinds of TRAP packets, which are classified into four categories. Use this command to enable sending the specified TRAP messages. Use the **no** form of this command to restore the default setting.

enable traps [**error** [**IfAuthFailure** | **IfConfigError** | **IfRxBadPacket** | **VirtIfAuthFailure** | **VirtIfConfigError** | **VirtIfRxBadPacket**] | **lsa** [**LsdbApproachOverflow** | **LsdbOverflow** | **MaxAgeLsa** | **OriginateLsa**] | **retransmit** [**IfTxRetransmit** | **VirtIfTxRetransmit**] | **state-change** [**IfStateChange** | **NbrRestartHelperStatusChange** | **NbrStateChange** | **NssaTranslatorStatusChange** | **RestartStatusChange** | **VirtIfStateChange** | **VirtNbrRestartHelperStatusChange** | **VirtNbrStateChange**]]

no enable traps [**error** [**IfAuthFailure** | **IfConfigError** | **IfRxBadPacket** | **VirtIfAuthFailure** | **VirtIfConfigError** | **VirtIfRxBadPacket**] | **lsa** [**LsdbApproachOverflow** | **LsdbOverflow** | **MaxAgeLsa** | **OriginateLsa**] | **retransmit** [**IfTxRetransmit** | **VirtIfTxRetransmit**] | **state-change** [**IfStateChange** | **NbrRestartHelperStatusChange** | **NbrStateChange** | **NssaTranslatorStatusChange** | **RestartStatusChange** | **VirtIfStateChange** | **VirtNbrRestartHelperStatusChange** | **VirtNbrStateChange**]]

Parameter Description

Parameter	Description
error	Configures all traps switches related to errors. Use this parameter to set the following specified error traps switches. **Ifauthfailure** — Interface authentication error **Ifconfigerror** — Interface parameter configuration error **Ifrxbadpacket** — Error packets received on the interface **Virtifauthfailure** — Authentication error on the virtual interface

	Virtifconfigerror	Parameter configuration error on the virtual interface
	Virtifrxbadpacket	Error packets received on the virtual interface
isa	Configures all traps switches related to the LSA. Use this parameter to set the following specified LSA traps switches.	
	Lsdbapproachoverflow	External LSA count has reached the 90% of the upper limit.
	Lsdboverflow	External LSA count has reached the upper limit.
	Maxagelsa	LSA reaching the aging time
	Originatelsa	Generates new LSA
retransmit	Configures all traps switches related to the retransmission. Use this parameter to set the following specified retransmit traps switches.	
	Iftxretransmit	Packet retransmission on the interface
	Virtiftxretransmit	Packet retransmission on the virtual interface
state-change	Configures all traps switches related to the state change. Use this parameter to set the following specified state-change switches.	
	Ifstatechange	Interface state change
	NbrRestartHelper StatusChange	State change during the neighbor GR process
	Nbrstatechange	Neighbor state change
	NssaTranslatorStatusChange	State change of the NSSA translator
	RestartStatusChange	State change of the GR Restarter on the device
	Virtifstatechange	State change on the virtual interface
	VirtNbrRestartHelper StatusChange	Status change of the virtual neighbor GR process
	Virtnbrstatechange	State change on the virtual neighbor

Defaults All TRAP switches are disabled by default.

Command Mode Routing process configuration mode

Usage Guide The **snmp-server enable traps ospf** command must be configured before you configure this command, for it is limited by the **snmp-server** command.

This command is not limited by the binding of process and MIB, allowing to enable the TRAP switch for different processes simultaneously.

Configuration Examples The following example enables all TRAP switches of OSPFv2 process 100.

```
FS(config)# routerospf100
FS(config-router)# enable traps
```

Related Commands

Command	Description
show ip ospf	Displays the OSPF global configuration information.
enable mib-binding	Binds the OSPFv2 process with MIB.
snmp-server enable traps ospf	Enables the OSPF TRAP notification function.

Platform Description

N/A

2.22 Fast-reroute

Use this command to enable the OSPF FRR (Fast Reroute) function for the device. Use the **no** form of this command to restore the default setting.

fast-reroute { **lfa** | **downstream-paths** | **route-map** *route-map-name* }

no fast-reroute { **lfa** [**downstream-paths**] | **route-map**] }

Parameter Description

Parameter	Description
lfa	Enables the LFA (loop-free alternate) path computation.
downstream-paths	Enables the downstream path computation.
route-map *route-map-name*	Specifies the backup path through the route map.

Defaults

The FRR function is disabled by default.

Command Mode

Routing process configuration mode

Usage Guide

If the **ifa** parameter is configured, computation of the loop-free standby path is enabled. In this case, you can use the interface mode command to specify the path protection mode of the interface.

It is recommended that computation of the loop-free standby path be disabled if any of the following case exists on the network:

1. Virtual links exist.
2. Alternative ABRs exist.
3. An ASBR is also an ABR.
4. Multiple ABSRs advertise the same external route.

If both **lfa** and **downstream-paths** are configured, computation of the downstream path is enabled.

If **route-map** is configured, a standby path can be specified for a matched route through the route-map.

When the OSPF fast reroute function is used, it is recommended that BFD be enabled at the same time so that the device can quickly detect any link failure and therefore shorten the forwarding interruption time. If the interface is up or down, to shorten the forwarding interruption time during OSPF fast reroute, you can configure **carrier-delay** 0 in L3 interface configuration mode to achieve the fastest switchover speed.

Configuration Examples

The following example enables FRR for OSPF instance 1 and associates route map *fast reroute*.

FS(config)# **route-map** *fast-reroute*

FS(config-route-map)# **match ip address** *1*

```
FS(config-route-map)# set fast-reroute backup-nexthop GigabitEthernet 0/1 backup-nexthop 192.168.1.2
FS(config)# router ospf 1
FS(config-router)# fast-reroute route-map fast-reroute
```

Related Commands

Command	Description
graceful-restart helper	Enables the OSPF graceful-restart helper.

Platform Description

N/A

2.23 Graceful-restart

Use this command to enable the graceful restart (GR) of OSPF on the device. Use the **graceful-restart grace-period** command to configure the grace period parameter and enable the OSPF GR function. Use the **no** form of this command to disable this function.

graceful-restart [**grace-period** *grace-period* | **inconsistent-lsa-checking**]

no graceful-restart [**graceful-period**]

Parameter Description

Parameter	Description
grace-period *grace-period*	Indicates the grace period, which is the maximum time from occurrence of an OSPF failure to completion of the OSPF GR. The value of the graceperiod varies from 1s to 1800s. The default value is 120s.
inconsistent-lsa-checking	Enables topological change detection. If any topological change is detected, OSPF exits the GR process to complete convergence.After GR is enabled, topological change detection is enabled by default.

Defaults This function is enabled by default.

Command Mode Routing process configuration mode

Usage Guide GR is configured based on the OSPF instance. Different instances could be configured with different parameters according to the actual situation.

The graceful restart interval is the longest time between the OSPF restart and the graceful restart. In this period, you can perform link status reconstruction to restore the OSPF status to the original. With the interval times out, the OSPF will exit GR and perform common OSPF operations.

The GR interval is 120 seconds set with the graceful-restart command, and the graceful-restart grace-period command allows you to change the interval explicitly.

GR is unavailable when the Fast Hello function is enabled.

Configuration Examples The following example enables GR for the OSPF instance 1 and sets the restart interval for GR.

```
FS(config)# router ospf 1
FS(config-router)# graceful-restart
```

```
FS(config-router)# graceful-restart grace-period 60
```

Related Commands

Command	Description
graceful-restart helper	Enables the OSPF graceful-restart helper.

Platform Description

N/A

2.24 Graceful-restart Helper

Use this command to enable the graceful restart helper function. Use the **no** form of this command to restore the default setting.

graceful-restart helper disable

no graceful-restart helper disable

graceful-restart helper { **strict-lsa-checking** | **internal-lsa-checking**}

no graceful-restart helper {**strict-lsa-checking** | **internal-lsa-checking**}

Parameter Description

Parameter	Description
disable	Prohibits a device from acting as a GR helper for another device.
strict-lsa-checking	Indicates that changes in Type 1 to Type 5 and Type 7 LSAs will be checked during the period that the device acts as a GR helper to determine whether the network changes. If the network changes, the device will stop acting as the GR helper.
internal-lsa-checking	Indicates that changes in Type 1 to Type 3 LSAs will be checked during the period that the device acts as a GR helper to determine whether the network changes. If the network changes, the device will stop acting as the GR helper.

Defaults

The GR helper is enabled by default.

The router enabled with the GR helper does not check the LSA change by default.

Command Mode

Routing process configuration mode

Usage Guide

This command is used to configure the GR helper capability of a router. When a neighbor router implements GR, it sends a Grace-LSA to notify all neighbor routers. If the GR helper function is enabled on the local router, the local router becomes the GR helper on receiving the Grace-LSA, and helps the neighbor to complete GR. The **disable** option indicates that GR helper is not provided for any device that implements GR.

After a device becomes the GR helper, the network changes are not detected by default. If any change takes place on the network, the network topology converges after GR is completed. If you wish that network changes can be quickly detected during the GR process, you can configure **strict-lsa-checking** to check Type 1 to 5 and Type 7 LSAs that indicate the network information or **internal-lsa-checking** to check Type 1 to 3 LSAs that indicate internal routes of the AS domain. When the network scale is large, it is recommended that you disable the LSA checking options (**strict-lsa-checking** and **internal-lsa-checking**) because regional network changes may

trigger termination of GR and consequently reduce the convergence of the entire network.

Configuration Examples

The following example disables the GF helper and modifies the policy of checking network changes.

```
FS(config)# router ospf1
FS(config-router)# graceful-restart helper disable
FS(config-router)# no graceful-restart helper disable
FS(config-router)# graceful-restart helper
strict-lsa-checking
```

Related Commands

Command	Description
graceful-restart	Enables GR on the device.

Platform Description

N/A

2.25 Ip Ospf Authentication

Use this command to configure the authentication type. Use the **no** form of this command to restore the default setting.

ip ospf authentication [**message-digest** | **null**]

no ip ospf authentication

Parameter Description

Parameter	Description
message-digest	Enables MD5 authentication on the interface.
null	Enables no authentication.

Defaults

No authentication mode is configured and that of the local area is used on the interface by default.

Command Mode

Interface configuration mode

Usage Guide

Plaintext authentication is applicable when **no** option is used with the command. Note that the no form of this command restores the default value. Whether authentication is used actually depends on authentication mode configured for the local area of the interface. If authentication mode is configured as **null,** no authentication is enabled. When both the interface and its area are configured with authentication, the one for the interface takes precedence.

Configuration Examples

The following example configures MD5 authentication for OSPF on fastEthernet 0/1.

```
FS (config)#interface fastEthernet0/1
FS(config-if-FastEthernet 0/1)# ipaddress172.16.1.1
255.255.255.0
FS(config-if-FastEthernet 0/1)# ip ospf authentication
message-digest
```

Related Commands

Command	Description
area authentication	Enables authentication and defines authentication mode in the OSPF area.
ip ospf authentication-key	Configures the plain text authentication key.
ip ospf message-digest-key	Configures the MD5 authentication key.

Platform Description

N/A

2.26 Ip Ospf Bdf

Use this command to enable or disable the BFD on the specified OSPF interface. Use the **no** form of this command to restore the default setting.

ip rip bfd [**disable**]

no ip ospf bfd

Parameter Description

Parameter	Description
disable	Disables BFD on the specified OSPF interface.

Defaults

BFD is not configured by default, and the BFD configuration in OSPF process configuration mode shall prevail.

Command Mode

Interface configuration mode

Usage Guide

The interface-based configuration takes precedence over the **bfd all-interfaces** command used in process configuration mode.

Based on the actual environment, you can run the **ip ospf bfd** command to enable BFD on a specified interface for link detection, or run the **bfd all-interfaces** command in OSPF process configuration mode to enable BFD on all interface of the OSPF process, or run the **ospf bfd disable** command to disable BFD on a specified interface.

Configuration Examples

```
FS(config)# interface fastethernet 0/1
FS(config-if-FastEthernet 0/1)# ip address 172.16.1.1 255.255.255.0
FS(config-if-FastEthernet 0/1)# ip ospf bfd
```

Related Commands

Command	Description
router ospf	Creates the OSPF routing process and enters routing process configuration mode.
bdf all-interfaces	Enables the BFD on all OSPF interfaces.

Platform Description

N/A

2.27 Ip Ospf Authentication-key

Use this command to configure the OSPF plain text authentication key in interface configuration mode. Use the **no** form of this command to restore the default setting.

ip ospf authentication-key [**0 | 7**] *key*

no ip ospf authentication-key

Parameter Description

Parameter	Description
0	Displays the key in plain text.
7	Displays the key in cipher text.
key	Key containing at most eight characters.

Defaults

It is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

The **ip ospf authentication-key** command configures the key that will be inserted in all OSPF packet headers. As a result, if the keys are inconsistent, the OSPF neighbor relationship cannot be established between two devices directly connected, and thus route information exchange is impossible.

The keys may vary by interface, but the devices that are connected to the same physical network segment must use the same key.

To enable the OSPF area authentication, execute the area authentication command in routing process configuration mode.

The authentication can be enabled separately on an interface by executing the ip ospf authentication command in interface configuration mode. When both the interface and the area are configured with authentication, the one for the interface takes precedence.

Configuration Examples

The following example configures the OSPF authentication key ospfauth for fast Ethernet *0/1*.

```
FS (config)#interfacefastEthernet0/1
FS(config-if-FastEthernet 0/1)# ipaddress172.16.1.1
255.255.255.0
FS(config-if-FastEthernet 0/1)# ip ospf authentication-key ospfauth
```

Related Commands

Command	Description
area authentication	Enables OSPF area authentication and defines authentication mode
ip ospf authentication	Enables authentication on the interface and defines authentication mode

Platform Description

N/A

2.28 Ip Ospf Cost

Use this command to configure the cost (OSPF metric) of the OSPF interface for sending a packet in interface configuration mode. Use the **no** form of this command to restore the default setting.

ip ospf cost *cost*

no ip ospf cost

Parameter Description

Parameter	Description
cost	OSPF interface cost in the range from 0 to 65535

Defaults

The default interface cost is calculated as follows:

Reference bandwidth/Bandwidth

The reference bandwidth is *100* Mbps by default.

Command Mode

Interface configuration mode

Usage Guide

By default, the OSPF interface cost is 100Mbps/Bandwidth, where Bandwidth is the interface bandwidth configured with the bandwidth command in interface configuration mode.

The default costs of different types of lines are as follows:

- 64K serial line: 1562
- E1 line: 48
- 10M Ethernet: 10
- 100M Ethernet: 1

The OSPF cost configured with the **ip ospf cost** command will overwrite the default configuration.

Configuration Examples

The following example configures the OSPF cost of fastEthernet 0/1 to100.

```
FS(config)# interfacefastEthernet0/1
FS(config-if-FastEthernet 0/1)# ipospfcost100
```

Related Commands

Command	Description
bandwidth	Specifies the interface bandwidth. This setting does not affect the data transmission rate.
show ip ospf	Displays the OSPF global configuration information

Platform Description

N/A

2.29 Ip Ospf Database-filter All Out

Use this command to stop advertising LSAs of an interface, that is, the LSA update packets are not sent on the interface. Use the **no** form of the command to restore the default setting.

ip ospf database-filter all out

no ip ospf database-filter

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled and all LSA update packets can be sent on the interface by default.

Command Mode Interface configuration mode

Usage Guide To stop sending LSA update packets on the interface, enable this function on the interface.

Then, the device maintains the neighboring connections and accepts LSAs from neighbors, but stops sending LSAs to neighbors.

Configuration Examples The following example stops sending LSA update packets of fastEthernet 0/1.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# ip address 172.16.10.1 255.255.255.0
FS(config-if-FastEthernet 0/1)# ip ospf database-filter all out
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.30 Ip Ospf Dead-interval

Use this command to configure the interval for determining the death of an interface neighbor in interface configuration mode. Use the **no** form of this command to restore the default setting.

ip ospf dead-interval { *seconds* | **minimal hello-multiplier** *multiplier* }

no ip ospf dead-interval

Parameter Description

Parameter	Description
seconds	Defines the interval for determining the neighbor death in seconds. The range is from 0 to 2,147,483,647.
minimal	Indicates that the Fast Hello function is enabled to set the dead interval to 1s.
hello-multiplier *multiplier*	Indicates the number of Hello packets sent per second in the Fast Hello function. The value ranges from 3 to 20.

Defaults The value of dead-interval is 4 times the interval configured with the **ip ospf hello-interval** command by default.

Command Mode

Interface configuration mode

Usage Guide

The OSPF dead interval is contained in the Hello packet. If OSPF does not receive a Hello packet from a neighbor within the dead interval, it declares that the neighbor is invalid and deletes this neighbor record form the neighbor list. By default, the dead interval is four times the Hello interval. If the Hello interval is modified, the dead interval is modified automatically.

When using this command to manually modify the dead interval, pay attention to the following issues:

1. The dead interval cannot be shorter than the Hello interval.
2. The dead interval must be the same on all routers in the same network segment.

OSPF supports the Fast Hello function.

After the OSPF Fast Hello function is enabled, OSPF finds neighbors and detects neighbor failures faster. You can enable the OSPF Fast Hello function by specifying the **minimal** and **hello-multiplier** keywords and the **multiplier** parameter. The **minimal** keyword indicates that the death interval is set to 1s, and **hello-multiplier** indicates the number of Hello packets sent per second. In this way, the interval at which the Hello packet is sent decreases to less than 1s.

If the Fast Hello function is configured for a virtual link, the Hello interval field of the Hello packet advertised on the virtual link is set to 0, and the Hello interval field of the Hello packet received on this virtual link is ignored.

No matter whether the Fast Hello function is enabled, the death interval must be consistent and the **hello-multiplier** values can be inconsistent on routers at both ends of the virtual link. Ensure that at least one Hello packet can be received within the death interval.

Run the **show ip ospf virtual-links** command to monitor the death interval and Fast Hello interval configured for the virtual link.

The **dead-interval minimal hello-multiplier** and **hello-interval** parameters introduced for the Fast Hello function cannot be configured simultaneously.

Configuration Examples

The following example configures the interval for determining the death of the OSPF neighbor on fastEthernet 0/1 to30seconds.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# ip address 172.16.10.1 255.255.255.0
FS(config-if-FastEthernet 0/1)# ip ospf dead-interval30
```

The following example configures the value of hello-multiplier to3.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# ip address 172.16.10.1 255.255.255.0
FS(config-if-FastEthernet 0/1)# ip ospf dead-interval minimal hello-multiplier 3
```

Related Commands

Command	Description
ip ospf hello-interval	Specifies the interval at which the OSPF sends Hello packets
show ip ospf interface	Displays OSPF interface information.

Platform Description N/A

2.31 Ip Ospf Disable All

Use this command to prevent the specified interface from generating OSPF packets. Use the **no** form of this command to restore the default setting.

ip ospf disable all

no ip ospf disable all

Parameter Description

Parameter	Description
N/A	N/A

Defaults OSPF packets are generated on the specified interface by default.

Command Mode Interface configuration mode

Usage Guide The interface configured with this command will ignore whether the network areas are matched. After this command is configured, an interface will not generate OSPF packets even if the interface belongs to the network; therefore, the interface does not receive or send any OSPF packets or participate in OSPF calculation.

Configuration Examples The following example prevents the specified interface from generating OSPF packets.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# ip address172.16.10.1 255.255.255.0
FS(config-if-FastEthernet 0/1)# ip ospf disable all
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.32 Ip Ospf Fast-reroute No-eligible-backup

Use this command in interface configuration mode to exclude an OSPF interface as a backup interface in OSPF fast reroute calculation. Use the **no** form of this command to restore the default setting.

ip ospf fast-reroute no-eligible-backup

no ip ospf fast-reroute no-eligible-backup

Parameter Description

Parameter	Description
N/A	N/A

Defaults An OSPF interface can serve as a backup interface by default.

Command Mode Interface configuration mode

Usage Guide If the remaining bandwidth of an interface is small or if the interface and its active interface may fail at the same time, the interface cannot be used as a standby interface. Therefore, you need to run this command in interface configuration mode to prevent this interface from becoming a standby interface during OSPF fast reroute computation. After this command is executed, the standby interface is selected from other interface.
This command does not take effect if **fast-rerotue route-map** is configured.

Configuration Examples The following example excludes FastEthernet 0/1 as a backup interface in OSPF fast reroute calculation.

FS(config)# **interface** *fastEthernet 0/1*
FS(config-if-FastEthernet 0/1)# **ip address** *172.16.10.1 255.255.255.0*
FS(config-if-FastEthernet 0/1)# **ip ospf fast-reroute no-eligible-backup**

Related Commands

Command	Description
fast-reroute	Enables OSPF fast reroute.

Platform Description N/A

2.33 Ip Ospf Fast-reroute Protection

Use this command to specify the loop-free alternate (LFA) protection mode for an interface. Use the **no** form of this command to restore the default setting.

ip ospf fast-reroute protection { **node** | **link-node** | **disable** }

no ip ospf fast-reroute protection

Parameter Description

Parameter	Description
node	Enables LFA node protection.
link-node	Enables LFA link node protection.
disable	Disables LFA protection.

Defaults LFA node protection is enabled by default.

Command Mode Interface configuration mode

Usage Guide Enabling the **fast-reroute lfa** command in OSPF process configuration mode will enable OSPF fast reroute and generate a backup route for the master route according to the specified LFA protection mode in interface configuration mode. By default, link protection is enabled on each OSPF interface. In this protection mode, the

failure of a master link does not affect forwarding on the backup route.

Use the **node** parameter to enable node protection for an interface, that is, the neighbor node of a master link does not affect forwarding on the backup route.

Similarly, use the **link-node** parameter to protect the link and neighbor link of a master route at the same time.

Use the **disable** parameter to disable the LFA protection function for an interface, that is, a backup entry is not generated for the routes with this interface as the next hop.

Configuration Examples

The following example sets OSPF LFA fast reroute to link and node protection:

```
FS(config)# interface fastEthernet 0/1

FS(config-if-FastEthernet 0/1)# ip address 172.16.10.1 255.255.255.0

FS(config-if-FastEthernet 0/1)# ip ospf fast-reroute protection link-node
```

Related Commands

Command	Description
fast-reroute	Enables OSPF fast reroute.

Platform Description

N/A

2.34 Ip Ospf Hello-interval

Use this command to set the interval for sending Hello packets in interface configuration mode. Use the **no** form of this command to restore the default setting.

ip ospf hello-interval *seconds*

no ip ospf hello-interval

Parameter Description

Parameter	Description
seconds	Interval for sending Hello packets in seconds. The range is from1 to 65535.

Defaults

The defaults are as follows:

10secons for Ethernet

10seconsfor PPP or HDLC encapsulated interfaces

10secons for frame relay PTP interfaces

30secons for non-frame relay PTP sub-interface and X.25 interfaces

Command Mode

Interface configuration mode

Usage Guide

The interval of sending the Hello packets is included in the Hello packet. A shorter interval means that OSPF detects the topological change faster, which will increase network traffic. The Hello packet sending intervals for all the devices in the same network segment must be the same. To manually modify the interval to determine neighbor death, ensure that the Hello packet sending interval cannot be greater than dead-interval of the

neighbor.

Configuration Examples

The following example configures the interval of sending the Hello packets on fastEthernet 0/1 to15.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# ip address172.16.10.1 255.255.255.0
FS(config-if-FastEthernet 0/1)# ip ospf hello-interval15
```

Related Commands

Command	Description
ip ospf dead-interval	Sets the interval for determining the death of the OSPF neighbor.

Platform Description

N/A

2.35 Ip Ospf Message-digest-key

1.1.1

Use this command to configure the MD5 authentication key in interface configuration mode. Use the **no** form of this command to restore the default setting.

ip ospf message-digest-key *key-id* **md5** [**0 | 7**] *key*
no ip ospf message-digest-key *key-id*

Parameter Description

Parameter	Description
key	Key of up to 16 characters
0	Displays the key in plain text.
7	Displays the key in cipher text.
key-id	Key identifier in the range from1 to 255

Defaults

No MD5 key is configured by default.

Command Mode

Interface configuration mode

Usage Guide

The **ip ospf message-digest-key** command configures the key that will be inserted in all OSPF packet headers. As a result, if the keys are inconsistent, the OSPF neighboring relationship cannot be established between two devices directly connected, and thus route information exchange is impossible.

The keys can be different for different interfaces, but the devices that are connected to the same physical network segment must be configured with the same key. For neighbors, the same key identifier must correspond to the same key.

To enable OSPF area authentication, execute the **area authentication** command in routing process configuration mode. The authentication can be enabled separately on an interface by executing the **ip ospf authentication** command in interface configuration mode. When both the interface and the area are configured with authentication, the one for the interface takes precedence.

The FSOS software supports smooth modification of MD5 authentication keys, which shall be added before deleted. When an MD5 authentication key of the device is added, the device will regard other devices have not had new keys and thus send multiple OSPF packets by using different keys, till it confirms that the neighbors have been configured with new keys. When all devices have been configured with new keys, it is possible to delete the old key.

Configuration Examples

The following example adds a new OSPF authentication key "hello5" with key ID 5 for fastEthernet 0/1.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# ip address 172.16.24.2 255.255.255.0
FS(config-if-FastEthernet 0/1)# ip ospf authentication message-digest
FS(config-if-FastEthernet 0/1)# ip ospf message-digest-key 10 md5 hello10
FS(config-if-FastEthernet 0/1)# ip ospf message-digest-key 5md5 hello5
```

When all neighbors are added with new keys, the old keys shall be deleted for all devices.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# no ip ospf message-digest-key10md5 hello10
```

Related Commands

Command	Description
area authentication	Enables OSPF area authentication and defines authentication mode.
ip ospf authentication	Enables authentication on the interface and defines authentication mode.

Platform Description

N/A

2.36 Ip Ospf Mtu-ignore

Use this command to disable the MTU check when an interface receives the database description packet. Use the **no** form of this command to restore the default setting.

ip ospf mtu-ignore

no ip ospf mtu-ignore

Parameter Description

Parameter	Description
N/A	N/A

Defaults

MTU check is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

After receiving the database description packet, the device will check whether the MTU of the neighbor interface is the same as its own MTU. If the received database description packet indicates an MTU greater than the interface's MTU, the neighboring relationship cannot be established. This can be fixed by disabling the MTU

check.

Configuration Examples

The following example disables the MTU check function on fastEthernet 0/1.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# ip ospf mtu-ignore
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.37 Ip Ospf Network

Use this command to configure the OSPF network type in interface configuration mode. Use the **no** form of this command to restore the default setting.

ip ospf network { **broadcast | non-broadcast | point-to-multipoint** [**non-broadcast**] **| point-to-point** }

no ip ospf network

Parameter Description

Parameter	Description
broadcast	Sets the OSPF network type as the broadcast type.
non-broadcast	Sets the OSPF network type as the non-broadcast multi-path access type, i.e. NBMA network.
point-to-multipoint [non-broadcast]	Sets the OSPF network type as the point-to-multipoint type. The value is the point-to-multipoint broadcast type by default. The non-broadcast option means the point-to-multipoint non-broadcast type.
point-to-point	Sets the OSPF network type as the point-to-point type.

Defaults

The default configurations are as follows:

PTP network type: Point-to-Point Protocol(PPP), Serial Line Internet Protocol(SLIP), frame relay point-to-point (PTP) sub-interface, X.25 PTP sub-interface encapsulation

NBMA network type: frame relay (except for PTP sub-interface), X.25 encapsulation (except for PTP sub-interface)

Broadcast network type: Ethernet encapsulation

By default, the network type is the point-to-multipoint network type.

Command Mode

Interface configuration mode

Usage Guide

The broadcast type requires that the interface must have the broadcast capability.

The P2P type requires that the interfaces are interconnected in one-to-one manner.

The NBMA type requires full-meshed connections, and all interconnected routers can directly communicate with each other.

The P2MP type does not raise any requirement.

Configuration Examples

The following example configures the frame relay interface network as the P2P type.

```
FS(config)# interface Serial 1/0
FS(config-Serial 1/0)#ip address 172.16.24.4 255.255.255.0
FS(config-Serial 1/0)# encapsulation frame-relay
FS(config-Serial 1/0)# ip ospf network point-to-point
```

The following example configures the frame relay interface network as the NBMA type.

```
FS(config)# interface Serial 1/0
FS(config-Serial 1/0)# ip address 172.16.24.4 255.255.255.0
FS(config-Serial 1/0)# encapsulation frame-relay
FS(config-Serial 1/0)# ip ospf network non-broadcast
FS(config-Serial 1/0)#exit
FS(config)# router ospf 20
FS(config-router)# neighbor 172.16.24.2 priority 1 poll-interval 150
```

Related Commands

Command	Description
dialer map ip	Defines the mapping between IP address and dialing number.
frame-relay map	Defines the mapping between IP address and frame DLCI.
neighbor(OSPF)	Defines the IP address of neighbor applicable to NBMA network type and point-to-multipoint non-broadcast type only.
X25 map	Defines the mapping between IP address and X.25 network address.

Platform Description

N/A

2.38 Ip Ospf Priority

Use this command to configure the OSPF priority in interface configuration mode. Use the **no** form of this command to restore the default setting.

ip ospf priority *priority*

no ip ospf priority

Parameter Description

Parameter	Description
priority	Sets the OSPF priority of the interface in the range from 0 to 255.

Defaults

The default is 1.

Command

Interface configuration mode

Mode

Usage Guide The interface priority is included in the Hello packet. When DR/BDR election occurs in the OSPF broadcast type network, the device with higher priority will become the DR or BDR. If the devices have the same priority, the one with higher ID will become the DR or BDR. The device with priority 0 cannot become DR or BDR. This command is valid only for OSPF broadcast and non-broadcast network types.

Configuration Examples The following example configures the priority offastethernet 0/1 as 0.

```
Switch(config)#interface fastethernet 0/1
FS(config-if-FastEthernet 0/1)# ipospfpriority0
```

Related Commands

Command	Description
ip ospf network	Configures the network type of the interface.

Platform Description N/A

2.39 Ip Ospf Retransmit-interval

Use this command to define the interval for sending the link state update (LSU) packet on the interface in interface configuration mode. Use the **no** form of this command to restore the default setting.

ip ospf retransmit-interval *seconds*

ip ospf retransmit-interval

Parameter Description

Parameter	Description
seconds	Interval for sending the LSU packets in seconds. The range is from 1 to 65535. This interval must be greater than the round trip delay of packets between two neighbors.

Defaults The default is 5.

Command Mode Interface configuration mode

Usage Guide After the device sends an LSU packet, the LSU packet stays in the transmission buffer queue. If no confirmation from the neighbor is obtained in the interval defined with the **ip ospf retransmit-interval** command, the LSU will be sent once again.

In serial lines or virtual links, the retransmission interval shall be slightly larger. The LSU packet retransmission interval of virtual links is defined with the area virtual-link command followed with the keyword retransmit-interval.

Configuration Examples The following example configures the LSU packet retransmission interval on fastEthernet 0/1 as 10 seconds.

```
FS(config)# interface fastEthernet 0/1
```

```
FS(config-if-FastEthernet 0/1)# ip ospf retransmit-interval 10
```

Related Commands

Command	Description
area virtual-link	Defines an OSPF virtual link.

Platform Description N/A

2.40 Ip Ospf Source-check-ignore

Use this command to disable the source address check in the point-to-point link. Use the **no** form of this command to restore the default setting

ip ospf source-check-ignore

no ip ospf source-check-ignore

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Interface configuration mode

Usage Guide For OSPF, the source address of the received packet is required to be in the same network segment with the receiving interface. However, in a point-to-point link, the addresses of two ends of the link are individually set, and they are not required to be in the same network segment. The peer address is informed during the process of point-to-point link negotiation; therefore, OSPF will check whether the source address of the packet is the informed one. If no, the OSPF regards this packet as illegal and drops it. In some applications, the addresses informed during the negotiation are shielded. You need to disable the source address check to ensure the normal establishment of OSPF neighbors. The source address check shall be never enabled, especially for the unnumbered interfaces.

Configuration Examples The following example disables the source address check function in the point-to-point link.

```
FS(config)# interface serial 1/0
FS(config-if)# ip ospf source-check-ignore
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.41 Ip Ospf Transmit-delay

Use this command to define the LSU packet transmission delay in interface configuration mode. Use the **no** form of this command to restore the default setting.

ip ospf transmit delay *seconds*

no ip ospf transmit delay

Parameter Description

Parameter	Description
seconds	LSU packet transmission delay in seconds in the range from 1 to 65535.

Defaults

The default is 1.

Command Mode

Interface configuration mode

Usage Guide

Before the LSU packet is transmitted, the Age field in all the LSAs of the packet will be increased by the value defined with the **ip ospf transmit-delay** command in interface configuration mode. The configuration of this parameter shall consider the transmission and line transmission delay of the interface. For low-rate lines, the transmission delay of the interface shall be slightly larger. The LSU packet transmission delay of the virtual link is defined with the **area virtual-link** command followed with the keyword retransmit-interval.

The FSOS software will resend or request resending the LSA with Age up to 3600. If no update is obtained in time, the aged LSA will be cleared from the link state database.

Configuration Examples

The following example configures the transmission delay of fastEthernet 0/1 as 10.

```
FS(config)# interface fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# ip ospf transmit-delay 10
```

Related Commands

Command	Description
area virtual-link	Defines an OSPF virtual link.

Platform Description

N/A

2.42 Log-adj-changes

Use this command to enable the logging of the neighbor state changes. Use the **no** form of the command to disable this function.

log-adj-changes [**detail**]

no log-adj-changes [**detail**]

Parameter Description

Parameter	Description
detail	Records the detail of changes.

Defaults

This function is enabled by default. Without the detail parameter, the system records the logs that the neighbor

enters or exits the full state.

Command Mode Routing process configuration mode

Usage Guide N/A

Configuration Examples The following example logs the neighbor state changes.

```
FS(config)# router ospf 1
FS(config-router)# log-adj-changes detail
```

Related Commands

Command	Description
show ip ospf	Displays the OSPF global configuration information.

Platform Description N/A

2.43 Max-concurrent-dd

Use this command to specify the maximum number of DD packets that can be processed (initiated or accepted) at the same time. Use the **no** form of this command to restore the default setting.

max-concurrent-dd *number*

no max-concurrent-dd

Parameter Description

Parameter	Description
number	Maximum number of DD packets in the range from1 to 65535

Defaults The default is 5.

Command Mode Routing process configuration mode

Usage Guide When a router is exchanging data with multiple neighbors, its performance will be affected. This command is configured to limit the maximum number of DD packets that each OSPF instance can have at the same time.

Configuration Examples The following example sets the maximum number of DD packets to 4.

After the configuration, the device can initiate to interact with four neighbors and can concurrently accept the interaction. That is, the device can interact with a maximum of eight neighbors.

```
FS(config)# routerospf10
FS(config-router)# max-concurrent-dd4
```

Related Commands

Command	Description

router ospf max-concurrent-dd	Sets the maximum number of neighbors allowed in concurrent interaction for all OSPF routing processes.

Platform Description N/A

2.44 Max-metric

Use this command to set the maximum metric of the router-lsa, so that this routing device will not firstly be used as the transmission node by other devices in SPF computing. Use the **no** form of this command to restore the default setting.

max-metric router-lsa [external-lsa *[max-metric-value]]* [**include-stub**] [**on-startup** *[seconds]]* [**summary-lsa** *[max-metric-value]]*

no max-metric router-lsa [external-lsa *[max-metric-value]]* [**include-stub**] [**on-startup** *[seconds]]* [**summary-lsa** *[max-metric-value]]*

Parameter Description

	Description
router-lsa	Configures the maximum metric (0XFFFF) of non-stub links in the Router LSA.
external-lsa	Uses the maximum metric instead of the external-lsa metric (including the Type-5 and Type-7).
max-metric-value	Maximum metric of the LAS. The range is 1 to 16777215.The default value is 16711680,
include-stub	Configures the maximum metric of the stub links in the Router LSA.
on-startup	Advertises the maximum metric when the routing device starts up.
seconds	Interval of advertising the maximum metric. The range is 5 to 86400. The default value is 600 seconds.
summary-lsa	Uses the maximum metric to replace the summary LSA metric. (including Type-3 and Type-4)

Defaults The normal metric LSAs are used by default.

Command Mode Routing process configuration mode

Usage Guide With the **max-metric router-lsa** command enabled, the maximum metric of non-stub links in the Router LSA generated by the routing device is set. The link's normal metric is restored after canceling this configuration or reaching the timer.

By default, with this command enabled, the normal metric of the stub links is still advertised, which is the output interface cost. If the **include-stub** parameter is configured, the maximum metric of the stub links will be advertised.

When the device acts as an ABR, if no interval flow transmission is expected, use the **summary-lsa** parameter to set the summary LSA as the maximum metric.

When the device acts as an ASBR device, if no external flow transmission is expected, use the **external lsa** parameter to set the external LSA as the maximum metric.

The **max-metric router-lsa** command is usually used in the following scenes:

The device is restarted, which generally makes the IGP protocol converge faster, so that other devices attempt forwarding the dataflow through the new started-up device. In this case, use the **on-startup** parameter to set certain delay, so that this device can serve as a transmission node after restarting.

The device is added into the network without being used for dataflow transmission. If the backup path exists, the current device is not used for the dataflow transmission. Otherwise, this device is still used to transmit the dataflow.

Remove the device from the network gracefully. With this command enabled, the current device advertises the maximum metric to all devices, as that the other devices in this network can choose the backup path to for the dataflow transmission before the current device is removed.

For the OSPF implementation in the earlier versions (RFC 1247 or earlier versions), the links with the maximum metric (0xFFFF) in the LSA will not participate in the SPF calculation, that is, no dataflow will be sent to the router that have generated these LSAs.

Configuration Examples

The following example configures the LSA maximum metric as 100 seconds after starting the device.

```
FS(config)# router ospf 20
FS(config-router)# max-metric router-lsa on-startup 100
```

Related Commands

Command	Description
show ip ospf	Displays the OSPF related configurations.

Platform Description

N/A

2.45 Neighbor

Use this command to define the OSPF neighbor in routing process configuration mode. Use the **no** form of this command to restore the default setting.

Neighbor *ip-address* [**poll-interval** *seconds*] [**priority** *priority*] [**cost** *cost*]]

no neighbor *ip-address* [[**poll-interval**] [**priority**] | [cost]]

Parameter Description

Parameter	Description
ip address	IP address of the neighbor
poll-interval *seconds*	(Optional) Specifies the interval of polling neighbors in seconds. The range is from 0 to 2147483647. Only the non-broadcast (NBMA) network type supports this option.
priority *priority*	(Optional) Configures the priority of non-broadcast network neighbors. The range is from 0 to 255. Only the non-broadcast (NBMA) network type supports this option.
cost *cost*	(Optional) Configures the cost to each neighbor in point-to-multipoint network, not defined by default, where the cost configured on the interface will be used. The range is from 0 to 65535.

	Only the point-to-multipoint [non-broadcast] network type supports this option.

Defaults

No neighbor is defined by default.

The default neighbor polling interval is 120 seconds.

The default NBMA neighbor priority is 0.

Command Mode

Routing process configuration mode

Usage Guide

The FSOS software must explicitly configure the neighbor information for every non-broadcast network neighbor. The IP address of a neighbor must be the master IP address of that neighbor interface.

In the NBMA network, if the neighbor device becomes inactive, in other words, if the Hello packet is not received within the device dead-interval, the OSPF will send more Hello packets to the neighbor. The interval at which the Hello packets are sent is called the polling interval. When the OSPF starts to work for the first time, it sends Hello packets only to the neighbor whose priority is not 0, so that the neighbor whose priority is set as 0 will not participate in the DR/BDR election. When the DR/BDR is generated, the DR/BDR sends the Hello packets to all neighbors to establish the neighbor relationship.

Since the point-to-multipoint non-broadcast network has no broadcast capability, neighbors cannot be found dynamically. So, it is required to use this command to manually configure neighbor. In addition, it is possible to configure the cost to each neighbor through the cost option for the point-to-multipoint network type.

Configuration Examples

The following example declares an OSPF non-broadcast network neighbor, with the IP address 172.16.24.2, priority 1 and polling interval 150 seconds.

```
FS(config)# routerospf 20
FS(config-router)# network 172.16.24.0 0.0.0.255 area 0
FS(config-router)# neighbor 172.16.24.2 priority 1 poll-interval 150
```

Related Commands

Command	Description
ip ospf priority	Sets the interface priority.
ip ospf network	Sets the network type

Platform Description

N/A

2.46 Network Area

Use this command to define which interfaces run OSPF and the OSPF areas they belong to in routing process configuration mode. Use the **no** form of this command to restore the default setting.

network *ip-address wildcard* **area** *area-id*

no network *ip-address wildcard* **area** *area-id*

Parameter Description

Parameter	Description

ip-address	IP address of the interface
wildcard	Defines the comparison bits in the IP address, with 0 for exact match and 1 for no comparison
area-id	OSPF area identifier. An OSPF area is always associated with an address range. For easy of management, a subnet can be used as the OSPF area identifier.

Defaults No OSPF area is configured by default.

Command Mode Routing process configuration mode

Usage Guide The ip-address and wildcard parameters allow associating multiple interfaces with one OSPF area. To run OSPF on an interface, it is required to include the primary IP address and secondary IP address of the interface in the IP address range defined by the network area command. If only the secondary IP address is included, OSPF cannot be enabled on the interface.

You can determine the OSPF process that the interface takes part in by the means of the best match if the IP address of the interface matches the IP address ranges defined by the network command in multiple OSPF processes.

Configuration Examples The following example defines:

Three areas: 0, 1 and 172.16.16.0

The interfaces whose IP addresses fall into the 192.168.12.0/24 range to area 1

The interfaces whose IP addresses fall into the 172.16.16.0/20 range to area 2

The remaining interface being assigned to area 0.

```
FS(config)# routerospf 20
FS(config-router)# network172.16.16.0
0.0.15.255 area172.16.16.0
FS(config-router)# network192.168.12.0
0.0.0.255 area 1
FS(config-router)# network0.0.0.0 255.255.255.255 area0
```

Related Commands

Command	Description
router ospf	Creates the OSPF routing process.

Platform Description N/A

2.47 Overflow Database

Use this command to configure the maximum number of LSAs supported by the current OSPF instance. Use the **no** form of this command to restore the default setting.

overflow database *number* [**hard | soft**]

no overflow database

Parameter Description

Parameter	Description
number	Maximum number of LSAs. The range is from 1 to 4294967294.
hard | soft	hard: shuts down the OSPF instance when the number of LSAs exceeds that number. soft: issues an alarm when the number of LSAs exceeds that number.

Defaults

The maximum number of LSAs supported by the current OSPF instance is not restricted by default.

Command Mode

Routing process configuration mode

Usage Guide

To shut down the OSPF instance when the number of LSAs exceeds that number, use the hard parameter; otherwise, use the soft parameter.

Configuration Examples

The following example configures that OSPF instance 10 will be shut down when there are more than 10 LSAs.

```
FS(config)# router ospf 10
FS(config-router)# overflow database 10 hard
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.48 Overflow Database External

Use this command to configure the maximum number of external LSAs and the waiting time from the overflow state to the normal state. Use the **no** form of this command to restore the default setting.

overflow database external *max-dbsize wait-time*

no overflow database external

Parameter Description

Parameter	Description
max-dbsize	Maximum number of external LSAs (the value shall be the same for all routing devices in the same AS). The range is from 0 to 2147483647.
wait-time	Waiting time of the routing device from the overflow status to normal status. The range is from 0 to 2147483647.

Defaults

The maximum number of external-LSAs is not restricted by default.

If the maximum number of external-LSAs is restricted, the normal status cannot be restored when the maximum number is exceeded.

Command Mode

Routing process configuration mode

Usage Guide

When the number of external-LSAs exceeds the value of max-db size, the device enters the overflow state. Then no more external-LSA will be loaded and the external-LSAs generated locally will be cleared. After wait-time expires, the device restores to the normal state and external-LSAs are reloaded.

When using this function, ensure that all routers of the OSPF backbone area and common areas use the same max-db size value. Otherwise, the following situations occur:

The link status is inconsistent on the entire network and neighbors fail to achieve the Full state.

Incorrect routes occur, including loops.

AS-External-LSAs may be frequently retransmitted.

Configuration Examples

The following example configures that the maximum number of external LSAs is 10, and it turns to the overflow status upon timeout, and the time interval attempting to restore from the overflow state to the normal state is 3 seconds.

```
FS(config)# routerospf10
FS(config-router)# overflow database external10 3
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.49 Overflow Memory-lack

Use this command to allow OSPF to enter the OVERFLOW state when the memory lacks. Use the **no** form of this command to disable this function.

overflow memory-lack

no overflow memory-lack

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default

Command Mode

Routing process configuration mode

Usage Guide

The action of OSPF entering the OVERFLOW state is to discard the newly-learned external route and effectively

prevent the memory from increasing.

It is possible that enabling this function causes the route loop in the whole network. To reduce that possibility, OSPF will generate a default route directing to the NULL port and this default route will exist in the OVERFLOW state.

Use the **clear ip ospf process** command to reset the OSPF and remove the OSPF OVERFLOW state.

Use the no form of this command to prevent the OSPF to enter the OVERFLOW state when the memory is insufficient, which may result in the constantly consumption of the memory resources. If the memory is exhausted to some degree, the OSPF instance will stop and all learned routes will be removed.

Configuration Examples

The following example prevents the OSPF from entering the OVERFLOW state when the memory is insufficient.

```
FS(config)# router ospf 1
FS(config-router)# no overflow memory-lack
```

Related Commands

Command	Description
clear ip ospf process	Resets the OSPF instances.
show ip protocols ospf	Displays the OSPF information.

Platform Description

N/A

2.50 Passive-interface

Use this command to configure the specified network interface or all interface as the passive interfaces. Use the **no** form of this command to restore the default setting.

passive-interface { **default |** *interface-type interface-number* | *interface-type interface-number ip-address* }

no passive-interface { **default |** *interface-type interface-number* | *interface-type interface-number ip-address* }

Parameter Description

Parameter	Description
interface-type interface-number	Interface to be set as a passive interface
default	Sets all the interfaces as passive interfaces
interface-type interface-number ip-address	Sets the address of the specified interface as a passive address.

Defaults

No interface is configured as a passive interface by default. All interfaces are allowed to receive or send OSPF packets.

Command Mode

Routing process configuration mode

Usage Guide

To prevent other devices in the network from dynamically learning the routing information of the device, set the specified network interface of this device as a passive interface or the IP address of the specified network interface as a passive address

Configuration Examples

The following example configures fastEthernet 0/1 as a passive interface and the IP address of the interface 1.1.1.1 as the passive address.

```
FS(config)# routerospf 30
FS(config-router)# passive-interface fastEthernet 0/1
FS(config-router)# passive-interface fastEthernet 0/1 1.1.1.1
```

Related Commands

Command	Description
show ip ospf interface	Displays the configuration information of the interface.

Platform Description

N/A

2.51 Redistribute

Use this command to redistribute the external routing information. Use the **no** form of this command to restore the default setting.

redistribute { **bgp | connected | isis** [*area-tag*] **| ospf** *process-id* **| rip | static** } [{ **level-1 | level-1-2 | level-2** }] [**match { internal | external** [**1|2**] **|nssa-external** [**1|2**] }] [**metric** *metric-value*] [**metric-type** { *1|2* }] [**route-map** *route-map-name* **] [subnets] [tag** *tag-value* **]**

no redistribute { bgp | connected | isis [*area-tag*] **| ospf** *process-id* **| rip | static } [{ level-1 | level-1-2 | level-2 }] [match { internal | external [1|2] | nssa-external [1|2]}] [metric** *metric-value* **] [metric-type {** *1|2* **}]** **[route-map** *route-map-name*] [**subnets**] [**tag** *tag-value*]

Parameter Description

Parameter	Description
bgp	Redistribution from bgp
connected	Redistribution from direct routes
isis *[area-tag]*	Redistribution from an IS-IS instance specified in area-tag
ospf *process-id*	Redistribution from an ospf instance specified in process-id in the range from 1 to 65,535
rip	Redistribution from rip
static	Redistribution from static routes
level-1 | level-1-2 | level-2	Configures IS-IS route redistribution. The parameter specifies a level, and routes of this level will be redistributed. Only level-2 IS-IS routes can be redistributed by default.
match	Filters specified routes for configuring OSPF route redistribution. By default, all the OSPF routes are redistributed.
metric *metric-value*	Specifies the metric of an OSPF external LSA in the range from 0 to 16777214.
metric-type{1|2}	Sets the external routing type as E-1 or E-2.
route-map *route-map-name*	Redistribution filter rule
subnets	Redistributes the routes of non standard networks.
tag *tag-value*	Sets the tag value of the routes redistributed to the OSPF in the range from 0 to 4294967295.

Defaults

Redistribution configuration is not supported by default.

If you configure OSPF redistribution, all subtype routes of the instance are redistributed.

If you configure ISIS redistribution, all level-2 subtype routes of the instance are redistributed.

In other cases, all routings of this type are redistributed.

The default metric of the redistribution BGP route is 1. The default metric of LSAs generated by routes of other types is 20.

The default value of metric-type is E-2.

No route-map is associated by default.

Command Mode

Route configuration mode

Usage Guide

After the command is configured, the router will become an ASBR, and the related routing information is imported into the OSPF domain and broadcasted to other OSPF routers through type-5 LSAs.

When you configure is route redistribution without the level parameter, level-2 routes can be redistributed by default. In initial redistribution configuration that carries the level parameter, routes of the specified level can be redistributed. When you save the configuration containing both level 1 and level 2, they are merged into level-1-2 for convenience. For details, see the configuration examples.

When you configure OSPF router distribution without the match parameter, the OSPF routes of all sub types are redistributed by default. Then the first configured match parameter is used as the original one. Only the routes matching the specific type can be redistributed. Use the no form of this command to restore the default configuration.

When you filter routes for redistribution by following the route-map rule, the match rule of the route-map rule is specific for the original redistribution parameters. The route-map rule works only when the redistributed OSPF routes follow the match rule.

The range of set metric is from 0 to 16777214 for the associated route-map. If the value exceeds the range, introducing a route fails.

The following are the rules for configuring the no form of the redistribute command:1. If the **no** form specifies some parameters, restore their default values.2. If the **no** form contains no parameter, delete the whole command. If the following configuration exists: redistribute isis 112 level-2 You can use the no redistribute isis 112 level-2command to modify the configuration. According to preceding rules, this command restores the level-2 parameter to the default value, namely level-2. Therefore, the configuration remains the same after the no form of the preceding command is executed. redistribute isis 112 level-2 To delete the whole command, use the following command: no redistribute isis 112

Configuration Examples

The following example redistributes routes of **ospf2** and **isis** isis-001 to the OSPF area.

```
FS(config)# router ospf1
FS(config-router)# redistribute ospf 2 subnets
FS(config-router)# redistribute ospf2match
external 1 internal
FS(config-router)# redistribute isisisis-001
FS(config-router)# redistribute isisisis-001 level-1
```

The following example displays the output of the **show run** command.

```
router ospf 1
redistribute ospf 2 match external 1 internal subnets
redistribute isis isis-001 level-1-2
```

Related Commands

Command	Description
summary-address	Configures the aggregate route for the external route of the OSPF route area.
default-metric	Sets the default metric of the OSPF redistribution route.

Platform Description

N/A

2.52 Router Ospf

Use this command to create the OSPF routing process in global configuration mode. Use the **no** form of this command to restore the default setting.

router ospf process-id [vrf vrf-name]

no router ospf *process-id*

Parameter Description

Parameter	Description
process-id	ID of an OSPF process. If the process ID is not configured, process 1 is configured.
vrf-name	Specify the VRF to which the OSPF process belongs

Defaults

No OSPF routing process exists by default.

Command Mode

Global configuration mode

Usage Guide

Based on the original implementation, the FSOS10.1 adds the routing process ID to multi-instance OSPF. Different OSPF instances are mutually independent and can be approximately considered as two routing protocols that run independently.

Configuration Examples

Related Commands

Command	Description
show ip protocols	Displays the routing protocol information.
show ip ospf	Displays the OSPF information.

Platform Description

N/A

2.53 Router Ospf Max-concurrent-dd

Use this command to specify the maximum number of DD packets that can be processed (initiated or accepted) at the same time. Use the **no** form of this command to restore the default setting.

router ospf max-concurrent-dd *number*

no router ospf max-concurrent-dd

Parameter Description

Parameter	Description
number	Maximum number of DD packets in the range from 1 to 65535.

Defaults

The default is 10.

Command Mode

Global configuration mode

Usage Guide

When a routing device is exchanging data with multiple neighbors, its performance will be affected. This command is configured to limit the maximum number of DD packets that each OSPF instance can have (initiated or accepted) at the same time.

Configuration Examples

The following example sets the maximum number of DD packets to 4.

After the configuration, the device can initiate to interact with four neighbors and can concurrently accept the interaction. That is, the device can interact with a maximum of eight neighbors.

```
FS# configure terminal
FS(config)# router ospfmax-concurrent-dd4
```

Related Commands

Command	Description
max-concurrent-dd	Sets the maximum number of the neighbors that the OSPF routing process can concurrently interact with.

Platform Description

N/A

2.54 Router-id

Use this command to set the router ID. Use the **no** form of this command to restore the default setting.

router-id *router-id*

no router-id

Parameter Description

Parameter	Description
router-id	Router ID in IP address form

Defaults

The OSPF routing process will select the maximal interface IP address as the router ID by default.

If the loopback interface of an IP address is not configured, the OSPF routing process will select the maximum IP address among all its physical interfaces as the router ID.

Command Mode

Routing process configuration mode

Usage Guide

You can configure any IP address as the router ID. However, the router ID should be unique. Note that once the router ID changes, the OSPF protocol will do a lot of processing. Therefore, it is not recommended to change the router ID. The device can be changed only when no LSA is generated.

Configuration Examples

The following example modifies the router ID to 0.0.0.36.

```
FS(config)# router ospf 20
FS(config-router)# router-id0.0.0.36
```

Related Commands

Command	Description
show ip protocols	Displays the routing protocol information.

Platform Description N/A

2.55 Show Ip Ospf

Use this command to display the OSPF information.

show ip ospf [*process-id*]

Parameter Description

Parameter	Description
process-id	OSPF process ID

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command displays the information of the OSPF routing process.

Configuration Examples The following example displays the output of the **show ip ospf** command.

```
FS# show ip ospf
Routing Process "ospf 1" with ID 1.1.1.1
Domain ID type 0x0105, value 0x010101010101
Process uptime is 4 minutes
Process bound to VRF default
Memory Overflow is enabled.
Router is not in overflow state now.
Conforms to RFC2328, and RFC1583Compatibility flag isenabled
Supports only single TOS(TOS0) routes
Enable two-way-maintain
Supports opaque LSA
Supports Graceful Restart
This router is an ASBR (injecting external routing information)
Originating router-LSAs with maximum metric
Condition:on startup for 100 seconds, State:inactive
Advertise stub links with maximum metric in router-LSAs
Advertise summary-LSAs with metric 16711680
Advertise external-LSAs with metric 16711680
Unset reason:timer expired, Originated for 100 seconds
Unset time:00:02:02.080, Time elapsed: 00:23:54.656
```

```
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Initial LSA throttle delay 0 msecs
Minimum hold time for LSA throttle 5000 msecs
Maximum wait time for LSA throttle 5000 msecs
Lsa Transmit Pacing timer 40 msecs, 10 LS-Upd
Minimum LSA arrival 1000 msecs
Pacing lsa-group:240 secs
Number of incomming current DD exchange neighbors 0/5
Number of outgoing current DD exchange neighbors 0/5
Number of external LSA 4. Checksum 0x0278E0
Number of opaque AS LSA 0. Checksum 0x000000
Number of non-default external LSA 4
External LSA database is unlimited.
Number of LSA originated 6
Number of LSA received 2
Log Neighbor Adjency Changes :Enabled
Graceful-restart disabled
Graceful-restart helper support enabled
Number of areas attached to this router: 1
BFD enabled
Area 0 (BACKBONE)
Number of interfaces in this area is 1(1)
Number of fully adjacent neighbors in this area is 1
Area has no authentication
SPF algorithm last executed 00:01:26.640 ago
SPF algorithm executed 4 times
Number of LSA 3. Checksum 0x0204bf
Area 1 (NSSA)
Number of interfaces in this area is 1(1)
Number of fully adjacent neighbors in this area is 0
Number of fully adjacent virtual neighbors through this area is 0
Area has no authentication
SPF algorithm last executed 02:09:23.040 ago
SPF algorithm executed 4 times
Number of LSA 6. Checksum 0x028638
NSSA Translator State is disabled, Stability Interval expired in 00:00:03
```

Field	Description
Router ID	ID of a router.
Process uptime	Effective time of the current OSPF process (the process does not take effect when device-id is 0.0.0.0)

Bou to VRF	VRF of the current OSPF
Conforms to RFC2328	Same as the RFC2328
RFC1583Compatibilit flag	Whether the RFC1583 or RFC2328 is adopted for the calculation of external routes. This policy is used in the selection of best ASBR and in the route comparison.
Support Tos	Supports Only TOS0.
Supports opaque LSA	Supports opaque-LSA.
Graceful-restart	GR Restart capability described in the RFC3623 Graceful Restart
Graceful-restart helper	GR Help capability described in the RFC3623 Graceful Restart
Router Type	OSPF device type, including normal, ABR, and ASBR
SPF Delay	Delay before the SPF calculation is invoked after the topology change is received
SPF-holdtime	Minimum holdtime between two SPF calculations
LsaGroupPacing	Parameter used for LSA pacing, checksum calculation, and aging interval
Incomming current DD exchange neighbors	Number of neighbors under interaction. The incoming neighbors are those entering the exstart status for the first time.
Outgoing current DD exchange neighbors	Number of neighbors under interaction. The outgoing neighbors are those exiting from the higher status to the exstart status for re-interaction.
Number of external LSA	Number of external LSAs stored in the database
External LSA Checksum Sum	Checksum sum of external LSAs stored in the database
Number of opaque LSA	Number of external LSAs stored in the database
Opaque LSA Checksum Sum	Checksum sum of external LSAs stored in the database
Number of non-default external LSA	Number of external LSAs with non-default routes
External LSA database limit	Limit of external LSA number
Exit database overflow state interval	Time of exiting the overflow status

Database overflow state	Whether the current OSPF process is in the overflow status
Number of LSA originated	Number of LSAs generated
Number of LSA received	Number of LSAs received
Log Neighbor Adjency Changes	Whether the record switch for neighbor status change is enabled
Number of areas attached to this router	Total number of areas on the devices
Area type	Area type, including normal, stub, and nssa
Number of interfaces in this area	Number of interfaces in this area
Number of fully adjacent neighbors in this area	Number of Full neighbors of the area
Number of fully adjacent virtual neighbors through this area	Number of Full neighbors with virtual connections in the area. It is effective only in the non-backbone default-type areas.
Area authentication	Authentication mode of the area
SPF algorithm last executed	Time from the previous SPF calculation to the current time
SPF algorithm executed times	Times of SPF calculations
Number of LSA	Total number of LSAs in this area
Checksum Sum	Checksum sum of the LSAs in the area
NSSATranslatorState	Whether to convert the NSSA LSA to External LSA. It is effective on the ABR OSPF process in the NSSA.
BFD enabled	Enables BFD for OSPF.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.56 Show Ip Ospf Border-routers

Use this command to display the OSPF internal routing table on the ABR/ASBR.

show ip ospf [*process-id*] **border-routers**

Parameter Description

Parameter	Description
process-id	OSPF process ID

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command displays the OSPF internal routes from the local routing device to the ABR or ASBR. The OSPF internal routing table is different from the one displayed with the show ip route command. The OSPF internal routing table has the destination address of the router ID instead of the destination network.

Configuration Examples The following example displays the output of the **show ip ospf border-mrouters** command.

```
FS# show ip ospf border-routers
OSPF internal Routing Table
Codes:i - Intra-area route, I - Inter-area route
i 1.1.1.1 [2] via 10.0.0.1, FastEthernet 0/1, ABR, ASBR, Area 0.0.0.1 select
```

The following table describes fields in the output.

Field	Description
Codes	Route type code, where “i” means intra-area routes, while “I” means inter-area routes.
I	Intra-area routes
1.1.1.1	Displays the OSPF ID of the border device.
[2]	Displays the cost to the border device.
via 10.0.0.1	Displays the next-hop gateway to the border device.
FastEthernet 0/1	Displays the interface to the border device.
ABR, ASBR	Displays the type of the border device, including ABR, ASBR, or both.
Area 0.0.0.1	Displays the area that learns the route.
select	Indicates the currently selected optimal path when there are multiple paths to the ASBR.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.57 Show Ip Ospf Database

Use this command to display the OSPF link state database information. Use the **no** form of this command to

restore the default setting. Different formats of the command will display different LSA information.

show ip ospf [*process-id* [*area-id* | *ip-address*]] **database** [{ **asbr-summary | external | network | nssa-external | opaque-area | opaque-as | opaque-link | router | summary** }] [{ **adv-router** *ip-address* **| self-originate } |** *link-state-id* **| brief**] [**database-summary | max-age | detail**]

Parameter Description

Parameter	Description
area-id	(Optional) Displays the area ID.
adv-device	(Optional) Displays the LSA information generated by the specified advertising device.
link-state-id	(Optional) Displays the LSA information of the specified OSPF link state identifier.
self-originate	(Optional) Displays the LSA information generated by the device itself.
Max-age	(Optional) Displays the LSAs aged.
router	(Optional) Displays the OSPF device LSA information.
network	(Optional) Displays the OSPF network LSA information.
summary	(Optional) Displays the OSPF summary LSA information.
asbr-summary	(Optional) Displays the ASBR summary LSA information.
external	(Optional) Displays the OSPF external LSA information.
nssa-external	(Optional) Displays the category 7 OSPF external LSA information.
opaque-area	(Optional) Displays type 10 LSAs.
opaque-as	(Optional) Displays type 11 LSAs.
opaque-link	(Optional) Displays type 9 LSAs.
database-summary	(Optional) Displays the statistics of LSAs of the link state database.
detail	Displays detailed information of LSAs of the OSPF.
brief	Displays the brief information of the LSAs of the specified type.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

When the OSPF link state database is very large, you should display the information on the link state database by item. Proper use of commands may help OSPF troubleshooting.

Configuration Examples

The following example displays the output of the **show ip ospf database** command.

```
FS# show ip ospf database
OSPF Device with ID (1.1.1.1) (Process ID 1)
Device Link States (Area 0.0.0.0)
Link ID          ADV Device       Age   Seq#        CkSum   Link count
1.1.1.1          1.1.1.1          2     0x80000011 0x6f39 2
3.3.3.3          3.3.3.3          120   0x80000002 0x26ac 1
Network Link States (Area 0.0.0.0)
Link ID          ADV Device       Age   Seq#        CkSum
```

```
192.88.88.27        1.1.1.1          120    0x80000001 0x5366
Summary Link States (Area 0.0.0.0)
Link ID             ADV Device       Age    Seq#       CkSum    Route
10.0.0.0            1.1.1.1          2      0x80000003 0x350d 10.0.0.0/24
100.0.0.0           1.1.1.1          2      0x8000000c 0x1ecb 100.0.0.0/16
Device Link States (Area 0.0.0.1 [NSSA])
Link ID             ADV Device       Age    Seq#       CkSum    Link count
1.1.1.1             1.1.1.1          2      0x80000001 0x91a2 1
                Summary Link States (Area 0.0.0.1 [NSSA])
Link ID             ADV Device       Age    Seq#       CkSum    Route
100.0.0.0           1.1.1.1          2      0x80000001 0x52a4 100.0.0.0/16
192.88.88.0         1.1.1.1          2      0x80000001 0xbb2d 192.88.88.0/24
NSSA-external Link States (Area 0.0.0.1 [NSSA])
Link ID             ADV Device       Age    Seq#       CkSum    Route                Tag
20.0.0.0            1.1.1.1          1      0x80000001 0x033c E2 20.0.0.0/24        0
100.0.0.0           1.1.1.1          1      0x80000001 0x9469 E2 100.0.0.0/28       0
AS External Link States
Link ID             ADV Device       Age    Seq#       CkSum    Route                Tag
20.0.0.0            1.1.1.1          380    0x8000000a 0x7627 E2 20.0.0.0/24        0
100.0.0.0           1.1.1.1          620    0x8000000a 0x0854 E2 100.0.0.0/28       0
```

The following table describes the fields in the output of the **show ip ospf database** command.

Field	Description
OSPF Device with ID	Displays the Router ID.
Device Link States	Displays the device LSA information.
Net Link States	Displays the network LSA information.
Summary Net Link States	Displays the summary network LSA information.
NSSA-external Link States	Displays the type 7 autonomous external LSA information.
AS External Link States	Displays the type 5 autonomous external LSA information.
Link ID	Displays the Link ID.
ADV Device	Displays the ID of the device that advertises the LSAs.
Age	Displays the keepalive period of the LSA.
Seq#	Displays the sequence number of the LSA, which is used to check aged or duplicate LSAs.
Cksum	Displays the checksum of LSAs.
Link-Count	Displays the number of links in the device LSA information.
Route	Displays the device information included in the LSA.
Tag	Displays the tag of the LSA.

The following example displays the output the **show ip ospf database asbr-summary** command.

```
FS# show ip ospf database asbr-summary
        OSPF Device with ID (1.1.1.35) (Process ID 1)
            ASBR-Summary Link States (Area 0.0.0.1)
LS age: 47
Options: 0x2 (*|-|-|-|-|-|E|-)
LS Type: ASBR-summary-LSA
Link State ID: 3.3.3.3 (AS Boundary Device address)
Advertising Device: 1.1.1.1
LS Seq Number: 80000001
Checksum: 0xbe8c
Length: 28
Network Mask: /0
        TOS: 0    Metric: 1
```

The following table describes the fields in the output of the **show ip ospf database asbr-summary** command.

Field	Description
OSPF Device with ID	Displays the router ID.
AS Summary Link States	Displays the summary LSA information in the AS.
LS age	Displays the keepalive period of the LSA.
Options	Option
LS Type	Displays the type of the LSA.
Link State ID	Displays the link ID of the LSA.
AdvertisingRouter	Displays the device advertising the LSA.
LS Seq Number	Displays the sequence number of the LSA.
Checksum	Displays the checksum of the LSAs.
Length	Displays the length (in bytes) of the LSA.
Network Mask	Displays the network mask of the route corresponding to the LSA.
TOS	TOS value, which can be only 0 now.
Metric	Displays the metric of the route corresponding to the LSA.

The following example displays the output of the **show ip ospf database external** command.

```
FS# show ip ospf database external
        OSPF Device with ID (1.1.1.35) (Process ID 1)
            AS External Link States
LS age: 752
Options: 0x2 (*|-|-|-|-|-|E|-)
LS Type: AS-external-LSA
Link State ID: 20.0.0.0 (External Network Number)
Advertising Device: 1.1.1.1
LS Seq Number: 8000000a
Checksum: 0x7627
Length: 36
Network Mask: /24
```

```
    Metric Type: 2 (Larger than any link state path)
    TOS: 0
    Metric: 20
    Forward Address: 0.0.0.0
    External Route Tag: 0
```

The following table describes the fields in the output of the **show ip ospf database external** command.

Field	Description
OSPF Device with ID	Displays the router ID.
Type-5 AS External Link States	Displays autonomous external LSA information.
LS age	Displays the keepalive period of the LSA.
Options	Option
LS Type	Displays the type of the LSA.
Link State ID	Displays the link ID of the LSA.
Advertising Router	Displays the device advertising the LSA
LS Seq Number	Displays the sequence number of the LSA.
Checksum	Displays the checksum of the LSAs.
Length	Displays the length (in bytes) of the LSA.
Network Mask	Displays the network mask of the route corresponding to the LSA.
Metric Type	Indicates the external link type.
TOS	TOS value, which can be 0 only now.
Metric	Displays the metric of the route corresponding to the LSA.
Forward Address	IP address through which traffic is forwarded to the destination network. If this address is 0.0.0.0, the data traffic will be forwarded to the device that generates the link state.
External Route Tag	External route tag. Each external route has a 32-byte route tag. The OSPF does not use the route tag by itself, but it will be used by other routing processes to redistribute OSPF routes.

The following example displays the output of the **show ip ospf database network** command:

```
FS# show ip ospf database network
OSPF Router with ID (1.1.1.1) (Process ID 1)
Network Link States (Area 0.0.0.0)
LS age: 572
Options:0x2 (*|-|-|-|-|-|E|-)
LS Type:network-LSA
Link State ID:192.88.88.27 (address of Designated Router)
Advertising Router:1.1.1.1
LS Seq Number: 80000001
Checksum:0x5366
Length: 32
Network Mask: /24
```

```
Attached Router:1.1.1.1
Attached Router:3.3.3.3
```

The following table describes the fields in the output of the **show ip ospf database network** command.

Field	Description
OSPF Router with ID	Displays the router ID corresponding to the follow-up information and the process ID corresponding to the OSPF.
Network LinStates	Displays the network LSA information.
LS age	Displays the keepalive period of the LSA.
Options	Option
LS Type	Displays the type of the LSA.
Link State ID	Displays the link ID of the LSA.
Advertising Device	Displays the device advertising the LSA.
LS Seq Number	Displays the sequence number of the LSA.
Checksum	Displays the checksum of LSAs.
Length	Displays the length (in bytes) of the LSA.
Network Mask	Displays the network mask of the network corresponding to the LSA.
Attached Router	Displays the device that is connected with the network.

The following example displays the output of the **show ip ospf database device** command:

```
FS# show ip ospf database router
OSPF Router with ID (1.1.1.1) (Process ID 1)
Router Link States (Area 0.0.0.0)
LS age: 322
Options:0x2 (*|-|-|-|-|-|E|-)
Flags:0x3 :ABR ASBR
LS Type:router-LSA
Link State ID:1.1.1.1
Advertising Router:1.1.1.1
LS Seq Number: 80000012
Checksum:0x6d3a
Length: 48
Number of Links: 2
Link connected to:Stub Network
(Link ID) Network/subnet number: 100.0.1.1
(Link Data) Network Mask: 255.255.255.255
Number of TOS metrics: 0
TOS 0 Metric: 0
```

The following table describes the fields in the output of the **show ip ospf database device** command.

Field	Description
OSPF Device with ID	Displays the router ID.

Device Link States	Displays the device LSA information.
LS age	Displays the keepalive period of the LSA.
Options	Option
Flag	Flag
LS Type	Displays the type of the LSA.
Link State ID	Displays the link ID of the LSA.
Advertising Router	Displays the device advertising the LSA.
LS Seq Number	Displays the sequence number of the LSA.
Checksum	Displays the checksum of LSAs.
Length	Displays the length (in bytes) of the LSA.
Number of Links	Displays the number of links associated with the device.
Link connected to	Displays what the link is connected to and the network type.
(Link ID)	Link identifier
(Link Data)	Link data
Number of TOS metrics	TOS value, supporting TOS0 only
TOS 0 Metrics	TOS0 metric

The following example displays the output of the **show ip ospf database summary** command:

```
FS# show ip ospf database summary
        OSPF Device with ID (1.1.1.1) (Process ID 1)
                Summary Link States (Area 0.0.0.0)
LS age: 499
Options: 0x2 (*|-|-|-|-|-|E|-)
LS Type: summary-LSA
Link State ID: 10.0.0.0 (summary Network Number)
Advertising Device: 1.1.1.1
LS Seq Number: 80000004
Checksum: 0x330e
Length: 28
Network Mask: /24
        TOS: 0    Metric: 11
```

The following table describes the fields in the output of the **show ip ospf database summary** command.

Field	Description
OSPF Router with ID	Displays the router ID.
Summary Net Link States	Displays the summary network LSA information.
LS age	Displays the keepalive period of the LSA.
Options	Option
LS Type	Displays the type of the LSA.
Link State ID	Displays the link ID of the LSA.
Advertising Router	Displays the device advertising the LSA.
LS Seq Number	Displays the sequence number of the LSA.
Checksum	Displays the checksum of LSAs.
Length	Displays the length (in bytes) of the LSA.
Network Mask	Displays the network mask of the route corresponding to the LSA.
TOS	TOS value, supporting only 0 now
Metric	Displays the metric of the route corresponding to the LSA.

The following example displays the output of the **show ip ospf database nssa-external** command:

```
FS# show ip ospf database nssa-external
        OSPF Device with ID (1.1.1.1) (Process ID 1)
NSSA-external Link States (Area 0.0.0.1 [NSSA])
LS age: 1
Options: 0x0 (*|-|-|-|-|-|-|-)
LS Type: AS-NSSA-LSA
Link State ID: 20.0.0.0 (External Network Number For NSSA)
Advertising Device: 1.1.1.1
LS Seq Number: 80000001
Checksum: 0x033c
Length: 36
Network Mask: /24
        Metric Type: 2 (Larger than any link state path)
        TOS: 0
        Metric: 20
        NSSA: Forward Address: 100.0.2.1
        External Route Tag: 0
```

The following table describes the fields in the output of the **show ip ospf database nssa-external** command.

Field	Description
OSPF Router with ID	Displays the router ID.
NSSA-external Link States	Displays the type 7 autonomous external LSA information.
LS age	Displays the keepalive period of the LSA.
Options	Option
LS Type	Displays the type of the LSA.
Link State ID	Displays the link ID of the LSA.
Advertising Router	Displays the device advertising the LSA.
LS Seq Number	Displays the sequential number of the LSA.
Checksum	Displays the checksum of the LSAs.
Length	Displays the length (in bytes) of the LSA.
Network Mask	Displays the network mask of the route corresponding to the LSA.
Metric Type	Displays the metric type.
TOS	TOS value, which can be 0 only now.
Metric	Displays the metric of the route corresponding to the LSA.
NSSA:Forward Address	IP address through which traffic is forwarded to the destination network. If this address is 0.0.0.0, the data traffic will be forwarded to the device that generates the link state.
External Route Tag	External route tag. Each external route has a 32-byte route tag. The OSPF does not use the route tag by itself, but it will be used in redistributing OSPF routes by other routing process.

The following example displays the output of the **show ip ospf database external** command:

```
FS# show ip ospf database external
        OSPF Device with ID (1.1.1.1) (Process ID 1)
                AS External Link States
LS age: 1290
Options: 0x2 (*|-|-|-|-|-|E|-)
```

```
LS Type: AS-external-LSA
Link State ID: 20.0.0.0 (External Network Number)
Advertising Device: 1.1.1.1
LS Seq Number: 8000000a
Checksum: 0x7627
Length: 36
Network Mask: /24
        Metric Type: 2 (Larger than any link state path)
        TOS: 0
        Metric: 20
        Forward Address: 0.0.0.0
        External Route Tag: 0
```

The following table describes the fields in the output of the **show ip ospf database external** command.

Field	Description
OSPF Device with ID	Displays the router ID.
Type-7 AS External Link States	Displays the type 7 autonomous external LSA information.
LS age	Displays the keepalive period of the LSA.
Options	Option
LS Type	Displays the type of the LSA.
Link State ID	Displays the link ID of the LSA.
Advertising Router	Displays the device advertising the LSA.
LS Seq Number	Displays the sequence number of the LSA.
Checksum	Displays the checksum of the LSAs.
Length	Displays the length (in bytes) of the LSA.
Network Mask	Displays the network mask of the route corresponding to the LSA.
Metric Type	Displays the metric type.
TOS	TOS value, which can be 0 only now.
Metric	Displays the metric of the route corresponding to the LSA.
Forward Address	IP address through which traffic is forwarded to the destination network. If this address is 0.0.0.0, the data traffic will be forwarded to the device that generates the link state.

External Route Tag	External route tag. Each external route has a 32-byte route tag. The OSPF does not use the route tag by itself, but it will be used in redistributing OSPF routes by other routing process.

The following example displays the output of the **show ip ospf database database-summary** command:

```
FS# show ip ospf database database-summary
OSPF process 1:
Device Link States          : 4
Network Link States         : 2
Summary Link States         : 4
ASBR-Summary Link States : 0
AS External Link States    : 4
NSSA-external Link States: 2
```

The following table describes the fields in the output of the command **show ip ospf database database-summary**.

Field	Description
OSPF Process	OSPF process ID
Router Link	Number of device LSAs in the area
Network Link	Number of network LSAs in the area
Summary Link	Number of summary LSAs in the area
ASBR-Summary Link	Number of ASBR summary LSAs in the area
AS External Link	Number of NSSA LSAs in the area
NSSA-external Link	Number of NSSA LSAs in the area

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.58 Show Ip Ospf Interface

Use this command to display the OSPF-associated interface information.

show ip ospf [*process-id*] **interface** [*interface-type interface-number* | **brief**]

Parameter Description

Parameter	Description

process-id	OSPF process ID
interface-type	(Optional) type of the specified interface
interface-number	(Optional) number of the specified interface
brief	Displays the summary of the interface.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command displays the OSPF information on the interface.

Configuration Examples The following example displays the output of the **show ip ospf interface fastEthernet** *0/1* command:

```
FS# show ip ospf interface fastEthernet0/1
FastEthernet 0/1 is up, line protocol is up
Internet Address 192.88.88.27/24, Ifindex 4, Area 0.0.0.0, MTU 1500
Matching network config: 192.88.88.0/24
Process ID 1, Router ID 1.1.1.1, Network Type BROADCAST, Cost: 1
Transmit Delay is 1 sec, State DR, Priority 1,BFD enabled
Designated Router (ID) 1.1.1.1, Interface Address 192.88.88.27
Backup Designated Router (ID) 3.3.3.3, Interface Address 192.88.88.72
Timer intervals configured,Hello 10,Dead 40,Wait 40,Retransmit 5
Hello due in 00:00:03
Neighbor Count is 1, Adjacent neighbor count is 1
Crypt Sequence Number is 70784
Hello received 1786 sent 1787, DD received 13 sent 8
LS-Req received 2 sent 2, LS-Upd received 29 sent 53
LS-Ack received 46 sent 23, Discarded 1
```

The following table describes the fields in the output of the **show ip ospf interface serial** *1/0* command.

Field	Description
FastEthernet 0/1 State	State of the network interface; UP means normal working and Down means faults.
Internet Address	Interface IP address
Area	OSPF area of the interface
MTU	Corresponding MTU
Matching network config	Network area configured for the corresponding OSPF
Process ID	Corresponding process ID
Router ID	OSPF router id
Network Type	OSPF network type
Cost	OSPF interface cost
Transmit Delay is	OSPF interface transmit delay

State	DR/BDR state ID
Priority	Priority of the interface
Designated Router(ID)	DR ID of the interface
DR's Interface address	Address of the DR of the interface
Backup designated device(ID)	Router ID of the BRD of the interface
BDR's Interface address	Address of the BDR of the interface
Time intervals configured	Hello, Dead, Wait, and Retransmit intervals of the interface
Hello due in	Time when the previous Hello is sent
Neighbor count	Total number of neighbors
Adjacent neighbor count	Number of Full neighbors
Crypt Sequence Number	The corresponding md5 authentication number of the interface
Hello received send	Statistics on the Hello packets sent and received
DD received send	Statistics on the DD packets sent and received
LS-Req received send	Statistics on the LS request packets sent and received
LS-Upd received send	Statistics on the LS update packets sent and received
LS-Ack received send	Statistics on the LS response packets sent and received
Discard	Statistics on the discarded OSPF packets
BFD enabled	Indicates to enable OSPF and BFD linkage

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.59 Show Ip Ospf Neighbor

Use this command to display the OSPF neighbor list.

show ip ospf [*process-id*] **neighbor[statistics** | { [*interface-type interface-number*] | [*neighbor-id*] | [**detail**] }]

Parameter Description

Parameter	Description
detail	(Optional) Displays the neighbor details.
interface-type interface-number	(Optional) Displays the neighbor information of the specified interface
neighbor-id	(Optional) Displays the information of the specified neighbor
statistics	(Optional) Displays the neighbor statistics.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command displays neighbor information usually used to check whether the OSPF is running normally.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.60 Show Ip Ospf Route

Use this command to display the OSPF routes.

show ip ospf [*process-id*] **route** [**count** | *ip-address mask*]

Parameter Description

Parameter	Description
process-id	OSPF process ID. All OSPF routes will be displayed without an ID specified.
count	Statistics of various OSPF routes
ip-address mask	Statistics of routes which have a specified prefix and mask.

Defaults N/A

Command Mode Privileged mode

Usage Guide This command displays the OSPF routing information. The count option displays the OSPF routing statistics.

Configuration Examples The following example displays the output of the **show ip ospf route** command.

```
OSPF process 1:
Codes: C - connected, D - Discard , O - OSPF,
IA - OSPF inter area    N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
E2 100.0.0.0/24 [1/20] via 192.88.88.126, FastEthernet 0/1
C    192.88.88.0/24 [1] is directly connected,FastEthernet 0/1,Area 0.0.0.1
```

The following table describes the fields in the output of the **show ip ospf route** command.

Field	Description
codes	Route type and corresponding abbreviation and description
100.0.0.0/24	Route prefix
[1]	Route cost
via	Route next hop and interface

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.61 Show Ip Ospf Spf

Use this command to display the routing count in the OSPF area.

show ip ospf [*process-id*] **spf**

Parameter Description

Parameter	Description
process-id	OSPF process ID

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command displays the routing counts within the latest 30 minutes in the OSPF area and current routing total counts.

Configuration Examples The following example displays the output of the **show ip ospf [***process-id***] spf** command:

```
FS# show ip ospf 1 spf

OSPF process 1:
Area_id        30min_counts     Total_counts
0                   32                1235
1                   6                  356
```

The following table describes the fields in the output of the **show ip ospf [***process-id***] spf** command.

Field	Description
Area_id	OSPF area ID
30min_counts	OSPF routing counts within the latest 30 minutes
Total_counts	Total counts of the OSPF routing till now

Related Commands

Command	Description
show ip ospf	Displays the OSPF summary.

Platform Description N/A

2.62 Show Ip Ospf Summary-address

Use this command to display the converged route of all redistributed routes.

show ip ospf [*process-id*] **summary-address**

Parameter Description

Parameter	Description
process-id	ID of the OSPF process. All OSPF routing processes will be displayed if this parameter is not configured.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is valid only on the NSSA ABR, and displays only the routes with local aggregation operations.

Configuration Examples The following example displays the output of the **show ip ospf summary-address** command:

```
FS# show ip ospf summary-address
OSPF Process 1, Summary-address:
172.16.0.0/16, Metric 20, Type 2, Tag 0, Match count 3, advertise
```

Field	Description
Summary Address	IP address to be aggregated
Summary Mask	Mask to be aggregated
Advertise	Whether to advertise the aggregated route
Status	Whether the aggregation range takes effect
Aggregated subnets	Number of external routes included in the aggregation range

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.63 Show Ip Ospf Topology

Use this command to display topology information for OSPF SPF calculation.

show ip ospf [*process-id* [*area-id*]] **topology** [**adv-router** *adv-router-id* [*router-id*] | *self-originate* [*router-id*]]

Parameter Description

Parameter	Description
process-id	OSPF process ID.
area-id	Displayed area ID
topology	Displays a specified OSPF process and topology information summary of an

	area.
adv-router	Displays topology information of a specified device. This specified device must be a directly connected neighbor of the current device.
self-originate	Displays topology information of the current device.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command helps users to understand OSPF SPF calculation topology information and troubleshoot faults caused by topology planning. If the user enables fast reroute calculation, this command displays information related to fast reroute calculation.

Configuration Examples The following example displays the result of the show **ip ospf topology** command:

```
FS# show ip ospf topology
OSPF Router with ID (1.1.1.1) (Process ID 1)
Router Topology States (Area 0.0.0.0)
+1.1.1.1
   +2.2.2.2
      +4.4.4.4
   +3.3.3.3
      +4.4.4.4

+2.2.2.2
   +1.1.1.1
      +3.3.3.3
   +4.4.4.4
      +3.3.3.3

+3.3.3.3
   +1.1.1.1
      +2.2.2.2
   +4.4.4.4
+2.2.2.2
```

The following example displays the result of the **show ip ospf topology self-originate** command:

```
FS# show ip ospf topology self-originate
OSPF Router with ID (1.1.1.1) (Process ID 1)
Router Topology States (Area 0.0.0.0)
1.1.1.1
   Self to Destination Metric: 0
Parent Node: -
Child Node:2.2.2.2
   Primary next-hop: -
```

```
  Backup next-hop: -
  Backup Neighbor: -

2.2.2.2
  Self to Destination Metric: 1
Parent Node: 1.1.1.1
Child Node:-
  Primary next-hop: FastEthernet 0/1 via 10.0.0.1
  Backup next-hop: FastEthernet 0/2 via 10.0.1.1
  Backup Neighbor: 2.2.2.2
Neighbor to Destination Metric: 0
Neighbor to Self Metric: 10
Neighbor to Primary Neighbor: 0
Self to Neighbor Metric: 1
```

The description of every field displayed by **show ip ospf topology self-originate** is as follows:

Field	Description
Self to Destination Metric	Metric from the root node to the current destination node
Parent Node	Parent node of the current destination node
Child Node	Chile node of the current destination node
Primary next-hop	Primary next hop for reaching the current the destination node
Backup next-hop	Backup next hop for reaching the current the destination node
Backup Neighbor	Backup neighbor for reaching the current the destination node
Neighbor to Destination Metric	Metric from the backup neighbor to the current destination node
Neighbor to Self Metric	Metric from the backup neighbor to the root node
Neighbor to Primary Neighbor	Metric from the backup neighbor to the primary neighbor
Self to Neighbor Metric	Metric from the root node to the backup neighbor

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.64 Show Ip Ospf Virtual-link

Use this command to display the OSPF virtual link information.

show ip ospf [*process-id*] **virtual-link** [*ip-address*]

Parameter Description

Parameter	Description

process-id	ID of the OSPF process. All OSPF routing processes will be displayed if this parameter is not configured.
ip-address	Associated ID of a virtual link neighbor

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide If no virtual link is configured, the command displays the neighbor status and other related information. The show ip ospf neighbor command does not display the neighbor of the virtual link.

Configuration Examples The following is the output of the **show ip ospf virtual-links** command:

```
FS# show ip ospf virtual-links
Virtual Link VLINK0 to device 1.1.1.1 is up
Transit area 0.0.0.1 via interface FastEthernet 0/1
Local address 10.0.0.37/32
Remote address 10.0.0.27/32
Transmit Delay is 1 sec, State Point-To-Point,
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:05
Adjacency state Full
```

The following table describes the fields in the output.

Field	Description
Virtual Link VLINK0 to router	Displays the virtual link neighbors and their status.
Virtual Link State	Displays the virtual link state.
Transit area	Displays the transit area of the virtual link.
via interface	Displays the associated interface of the virtual link.
Local address	Local interface address
Remote Address	Peer interface address
Transmit Delay	Displays the transmit delay of the virtual link.
State	Interface state
Time intervals configured	Hello, Dead, Wait, and Retransmit interval of the interface
Adjacency State	Neighbor state, where FULL means the stable state

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.65 Summary-address

Use this command to configure the aggregate route out of the OSPF routing domain. Use the **no** form of this command to restore the remove the aggregate route.

summary-address *ip-address net-mask* [**not-advertise** | **tag** *value* | **cost** *cost*]

no summary-address *ip-address net-mask* [**not-advertise** | **tag** | **cost**]

Parameter Description

Parameter	Description
ip address	IP address of the aggregate route
net-mask	Network mask of the aggregate route
not-advertise	Does not advertise the aggregate route. If the parameter is not configured, the aggregate route is advertised.
tag *value*	Sets the tag value of an aggregate route. The range is from 0 to 4,294,967,295.
cost *cost*	Cost value of the aggregate route. The range is from 0 to 16,777,214.

Defaults

No aggregate route is configured by default.

Command Mode

Routing process configuration mode

Usage Guide

When routes are redistributed by another routing process into the OSPF routing process, every route is advertised to the OSPF-enabled device separately in external LSAs. If the incoming routes are continuous addresses, the autonomous border device can advertise only one aggregate route, reducing the scale of routing table greatly.

Unlike the **area range** command, the area range command aggregates inter-OSPF-area routes, while the summary-address command aggregates external routes of the OSPF routing domain.

For the NSSA, the **summary-address** command is valid only on the NSSA ABR now, and aggregates only redistributed routes.

Configuration Examples

The following example generates an external aggregate route 100.100.0.0/16.

```
FS(config)# router ospf20
FS(config-router)# summary-address100.100.0.0 255.255.0.0
FS(config-router)# redistribute static subnets
FS(config-router)# network200.2.2.0 0.0.0.255 area 1
FS(config-router)# network172.16.24.0 0.0.0.255area 0
FS(config-router)# area1nssa
```

Related Commands

Command	Description
area-range	Configures route convergence on the OSPF area border device.
redistribute	Redistributes routes of other routing processes.

Platform Description

N/A

2.66 Timers Lsa Arrival

Use this command to configure the time delay for the same LSA received. Use the **no** form of this command to restore the default setting.

timers lsa arrival *arrival-time*

no timers lsa arrival

Parameter Description

Parameter	Description
arrival-time	Configures the time delay when receiving the same LSA. The range is from 0 to 600000 in the unit of milliseconds.

Defaults

The default is 1000.

Command Mode

Routing process configuration mode

Usage Guide

No action is done when the same LSA is received within the specified time.

Configuration Examples

The following example configures the time delay for the same LSA as 2seconds.

```
FS(config)# routerospf1
FS(config-router)# timers arrival-time 2000
```

Related Commands

Command	Description
show ip ospf	Displays the OSPF information.

Platform Description

N/A

2.67 Timers Pacing Lsa-group

Use this command to configure the LSA grouping and then refresh the whole groups as well as the update interval for the aged link state. Use the **no** form of this command to restore the default setting.

timers pacing lsa-group *seconds*

no timers pacing lsa-group

Parameter Description

Parameter	Description
seconds	Parameter used for LSA pacing, checksum calculation, and aging interval. The range is from 10 to1800 in the unit of seconds.

Defaults

The default is 30.

Command Mode

Routing process configuration mode

Usage Guide

Each LSA has its own update and aging time (LSA age). If you update and age LSAs separately, many CPU resources will be consumed. To effectively use CPU resources, you can update LSAs of a device in batches.

You can use this command to modify the value of seconds, whose default value is 240 seconds. This parameter needs not to be adjusted often. The optimal group pacing interval is inversely proportional to the number of LSAs that need to be calculated. For example, if you have approximately 10000 LSAs in the database, decreasing the pacing interval would be better. If the switch has a small database (40 to 100 LSAs), increasing the pacing interval to 10 to 20 minutes might be better.

Configuration Examples

The following example configures the pacing time as 120 seconds.

```
FS(config)# deviceospf 20
FS (config-router)# timers paing lsa-group 120
```

Related Commands

Command	Description
show ip ospf	Displays the OSPF information.

Platform Description

N/A

2.68 Timers Pacing Lsa-transmit

Use this command to transmit the LSA grouping updating. Use the **no** form of this command to restore the default setting.

timers pacing lsa-transmit *transmit-time transmit-count*

no timers pacing lsa-transmit

Parameter Description

Parameter	Description
transmit-time	Configures the interval of sending the LSA grouping. The range is from 10 to 1000.
transmit-count	Configures the number of LS-UPD packets per group. The range is from 1 to 200.

Defaults

The default configurations are as follows:

Transmit-time: 40 milliseconds.

Transmit-count: 1

Command Mode

Routing process configuration mode

Usage Guide

If there are a large number of LSAs and the load on the system is heavy, you can properly use the **transmit-time** and **transmit-count** to inhibit the flooding LS-UPD packet number in the network.

If the CPU and network bandwidth loads are not too much, reduce **transimi-time** and increase **transimit-count** to quicken the environment convergence.

Configuration Examples

The following example sets the interval of sending the LS-UPD packets as 50ms, the packets number as 20.

```
FS(config)# routerospf1
FS(config-router)# timers pacing lsa-transmit 50 20
```

Related Commands

Command	Description
show ip ospf	Displays the OSPF process information, including the router ID.

Platform Description

N/A

2.69 Timers Spf

Use this command to configure the delay for SPF calculation after the OSPF receives the topology change as well as the interval between two SPF calculations. Use the **no** form of this command to restore the default setting.

timers spf *spf-delay spf-holdtime*

no timers spf

Parameter Description

Parameter	Description
spf-delay	Defines the SPF calculation waiting period in seconds. The range is from 0 to 2147483647.After receiving the topology change, the OSPF routing process must wait for the specified period to start the SPF calculation.
spf-holdtime	Defines the interval between two SPF calculations in seconds. The range is from 0 to 2147483647.When the waiting time is up but the interval between two calculations is still elapsing, the SPF calculation cannot start.

Defaults

For the FSOS not supporting the timers throttle spf command, the default values are as follows:
spf-delay: 5seconds;
spf-holdtime: 10 seconds.
For the FSOS supporting the timers throttle spf command, by default, the timers spf command takes no effect. Spf-delay depends on the default configuration of the timers throttle spf command.

Command Mode

Routing process configuration mode

Usage Guide

Smaller values of *spf-delay* and *spf-holdtime* mean that OSPF adapts to the topology change faster, and the network convergence period is shorter, but this will occupy more CPU of the router.

The configurations of the **timers spf command** and the timers throttle spf command may overwrite each other.

Configuration Examples

The following example configures the delay and holdover period of the OSPF as 3 and 9 seconds respectively.

```
FS(config)# deviceospf20
FS(config-router)# timersspf 3 9
```

Related Commands

Command	Description
show ip ospf	Displays the configuration information of the ospf.
timers throttle spf	Configures the exponential back off delay for SPF calculation. The command is recommended to replace the timers spf command because it is more powerful.

Platform Description

N/A

2.70 Timers Throttle Lsa All

Use this command to configure the exponential back off algorithm for the LSA. Use the **no** form of this command to restore the default setting.

timers throttle lsa all *delay-time hold-time max-wait-time*

no timers throttle lsa all

Parameter Description

Parameter	Description
delay-time	Configures the time delay of generating the LSA first. The range is from 1 to 600000.
hold-time	Configures the minimum interval of refreshing the LSA between the first time and second time. The range is from1 to 600000.
max-wait-time	Configures the maximum interval of successive refreshing the LSA., which determines whether the LSA is refreshed successively. The range is from1 to 600000

Defaults

The default configurations are as follows:

Delay-time: 0 millisecond,

Hold-time: 5000 milliseconds,

Max-wait-time: 5000 milliseconds.

Command Mode

Routing process configuration mode

Usage Guide

If high convergence performance is required for the link change, the value of delay-time can be relatively small. if you expect to reduce the CPU consumption, increase appropriately several values.

The value of hold-time cannot be smaller than that of delay-time, and the value of max-wait-time cannot be smaller than that of hold-time.

Configuration Examples

The following example configures the first delay as 10ms, hold-time as 1second and the longest delay as 5seconds.

```
FS(config)# routerospf1
FS(config-router)# timers throttle lsa all 10 1000 5000
```

Related Commands

Command	Description
show ip ospf	Displays the configuration information of the ospf

Platform Description

N/A

2.71 Timers Throttle Route

Use this command to configure the delay time of route calculation on receiving the ASBR summary LSA and the external summary LSA. Use the **no** form of this command to restore the default setting.

timers throttle route { **inter-area** *ia-delay* | **ase** *ase-delay* }

no timers throttle route { **inter-area** | **ase** }

Parameter Description

Parameter	Description
inter-area	Calculates the inter area routes.
ia-delay	Sets the delay time of the inter-area route calculation, in the range from 0 to 600,000 in the unit of milliseconds. On receiving the ASBR summary LSA, the router will not calculate the inter-area routes until the ia-delay time runs out.
ase	Calculates the external routes.
ase-delay	Defines the delay time of the external route calculation, in the range from 0 to 600,000 in the unit of milliseconds. On receiving the external summary LSA, the router will not calculate the external routes until the ase-delay time runs out.

Defaults

The default values are as follows:
ia-delay: 0,
ase-delay: 0,

Command Mode

Routing process configuration mode

Usage Guide

The default setting is recommended if the network needs to be fast converged. For the instable network where multiple inter-area and external routes exist, if you want to optimize the route calculation and save the CPU resources, increase the delay time.

Configuration Examples

The following example sets the .delay time of the inter-area route calculation to one second.

```
FS(config)# router ospf 1
FS(config-router)# timers throttle route inter-area 1000
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.72 Timers Throttle Spf

Use this command to configure the topology change information for OSPF, including the delay for SPF calculation as well as the interval between two SPF calculations in routing process configuration mode. Use the **no** form of this command to restore the default setting.

timers throttle spf *spf-delay spf-holdtime spf-max-waittime*

no timers throttle spf

Parameter Description

Parameter	Description
spf-delay	Defines the SPF calculation waiting period, in the unit of milliseconds, in the

	range from1 to 600,000. After receiving the topology change, the OSPF routing process must wait for the specified period to start the SPF calculation.
spf-holdtime	Defines the interval between two SPF calculations in seconds in the range from1 to 600,000.
spf-max-waittime	Defines the maximum interval between two SPF calculations, in milliseconds in the range from1 to 60,0000.

Defaults

The default configurations are as follows:

spf-delay: 1000ms;

spf-holdtime: 5000ms;

spf-max-waittime: 10000ms.

Command Mode

Routing process configuration mode

Usage Guide

The spf-delay parameter indicates the delay time of the topology change to the SPF calculation. The spf-holdtime parameter indicates the minimum interval between two SPF calculations. Then, the interval of the consecutive SPF calculations is at least twice as the last interval until it reaches to spf-max-waittime. If the interval between two SPF calculations has exceeded the required value, the SPF calculation will restart from spf-holdtime. Smaller spf-delay and spf-holdtime values can make the topology converge faster. A greater spf-max-waittime value can reduce the system resource consumption of SPF calculation. Those configurations can be flexibly adjusted according to the actual stability of the network topology.

Compared with the timers spf command, this command is more flexible. It speeds up the SPF calculation convergence, and reduces the system resource consumption of SPF calculation due to the topology change. To this end, the timers throttle spf command is recommended.

The value of spf-holdtime cannot be smaller than the value of spf-delay, or the value ofspf-holdtime will be set to be equal to the value of spf-delay;

The value of spf-max-waitime cannot be smaller than the value of spf-holdtime, or the value of spf-max-waittime will be set to be equal to the value of spf-holdtime automatically;

The configurations of the timers spf command and the timers throttle spf command may overwrite each other.

If both the timers spf command and the timers throttle spf command are not configured, the default value of the timers throttle spf command is used.

Configuration Examples

The following example configures the delay and holdtime and the maximum time interval of the OSPF as 5ms, 1000ms and 90000ms respectively. If the topology changes consecutively, the SPF calculation intervals are: 5ms, 1second, 3 seconds, 7 seconds, 15 seconds, 31 seconds, 63 seconds, 89 seconds, 179 seconds, 179+90seconds…

```
FS(config)# routerospf20
FS(config-router)# timersspf 5 1000 90000
```

Related Commands

Command	Description
show ip ospf	Displays the configuration information of OSPF

timers spf	Configures the SPF calculation delay. This command is supported in versions earlier than FSOS 10.4. It is recommended to replace the timers spf command with the timers throttle spf command.

Platform Description N/A

2.73 Two-way-maintain

Use this command to enable the OSPF two-way-maintain function. Use the **no** form of this command to disable this function.

two-way-maintain

no two-way-maintain

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Routing process configuration mode

Usage Guide In the large-scale network, partial packets delay or dropped may exist due to much CPU and memory are occupied caused by lots of packet transmission. If the Hello packets are handled over dead-interval, the corresponding adjacency will be disconnected. In this case, you can enable the two-way-maintain function for the packets such as DD, LSU, LSR and LSAck packets from a neighbor in the network (except for the Hello packets), avoiding the neighbor invalidation caused by delayed or dropped Hello packets.

Configuration Examples The following example disables the OSPF two-way-maintain function.

```
FS(config)# routerospf1
FS(config-router)# notwo-way-maintain
```

Related Commands

Command	Description
show ip ospf	Displays the configuration information of the OSPF

Platform Description N/A

3. OSPFv3 Commands

3.1 Area Authentication

Use this command to configure OSPFv3 area authentication. Use the **no** form of this command to restore the default setting.

area *area-id* **authentication ipsec spi** *spi* [**md5 | sha1**] [**0 | 7**] *key*

no area *area-id* **authentication**

Parameter Description

Parameter	Description
area-id	Specifies an area ID. It can be an integer or the prefix of an IPv4 address.
spi	Specifies a security parameter index, in the range from 256 to 4294967295.
md5	Specifies a message digest 5 (MD5) authentication mode.
sha1	Specifies a secure hash algorithm 1 (SHA1) authentication mode.
0	Indicates that a key is displayed in a plain-text format.
7	Indicates that a key is displayed in a cipher-text format.
key	Specifies an authentication key.

Defaults

Authentication is not performed by default.

Command Mode

Routing process configuration mode

Usage Guide

FSOS supports three authentication modes:

- null authentication mode, which is configured when authentication is not needed
- MD5 authentication mode
- SHA1 authentication mode

If OSPFv3 area authentication is configured, the configuration takes effect on all interfaces (except for those of virtual links) in the area. Interface authentication configuration, however, takes precedence over area authentication configuration.

Configuration Examples

The following example specifies MD5 authentication for area 1 where OSPFv3 routing processes reside, and sets the authentication password to aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa.

```
FS(config-router)# area 1 authentication ipsec spi 300 md5 aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
```

Related Commands

Command	Description
ipv6 ospf authentication	Specifies interface authentication.
area virtual-link authentication	Specifies virtual link authentication.

Platform Description

N/A

3.2 Area Default-cost

Use this command to set the cost of the default route for the ABR in the stub area. Use the **no** form of this command to restore the default setting.

area *area-id* **default-cost** *cost*

no area *area-id* **authentication**

Parameter Description

Parameter	Description
area-id	Area ID of the stub area. It can be an integer or an IPv4 prefix.
cost	Cost of the default route of the stub area in the range from 0 to 16777215.

Defaults

The default cost is 1.

Command Mode

Routing process configuration mode.

Usage Guide

This command can only work in the ABR connected to the stub area.

Configuration Examples

The following example sets the cost of the default route of stub area 50 to 100.

```
ipv6 router ospf 1
area 50 stub
area 50 default-cost 100
```

Related Commands

Command	Description
area stub	Sets a stub area.

Platform Description

N/A

3.3 Area Encryption

Use this command to enable encryption authentication for an OSPFv3 area. Use the **no** form of this command to restore the default setting.

area *area-id* **encryption ipsec spi** *spi* **esp null** [**md5** | **sha1**] [**0** | **7**] *key*

no area *area-id* **encryption**

Parameter Description

Parameter	Description
area-id	Specifies an area ID. It can be an integer or the prefix of an IPv4 address.
spi	Specifies a security parameter index, in the range from 256 to 4294967295.
null	Specifies the null encryption mode.
md5	Specifies the MD5 authentication mode.
sha1	Specifies the SHA1 authentication mode.

0	Indicates that a key is displayed in the plain-text format.
7	Indicates that a key is displayed in the cipher-text format.
Key	Specifies an authentication key.

Defaults Encryption authentication is not performed by default.

Command Mode Routing process configuration mode

Usage Guide FSOS supports the null encryption mode and two authentication modes: MD5 and SHA1.
If encryption authentication is configured for an OSPFv3 area, the configuration takes effect on all interfaces (except for those of virtual links) in the area. Encryption authentication configuration on interfaces, however, takes precedence over that of the OSPFv3 area.

Configuration Examples The following example specifies null encryption and MD5 authentication for area 1 where OSPFv3 routing processes reside, and sets the authentication password to aaaaaaaaaaaaaaaaaaaaaaaaaaaa.

```
FS(config-router)# area 1 encryption ipsec spi 300 esp null md5 aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
```

Related Commands

Command	Description
ipv6 ospf encryption	Specifies interface encryption authentication.
area virtual-link encryption	Specifies virtual link encryption authentication.

Platform Description N/A

3.4 Area-range

Use this command to set the range of the converged inter-area addresses. Use the **no** form of this command to restore the default setting.

area *area-id* **range** *ipv6-prefix/prefix-length* [**advertise|not-advertise**]

no area *area-id* **range** *ipv6-prefix/prefix-length*

Parameter Description

Parameter	Description
area-id	ID of the area in which the addresses are converged. It can be an integer or an IPv4 prefix.
ipv6-prefix/prefix-length	Range of the converged addresses.
advertise	Advertises the range of converged addresses.
not-advertise	The range of the converged addresses is not advertised. By default, the function is enabled.

Defaults No converged inter-area address range is defined by default.

Command Routing process configuration mode

Mode

Usage Guide

This command applies only to ABR. Use this command to converge multiple routes of an area into one route and advertise it to other areas. This command applies only to ABR. Use this command to converge multiple routes of an area into one route and advertise it to other areas. The routing information combination only takes place on the area border. The specific routing information is seen on the intra-area routers, but only one converged route can be seen on the devices in other areas. By configuring the two options of advertise and not-advertise, you can decide whether to advertise the convergence range to enable blocking and filtering. By default, the range is advertised to the outside. The option cost can be used to set the metric value of convergence routing.

A number of route convergence commands can be defined. In this way, the number of the routes in the OSPF AS is reduced. Particularly for a large network, the forwarding performance will be improved.

When a number of routes are converged, and the containment relationship exists between items, the area range converged is determined by the longest match principle.

Configuration Examples

The following example converges the routes in area 1.

```
ipv6 router ospf 1
area 1 range 2001:abcd:1:2::/64
```

Related Commands

Command	Description
summary-prefix	Sets the range of the external routes to be converged.

Platform Description

N/A

3.5 Area Stub

Use this command to create a stub area or set its attributes. Use the **no** form of this command to restore the default setting.

area *area-id* **stub** [**no-summary**]

no area *area-id* **stub** [**no-summary**]

Parameter Description

Parameter	Description
area-id	ID of the stub area. It can be an integer or an IPv6 prefix.
no-summary	This option applies only to the ABR in the stub area, indicating that the ABR only advertises the type 3 LSA indicating the default route to the stub area, not other type 3 LSAs.

Defaults

No stub area is defined by default.

Command Mode

Routing process configuration mode

Usage Guide

If an area is at the end of an entire network, it can be designed as the stub area, in which all the routers must execute the area stub command. If the area is designed as the stub area, it cannot learn the AS external routing information (type 5 LSAs). In practical application, the external routing information takes a large proportion of the link state database, so the devices in the stub area can only learn very little routing information, thus reducing the system resources required for the running of the OSPFv3 protocol.

By default, a type 3 LAS advertisement indicating default routing on the ABR in the stub area is generated, then the devices in the stub area can get to the outside of the AS.

If a totally stub area needs to be configured, just select the keyword **no-summary** when executing the **area stub** command on the ABR.

Configuration Examples

The following example enables the ABR in stub area 10 to advertise the default route to the stub area.

```
ipv6 router ospf 1
area 10 stub
area 10 stub no-summary
```

Related Commands

Command	Description
area default-cost	Sets the cost of the default route in the stub area.

Platform Description

N/A

3.6 Area Virtual-link

Use this command to create a virtual link or set its parameters. Use the **no** form of this command to restore the default setting.

area *area-id* **virtual-link** *router-id* [**hello-interval** *seconds*] [**dead-interval** *seconds*] [**retransmit-interval** *seconds*] [**transmit-delay** *seconds*] [**instance** *instance-id*] [**authentication ipsec spi** *spi* [**md5** | **sha1**] [**0** | **7**] *key*] [**encryption ipsec spi** *spi* **esp null** [**md5** | **sha1**] [**0** | **7**] *key*]

no area *area-id* **virtual-link** *router-id* [**hello-interval**] [**dead-interval**] [**retransmit-interval**] [**transmit-delay**] [**instance**] [**authentication**] [**encryption**]

Parameter Description

Parameter	Description
area-id	ID of the area in which the virtual link is located. It can be an integer or an IPv6 prefix.
Router-id	Neighbor router ID of the virtual link.
hello-interval *seconds*	Sets the interval to send the hello message on the local virtual link interface in the range from 1 to 65535 in the unit of seconds.
dead-interval *seconds*	Interval for the local interface of the virtual link to wait before considering that the neighbor fails. It is in the range from 1 to 65535 in the unit of seconds.
retransmit-interval *seconds*	Interval for retransmitting LSA on the local interface of the virtual link . The range is from 1 to 65535 in the unit of seconds.

transmit-delay *seconds*	Delay on the local interface of the virtual link in sending LSA. The range is from 1 to 65535 in the unit of seconds.
instnace *instance-id*	Specifies the instance corresponding to the virtual link. No virtual link can be established between different instances. Range: 0.-255
authentication ipsec spi *spi* [**md5 | sha1**] [**0 | 7**] *key*	Specifies OSPFv3 authentication. Authentication configuration on two neighboring devices must be consistent. The **service password-encryption** command enables a key to be displayed in the cipher-text format. *spi* specifies a security parameter index, in the range from 256 to 4294967295. **md5** specifies the MD5 authentication mode. **sha1** specifies the SHA1 authentication mode. 0 indicates that a key is displayed in the plain-text format. 7 indicates that a key is displayed in the cipher-text format. *key* specifies an authentication key.
encryption ipsec spi *spi* **esp null** [**md5| sha1**] [**0|7**] *key*	Specifies OSPFv3 encryption authentication. Authentication configuration on two neighboring devices must be consistent. The **service password-encryption** command enables a key to be displayed in the cipher-text format. *spi* specifies a security parameter index, in the range from 256 to 4294967295. **null** specifies the null encryption mode. **md5** specifies the MD5 authentication mode. **sha1** specifies the SHA1 authentication mode. 0 indicates that a key is displayed in the plain-text format. 7 indicates that a key is displayed in the cipher-text format. *key* specifies an authentication key.
authentication ipsec spi *spi* [**md5 | sha1**] [**0 | 7**] *key*	Specifies OSPFv3 authentication. Authentication configuration on two neighboring devices must be consistent. The **service password-encryption** command enables a key to be displayed in the cipher-text format. *spi* specifies a security parameter index, in the range from 256 to 4294967295. **md5** specifies the MD5 authentication mode. **sha1** specifies the SHA1 authentication mode. 0 indicates that a key is displayed in the plain-text format. 7 indicates that a key is displayed in the cipher-text format. *key* specifies an authentication key.

Defaults

No virtual link is defined by default

hello-interval: 10 seconds; dead-interval: four times of the hello-interval; retransmit-interval: five seconds; transmit-interval: one second.

Authentication and encryption are not performed by default.

Command

Routing process configuration mode

Mode

Usage Guide

In the OSPFv3 AS, all the areas must be connected with the backbone area to ensure that they can learn the routes of the whole OSPFv3 AS. If an area cannot be directly connected with the backbone area, it can connect it through a virtual link.

The virtual link shall not be in the stub area.

configuration, **dead-interval** and **instance** shall be configured consistently on both sides of the virtual link neighbors, otherwise neighboring relationship cannot be set up between the virtual neighbors.

Configuration Examples

The following example configures a virtual link.

```
FS(config)# ipv6 router ospf 1
FS(config-router)# area 1 virtual-link 192.1.1.1
```

Related Commands

Command	Description
show ipv6 ospf	Displays the OSPFv3 routing process information.
show ipv6 ospf neighbor	Displays the OSPFv3 neighbor information.
show ipv6 ospf virtual-links	Displays the OSPFv3 virtual link information.

Platform Description

N/A

3.7 Auto-cost

The metric of the OSPFv3 protocol is the interface-based bandwidth. Use this command to enable the bandwidth-based interface metric calculation or modify the reference bandwidth. Use the **no** form of this command to restore the default setting.

auto-cost [**reference-bandwidth** *ref-bw*]

no auto-cost [**reference-bandwidth**]

Parameter Description

Parameter	Description
reference-bandwidth *ref-bw*	Reference bandwidth in the range from 1 to 4294967 Mbps.

Defaults

The interface metric is calculated based on the reference bandwidth, which is 100Mbps.

Command Mode

Routing process configuration mode

Usage Guide

Use **no auto-cost reference-bandwidth** to restore it to the default reference bandwidth.

You can use **ipv6 ospf cost** in the interface configuration mode to set the cost of the specified interface, and it takes precedence over the metric calculated based on the reference bandwidth.

Configuration Examples

The following example changes the reference bandwidth to 10M.

```
ipv6 router ospf 1
auto-cost reference-bandwidth 5
```

Related Commands

Command	Description
ipv6 ospf cost	Sets the cost of an interface.
show ipv6 ospf	Displays the OSPFv3 routing process information.

Platform Description

N/A

3.8 Bdf All-interfaces

Use this command to enable the BDF on all OSPFv3 interfaces. Use this command to enable the BDF on all OSPFv3 interfaces in the routing configuration mode. Use the **no** form of this command to restore the default setting.

bdf all-interfaces

no bdf all-interfaces

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Routing process configuration mode.

Usage Guide

The OSPFv3 protocol dynamically discovers the neighbors through the Hello packets. With the BFD function enabled, BFD sessions will be established for the neighbors that match the FULL rules and the status of the neighbors will be detected through the BFD mechanism. Once the BFD neighbor fails, the OSPFv3 will perform the network convergence immediately.

You can also use the interface configuration mode command **ipv6 ospf bfd** [**disable**] to enable or disable the BFD function on the specified interface, which takes precedence over the command **bfd all-interfaces** in the routing process configuration mode.

Configuration Examples

N/A

Related Commands

Command	Description
ipv6 router ospf *process-id*	Enables the OSPFv3 routing process and enter into the routing process configuration mode.
ipv6 ospf bfd [disable]	Enables or disable the BFD on the specified OSPFv3

	interfaces.

Platform Description N/A

3.9 Clear Ipv6 Ospf Process

Use this command to clear and restart the OSPF process.

clear ipv6 ospf { **process** | *process-id*]

Parameter Description

Parameter	Description
process-id	OSPF process ID, in the range from 1 to 65535

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide In normal case, it is not necessary to use this command.

Use the parameter *process-id* to clear only one specific OSPFv3 instance. If no *process-id* is specified, all the OSPFv3 instances will be cleared.

Configuration Examples The following example restarts the OSPF process.

```
enble
clear ipv6 ospf process
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.10 Default-information Originate

Use this command to generate a default route to the OSPFv3 routing domain in the routing process mode. Use the **no** form of this command to restore the default setting.

default-information originate [**always**] [**metric** *metric*] [**metric-type** *type*] [**route-map** *map*]

no default-information originate [**always**] [**metric**] [**metric-type**] [**route-map** *map*]

Parameter Description

Parameter	Description
always	(Optional) It makes OSPFv3 generate the default route unconditionally, no matter whether the default route exists locally or not.
metric *metric*	(Optional) Initial metric value of the default route, in the range from 0 to

	16777214
metric-type *type*	(Optional) Type of the default route. There are two type of OSPF external routes: type 1, different metrics seen on different routers; type 2, the same metric seen on different routers.
route-map *map*	Associated route-map name, no associated route-map by default

Defaults

No default route is created;
The initial metric value is 1;
The default route type is type 2.

Command Mode

Routing process configuration mode

Usage Guide

When the **redistribute** or default-information command is executed, the OSPFv3-enabled router automatically turns into the autonomous system border router (ASBR). But the ASBR cannot generate the default route automatically or advertise it to all the routers in the OSPFv3 routing domain. The ASBR generates default routes by default. It is required to configure with the routing process configuration command **default-information originate**.

If the always parameter is used, the OSPF routing process advertises an external default route to the neighbors, no matter whether the default route in the core routing table exists or not. However, the local router does not display the default route. To make sure whether the default route is generated, execute **show ipv6 ospf database** to observe the OSPF link state database. The execution of the **show ipv6 route** command on the OSPF neighbor will display the default route.

The metric of the external default route can be defined only with the **default-information originate** command and cannot be set with the **default-metric** command.

There are two types of OSPFv3 external routes: type 1 external routes have changeable routing metrics, while type 2 external routes have constant routing metrics. For two parallel routes with the same route metric to the same destination network, type 1 takes precedence over type 2. As a result, the **show ipv6 route** command displays only the type 1 route.

Configuration Examples

The following example generates a default route.

```
FS(config)# ipv6 router ospf 1

FS(config-router)# default-information originate always
```

Related Commands

Command	Description
redistribute	Redistribute routes.
show ipv6 ospf	Displays the OSPFv3 routing process information.
show ipv6 ospf database	Displays the OSPFv3 link state database information.

Platform Description

N/A

3.11 Default-metric

Use this command to set the default metric for the routes to be redistributed. Use the **no** form of this command to restore the default setting

default-metric *metric-value*

no default-metric

Parameter Description

Parameter	Description
metric-value	Default metric for the routes to be redistributed. Its range is from 1 to 16777214.

Defaults

The default is 20.

Command Mode

The default route type is type 2.

Usage Guide

This command can be used together with **redistribute** to set the default metric for the routes to be redistributed. But this command does not apply to two types of routes:

- The **default route generated** with default-information originate;
- The redistributed direct route, for which 20 is always the default metric value.

Configuration Examples

The following example sets the default metric for the routes to be redistributed to 10.

```
FS(config)# ipv6 router ospf 1

FS(config-router)# default-metric 10
```

Related Commands

Command	Description
redistribute	Redistributes the routes.
show ipv6 ospf	Displays the OSPFv3 routing process information.

Platform Description

N/A

3.12 Distance

Use this command to set the management distance corresponding to different types of OSPFv3 routes. Use the **no** form of this command to restore the default setting.

distance { *distance* | **ospf** { **intra-area** *distance* | **inter-area** *distance* | **external** *distance* } }

no distance [**ospf**]

Parameter Description

Parameter	Description
distance	Sets the management distance of the route, in the range from 1 to 255.

intra-area *distance*	Sets the management distance of the intra-area route, in the range from1 to 255.
inter-area *distance*	Sets the management distance of the inter-area route, in the range from 1 to 255.
external *distance*	Sets the management distance of the external route, in the range from 1 to 255.

Defaults

The default value is 110.
Management distance of the intra-area route :110,
Management distance of the inter-area route :110
Management distance of the external-area route: 110.

Command Mode

Routing process configuration mode.

Usage Guide

This command is used to specify different management distances for different types of OSPFv3 routes. The management distance of the route is used for the comparison of routing priority, the smaller the management distance is, the higher the routing priority.

The priority of the route generated by different OSPFv3 processes must be compared using the management distance.

Setting the management distance as 255 indicates the routing entry is unreliable and will not for the packet forwarding.

Configuration Examples

the following example sets the OSPFv3 external route management distance to 160.

FS(config)# **ipv6 router ospf** *20*
FS(config-router)# **distance ospf external** *160*

Related Commands

Command	Description
ipv6 router ospf	Enables the OSPFv3 routing process .

Platform Description

N/A

3.13 Distribute-list in

Use this command to filter routes that are computed based on Link State Advertisement (LSA). Use the **no** form of this command to restore the default setting.

distribute-list { *name* | **prefix-list** *prefix-list-name* } **in** [*interface-type interface-number*]
no distribute-list { *name* | **prefix-list** *prefix-list-name* } **in** [*interface-type interface-number*]

Parameter Description

Parameter	Description
name	Specifies an ACL filtering rule.

prefix-list *prefix-list-name*	Specifies a prefix list filtering rule.
interface-type interface-number	Specifies an interface on which LSA-based routes are filtered.

Defaults

Routes are not filtered by default.

Command Mode

Routing process configuration mode

Usage Guide

Filter the routes computed based on LSA. Only the routes meeting filtering conditions can be forwarded. Route filtering does not affect the link state database and the routing tables of the neighbors. The ACL and prefix list filtering rules cannot be set at the same time. You can set only the ACL filtering rule or the prefix list filtering rule for a specific interface.

The routing filtering rules affect only forwarding of local routes but not route computation based on LSA. When route filtering is configured on an ABR, LSA can still compute routes and generate and send inter-area LSAs with prefixes to other areas. This will cause blackhole routes. To prevent the generation of blackhole routes, you can run the **area range** command with the **not-advertise** keyword.

Configuration Examples

The following example filters routes that are computed based on Link State Advertisement (LSA).

```
FS(config)# ipv6 prefix-list aaa seq 10 permit 2001::/64
FS(config)# ipv6 router ospf 25
FS(config-router)# redistribute rip metric 100
FS(config-router)# distribute-list prefix-list aaa in ethernet 0/1
```

Related Commands

Command	Description
area range	Configures route aggregation in an area.

Platform Description

N/A

3.14 Distribute-list Out

Use this command to filter routes that are re-distributed. This command has the similar function as the **redistribute** command. Use the **no** form of this command to restore the default setting.

distribute-list { *name* | **prefix-list** *prefix-list-name* } **out** [**bgp** | **connected** | **isis** [*area-tag*] | **ospf** *process-id* | **rip** | **static**]

no distribute-list { *name* | **prefix-list** *prefix-list-name* } **out** [**bgp** | **connected** | **isis** [*area-tag*] | **ospf** *process-id* | **rip** | **static**]

Parameter Description

Parameter	Description
name	Specifies the ACL filtering rule.
prefix-list *prefix-list-name*	Specifies the prefix list filtering rule.

bgp | connected | isis [*area-tag*] | **ospf** process-id | **rip** | **static**	Specifies the source from which the routes are filtered.

Defaults

Routes are not filtered by default.

Command Mode

Routing process configuration mode

Usage Guide

The **distribute-list out** command has the similar function as the **redistribute route-map** command. It can be used to filter the routes that are re-distributed based on other protocols into an OSPFv3 area. It does not directly re-distribute routes but works with the **redistribute** command to re-distribute routes. The ACL and prefix list filtering rules cannot be configured at the same time. You can set only the ACL filtering rule or the prefix list filtering rule to filter the routes from a specific source.

Configuration Examples

The following example filters static routes that are re-distributed.

```
FS(config)# ipv6 router ospf 1
FS(config-router)# redistribute static subnets
FS(config-router)# distribute-list prefix-list jjj out static
```

Related Commands

Command	Description
redistribute	Re-distributes routes that are carried by other routing processes.

Platform Description

N/A

3.15 Enable Mib-binding

Use this command to bind MIB to a specific OSPFv3 process. Use the **no** form of this command to restore the default setting.

enable mib-binding

no enable mib-binding

Parameter Description

Parameter	Description
N/A	N/A

Defaults

MIB is bound to an OSPFv3 process with the smallest process number by default.

Command Mode

Routing process configuration mode

Usage Guide

OSFPv3 MIB has no configuration information about OSFPv3 processes. You can operate only one OSFPv3 process through SNMP. OSFPv3 MIB is bound to the OSFPv3 process with the smallest process number by default. Users' operations take effect on this process.

To operate a specific OSFPv3 process through SNMP, you can bind OSFPv3 MIB to the process.

Configuration Examples

The following example enables users to operate the OSPFv3 process with the process number of 100 through SNMP.

```
FS(config)# ipv6 router ospf 100
FS(config-router)# enable mib-binding
```

Related Commands

Command	Description
show ipv6 ospf	Displays global OSPFv3 configuration information.
enable traps	Enables the OSPFv3 trap function.

Platform Description

N/A

3.16 Enable Traps

OSPFv3 processes support eight types of trap information, which are classified into two categories. Use this command to send specific trap information. Use the **no** form of this command to restore the default setting.

enable traps [**error** [**IfConfigError | IfRxBadPacket | VirtIfConfigError | VirtIfRxBadPacket**] | **state-change** [**IfStateChange | NbrStateChange | VirtIfStateChange | VirtNbrStateChange**]]

no enable traps [**error** [**IfConfigError | IfRxBadPacket | VirtIfConfigError | VirtIfRxBadPacket**] | **state-change** [**IfStateChange | NbrStateChange | VirtIfStateChange | VirtNbrStateChange**]]

Parameter Description

Parameter	Description
Error	Configures all error-related trap types. This keyword can also specify the following types of error traps: **IfConfigError** — Specifies an interface parameter error; **IfRxBadPacket** — Specifies incorrect packets received by an interface; **VirtIfConfigError** — Specifies a parameter error on a virtual interface; **VirtIfRxBadPacket** — Specifies incorrect packets received by a virtual interface.
state-change	Configures all traps related to state change. This keyword can also specify the following traps related to state change: **IfStateChange** — Specifies state change of an interface; **NbrStateChange** — Specifies state change of a neighbor; **VirtIfStateChange** — Specifies state change of a virtual interface; **VirtNbrStateChange** — Specifies state change of a virtual neighbor.

Defaults

All traps are disabled by default.

Command Mode

Routing process configuration mode

Usage Guide

Before configuring this command, you must run the **snmp-server enable traps ospf** command; otherwise, OSPFv3 trap information cannot be sent correctly**.** This is because the function of this command is restricted by the **snmp-server** command.

You can synchronously enable the trap function of different processes even if MIB is not bound to these processes.

Configuration Examples

The following example enables all traps of OSPFv3 process 100.

```
FS(config)#ipv6 router ospf 100
FS(config-router)# enable traps
```

Related Commands

Command	Description
show ipv6 ospf	Displays global OSPFv3 configuration information.
enable mib-binding	Binds MIB to an OSPFv3 process.
snmp-server enable traps ospf	Enables OSPFv3 to send trap information.

Platform

N/A

Description

3.17 Graceful-restart

Use this command to enable the OSPFv3 graceful restart (GR) function and to set the GR period. Use the **no** form of this command to restore the default setting.

graceful-restart [**grace-period** *grace-period* | **inconsistent-lsa-checking**]

no graceful-restart [*graceful-period*]

Parameter Description

Parameter	Description
grace-period *grace-period*	Configures the GR period. The GR period is the longest interval that lasts from the moment when OSPFv3 fails to the moment when OSPFv3 gracefully restarts. The GR period is in the range from 1 to 1800 in the unit of seconds. The default is 120.
inconsistent-lsa-checking	Configures the topology change detection. Once the topology change is detected, the device will exit GR and finish the convergence, This function is enabled by default after GR is enabled.

Defaults This function is enabled by default.

Command Mode Routing process configuration mode

Usage Guide GR is configured based on the OSPFv3 instance. Different instances could be configured with different parameters.

Use this command to configure the GR period. The GR period is the longest interval that lasts from the moment when OSPFv3 fails to the moment that OSPFv3 gracefully restarts. In this period, the device will perform link reconstruction to restore OSPFv3. When the GR period expires, OSPFv3 exits GR and finishes regular operation.

To enable the GR function and set the GR period to the 120 seconds, use the **graceful-restart** command. To modify the GR period, use the **graceful-restart grace-period** command. Topology stability is indispensable for uninterrupted forwarding. If topology changes, OSPFv3 finishes convergence instead of continuing GR to avoid long time interruption

1) Disabling the topology change detection: If the topology cannot converge in time in the hot backup process, the long term forwarding interruption may occur.

2) Enabling the topology change detection: Forwarding interruption may occur but the interruption time is much shorter than the time it takes to disable topology detection.

It is not recommended to disable the topology change detection. In some scenario where long term forwarding interruption does not occur, disabling the topology change detection minimizes the forwarding interruption time.

The GR function is unavailable when the Fast Hello function is enabled.

Configuration Examples The following example enables GR for OSPFv3 instance 1 and sets the GR period to 60 seconds.

```
FS(config)# ipv6 router ospf 1
```

```
FS(config-router)# graceful-restart
FS(config-router)# graceful-restart grace-period 60
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.18 Graceful-restart Helper

Use this command to enable the OSPFv3 graceful restart helper function. Use the **no** form of this command to disable this function.

graceful-restart helper disable

no graceful-restart helper disable

Use this command configure the topology change detection method of OSPFv3 GR helper. Use the **no** form of this command to cancel the configuration.

graceful-restart helper { **strict-lsa-checking** | **internal-lsa-checking**}

no graceful-restart helper {**strict-lsa-checking** | **internal-lsa-checking**}

Parameter Description

Parameter	Description
disable	Disables the device to assist other devices in performing GR.
strict-lsa-checking	Checks the change of the LSA of types 1-5 and 7 to judge whether the network topology changes. If the topology changes, the GR helper function will be disabled.
internal-lsa-checking	Checks the change of the LSA of types 1–3 to judge whether the network topology changes. If the topology changes, the GR helper function will be disabled.

Defaults

The GR helper is enabled by default.

The device where the GR helper is enabled does not check the LSA change by default.

Command Mode

Routing process configuration mode

Usage Guide

Use this command to enable the GR helper function. When one neighbor device performs graceful restart, the Grace-LSA is advertised to all neighbors. If the device enabled with the GR helper receives the Grace-LSA, it will become the GR Helper to help the neighbors perform GR. The **disable** option means that it is not allowed to perform the GR helper function for any device in GR.

The GR helper does not perform the network change detection by default. The convergence is not performed again until the GR is implemented even if the network changes. Use the **strict-lsa-checking orinternal-lsa-checking** command to enable the device to detect the change of network topology during the GR. The former checks any LSA (types 1-5,7) that stands for the network information, the latter checks the LSA

that stands for the AS inner-area route. In the large scale network, it is not recommended to enable the LSA check option because the partial network changes trigger the ending of the GR, decreasing the convergence speed of the entire network.

Configuration Examples

The following example disables the GF helper function of the OSPFv3 instance 1 and modifies the topology change detection policy.

```
FS(config)# ipv6 router ospf 1
FS(config-router)# graceful-restart helper disable
FS(config-router)# no graceful-restart helper disable
FS(config-router)# graceful-restart helper strict-lsa-checking
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.19 Ipv6 Ospf Area

Use this command to enable the interface to participate in the OSPFv3 routing process. Use the **no** form of this command to restore the default setting.

ipv6 ospf *process-id* **area** *area-id* [**instance** *instance-id*]

no ipv6 ospf *process-id* **area** [**instance** *instance-id*]

Parameter Description

Parameter	Description
process-id	OSPF process ID.
area *area-id*	OSPFv3 area in which the interface participates. It can be an integer or an IPv4 prefix.
instance *instance-id*	Configures the specific OSPFv3 instance on the interface.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode.

Usage Guide

You can use this command to enable the OSPFv3 on an interface, and then configure the OSPFv3 process with **ipv6 router ospf**. it will be automatically started after this command is used., it will be automatically started after this command is used.

Use **no ipv6 ospf area** to disable the specified interface to participate in the OSPFv3 routing process.

Use **no ipv6 router ospf** to disable all the interfaces to participate in the OSPFv3 routing process.

The neighbor relationship can only be established between the routers with the same instance ID.

After this command is configured, all the prefix information on the interface will be used in the operation of the OSPFv3.

Configuration Examples

The following example starts the OSPFv3 process on int fastethernet 0/0 for the specified area of the specified instance.

```
int fastethernet 0/0
ipv6 ospf 1 area 2 instance 2
```

Related Commands

Command	Description
ipv6 router ospf	Starts the OSPFv3 routing process.
passive-interface	Setsthe a passive interface.
show ipv6 ospf interface	Displays the OSPFv3 interface information.

Platform Description

N/A

3.20 Ipv6 Ospf Authentication

Use this command to configure OSPFv3 interface authentication. Use the **no** form of this command to restore the default setting.

ipv6 ospf authentication [**null | ipsec spi** *spi* [**md5 | sha1**] [**0 | 7**] *key*] [**instance** *instance-id*]

no ipv6 ospf authentication [**instance** *instance-id*]

Parameter Description

Parameter	Description
null	Indicates that authentication is not performed.
spi	Specifies a security parameter index, in the range from 256 to 4294967295.
md5	Specifies the MD5 authentication mode.
sha1	Specifies the SHA1 authentication mode.
0	Indicates that a key is displayed in the plain-text format.
7	Indicates that a key is displayed in the cipher-text format.
key	Specifies an authentication key.

Defaults

Authentication is not performed by default.

Command Mode

Interface configuration mode

Usage Guide

FSOS supports three authentication modes:

- null authentication mode, which is configured when authentication is not needed
- MD5 authentication mode
- SHA1 authentication mode

OSPFv3 authentication parameters configured on interconnected interfaces must be consistent.

Configuration

The following example specifies MD5 authentication in OSPFv3 interface configuration mode and sets the

Examples

authentication password to aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa.

```
FS(config-if)# ipv6 ospf authentication ipsec spi 300 md5 aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
```

Related Commands

Command	Description
ipv6 ospf authentication	Specifies interface authentication.
area virtual-link authentication	Specifies virtual link authentication.

Platform Description

N/A

3.21 Ipv6 Ospf Bdf

Use this command to enable or disable the BFD on the specified OSPFv3-enabled interface. Use the **no** form of this command to restore the default setting.

ipv6 ospf bfd [**dsable**] [**instance** *instance-id]*

no ipv6 ospf bfd [**instance** *instance-id*]

Parameter Description

Parameter	Description
disable	Disables the BFD function on the specified OSPF interface.
instance *instance-id*	Configures the specified OSPFv3 instance on the interface, in the range from 0 to 255.

Defaults

No configuration is made by default. The BFD configuration in the OSPFv3 process configuration mode will apply.

Command Mode

Interface configuration mode.

Usage Guide

The command ipv6 ospf bfd in the interface configuration mode takes precedence over the **bfd all-interfaces** command in the routing process configuration mode.

You can use this command to enable the BFD on the specified interface according to the actual environment, also can use the command **bfd all-interfaces** in the OSPFv3 process configuration mode to enanble the BFD function on all OSPFv3 interfaces and use the command ip **v6 ospf bfd disable** to disable the BFD on the specified interface.

Configuration Examples

```
FS(config)# int fastethernet 0/0
FS(config-if-fastethernet 0/0)# ipv6 ospf bfd
```

Related Commands

Command	Description
ipv6 router ospf *process-id*	Starts the OSPFv3 routing process and enter into the routing process configuration mode.
bdf all-interfaces	Enables the BFD on all OSPFv3 interfaces.

Platform Description N/A

3.22 Ipv6 Ospf Cost

Use this command to set the cost of the interface. Use the **no** form of this command to restore the default setting

ipv6 ospf cost *cost* [**instance** *instance-id*]

no ipv6 ospf cost [**instance** *instance-id*]

Parameter Description

Parameter	Description
Cost	Cost of interface, in the range from 0 to 65535.
instance *instance-id*	Configures the specific OSPFv3 instance on the interface, in the range from 0 to 255.

Defaults The default interface cost is the reference bandwidth/Bandwidth (100Mbps by default).

Command Mode Interface configuration mode.

Usage Guide By default, the cost of the OSPFv3 interface is 100Mbps/Bandwidth, in which the Bandwidth is the bandwidth of the interface and configured with the command **bandwidth** in the interface configuration mode.

The default costs of OSPFv3 interfaces for several typical lines are:

- 64K serial line: 1562;
- E1 line: 48
- 10M Ethernet: 10
- 100M Ethernet: 1

The OSPFv3 cost configured with the command **ipv6 ospf cost** will overwrite the default configuration.

Configuration Examples The following example sets the cost of the interface to 1:

```
FS(config)# int fastethernet 0/0
FS(config-if)# ipv6 ospf cost 1
```

Related Commands

Command	Description
show ipv6 ospf interface	Displays the OSPFv3 interface information.
ipv6 ospf area	Sets the interface to participate in the OSPFv3 routing process.

Platform Description N/A

3.23 Ipv6 Ospf Dead-interval

Use this command to set a dead interval of neighbors on an interface. If no hello packet is received from a neighbor within the interval, the neighboring relationship is considered to fail. Use the **no** form of this command

to restore the default setting

ipv6 ospf dead-interval { *seconds* | **minimal hello-multiplier** *multiplier* } [**instance** *instance-id*]

no ipv6 ospf dead-interval [**instance** *instance-id*]

Parameter Description

Parameter	Description
seconds	Dead interval of neighbors. Its range is from 1 to 65535 in the unit of seconds.
minimal hello-multiplier *multiplier*	Enables the fast hello function, which takes 1s as the dead interval of neighbors. *Multiplier* specifies the number of hello packets sent in one second, in the range from 3 to 20.
instance *instance-id*	Configures the specific OSPFv3 instance on the interface, in the range from 0 to 255.

Defaults

If the fast hello function is not enabled, the dead interval of neighbors is four times longer than the hello interval.

If the hello interval is changed, the dead interval of neighbors varies automatically.

Command Mode

Interface configuration mode

Usage Guide

The dead interval of neighbors must be longer than the hello interval.

The OSPFv3 fast hello function allows OSPFv3 to fast discovery neighbors and detect whether neighboring relationships are valid. To enable the OSPFv3 fast hello function, you can specify the **minimal** and **hello-multiplier** keywords and the *multiplier* parameter in this command. **minimal** specifies the deal interval of neighbors to be 1s; **hello-multiplier** specifies the number of times that hello packets are sent in a second. Therefore, this configuration reduces the hello interval to be shorter than 1s.

If an interface is enabled with the fast hello function, the **hello-interval** field of hello packets to be advertised by this interface is set to 0, and that of hello packets received from this interface is omitted**.**

dead-interval, **minimal**, and **hello-multiplier** that are introduced to enable the fast hello function cannot be configured together with **hello-interval**.

No matter whether the fast hello function is configured, the dead interval of neighbors on the interconnected interfaces of neighbors must be consistent. The values of **hello-multiplier** on the interconnected interfaces can be different but you must ensure that at least one hello packet is received within the dead interval of neighbors.

You can use the **show ipv6 ospf interface** command to monitor the dead interval of neighbors and the fast hello interval on an interface.

Configuration Examples

The following example sets the dead interval of neighbors to 60 seconds on an interface.

```
FS(config)# int fastethernet 0/0
```

```
FS(config-if)# ipv6 ospf dead-interval 60
```

Related Commands

Command	Description
ipv6 ospf hello-interval	Sets the interval for sending the Hello message on an interface.
show ipv6 ospf interface	Displays the OSPFv3 interface information.
ipv6 ospf area	Sets the interface to participate in the OSPFv3 routing process

Platform Description

N/A

3.24 Ipv6 Ospf Encryption

Use this command to enable OSPFv3 encryption authentication on an interface. Use the **no** form of this command to restore the default setting.

ipv6 ospf encryption [**null | ipsec spi** *spi* **esp null** [**md5 | sha1**] [**0 | 7**] *key*]

no ipv6 ospf encryption

Parameter Description

Parameter	Description
null	Indicates that encryption authentication is not performed.
spi	Specifies a security parameter index, in the range from 256 to 4294967295.
null	Specifies the null encryption mode.
md5	Specifies the MD5 authentication mode.
sha1	Specifies the SHA1 authentication mode.
0	Indicates that a key is displayed in the plain-text format.
7	Indicates that a key is displayed in the cipher-text format.
key	Specifies an authentication key.

Defaults

Encryption authentication is not performed by default.

Command Mode

Interface configuration mode

Usage Guide

FSOS supports the null encryption mode and two authentication modes: MD5 and SHA1.

OSPFv3 encryption authentication parameters configured on interconnected interfaces must be consistent.

Configuration Examples

The following example specifies null encryption and MD5 authentication in OSPFv3 interface configuration mode and sets the authentication password to aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa.

```
FS(config-if)# ipv6 ospf encryption ipsec spi 300 esp null md5 aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
```

Related

Command	Description

Commands

area encryption	Specifies area encryption authentication.
area virtual-link encryption	Specifies virtual link encryption authentication.

Platform Description

N/A

3.25 Ipv6 Ospf Hello-interval

Use this command to set the interval for the interface to send the Hello message. Use the **no** form of this command to restore the default setting

ipv6 ospf hello-interval *seconds* [**instance** *instance-id*]

no ipv6 ospf hello-interval [**instance** *instance-id*]

Parameter Description

Parameter	Description
seconds	Interval for sending the Hello message. Its range is from 1 to 65535 in the unit of seconds.
instance *instance-id*	Configures the specific OSPFv3 instance on the interface.

Defaults

The broadcast network and point-to-point network :10 seconds. The point-to-multipoint network and NBMA network :30 seconds.

Command Mode

Interface configuration mode.

Usage Guide

The same hello sending intervals must be set for the neighbors, otherwise the normal adjacency cannot be established.

The dead-interval minimal hello-multiplier and hello-interval parameters for Fast Hello cannot be configured simultaneously.

Configuration Examples

The following example sets the interval for the interface to send the Hello message to 20 seconds.

```
ipv6 ospf hello-interval 20
```

Related Commands

Command	Description
ipv6 ospf dead-interval	Sets the interval for the interface to consider that the neighbor fails.
show ipv6 ospf interface	Displays the OSPFv3 interface information.
ipv6 ospf area	Sets the interface to participate in the OSPFv3 routing process.

Platform Description

N/A

3.26 Ipv6 Ospf Mtu-ignore

Use this command to ignore the MTU check when an interface receives the database description message. Use the **no** form of this command to restore the default setting.

ipv6 ospf mtu-ignore [**instance** *instance-id*]

no ipv6 ospf mtu-ignore [**instance** *instance-id*]

Parameter Description

Parameter	Description
instance *instance-id*	Configures the specific OSPFv3 instance on the interface, in the range from 0 to 255.

Defaults

The MTU check is enabled by default.

Command Mode

Interface configuration mode.

Usage Guide

After receiving the database description message, the OSPFv3 device will check whether the MTU of neighbor interface is the same as its own MTU. If the received database description message indicates an MTU greater than its own interface's MTU, the neighbor relationship cannot be established. This can be fixed by disabling the MTU check.

Configuration Examples

The following example disables the MTU check function on the ethernet 1/0.

```
FS(config)# interface ethernet 1/0
FS(config-if)# ipv6 ospf mtu-ignore
```

Related Commands

Command	Description
ipv6 router ospf	Starts the OSPFv3 routing process.
ipv6 mtu	Sets the value of IPv6 MTU of the interface.

Platform Description

N/A

3.27 Ipv6 Ospf Neighbor

Use this command to configure the OSPFv3 neighbor manually. Use the **no** form of this command to restore the default setting.

ipv6 ospf neighbor *ipv6-address* [[**cost** <1-65535>] [poll-interval <0-2147483647> | priority <0-255>]] [instance *instance-id*]

no ipv6 ospf neighbor *ipv6-address* [[cost <1-65535>] [**poll-interval** < 0-2147483647 > | **priority** < 0-255 >]] [**instance** *instance-id*]

Parameter Description

Parameter	Description
cost *cost*	(Optional) Configures the cost to each neighbor in point-to-multipoint

	network. It is not defined by default, where the cost configured on the interface will be used. It ranges from 1 to 65535. Only the networks of the point-to-multipoint type support this option.
poll-interval *seconds*	(Optional) Interval for polling the neighbors (in seconds), which ranges from 1 to 2147483647. Only the networks of the non-broadcast (NBMA) type support this option.
priority *priority*	(Optional) Configures the priority value of non-broadcast network neighbors, which ranges from 0 to 255. Only the non-broadcast (NBMA) type network supports this option.
instance *instance-id*	(Optional) Configures the specific OSPFv3 instance on the interface, which ranges from 0 to 255.

Defaults

No neighbor is defined;
Neighbor polling interval: 120 seconds;
Priority value of non-broadcast network neighbor: 0.

Command Mode

Interface configuration mode.

Usage Guide

You can set relevant parameters for the neighbors depending on the actual network type.

Configuration Examples

The following example shows how to configure the OSPFv3 neighbor as follows: IPv6 address: 2001:DB8:4::1, priority value: 1, polling interval: 150 seconds.

```
FS(config)# interface fastEthernet 0/1
FS(config-if)# ipv6 ospf neighbor 2001:DB8:4::1 priority 1 poll-interval 150
```

Related Commands

Command	Description
Ipv6 ospf priority	Sets the priority value of an interface.
Ipv6 ospf network	Sets the network type of an interface.

Platform Description

N/A

3.28 Ipv6 Ospf Network

Use this command to set the network type of the interface. Use the **no** form of this command to restore the default setting.

ipv6 ospf network { **broadcast** | **non-broadcast** | **point-to-point** | **point-to-multipoint** [**non-broadcast**] } [**instance** *instance-id*]

no ipv6 ospf network [**broadcast** | **non-broadcast** | **point-to-point** | **point-to-multipoint** [**non-broadcast**]] [**instance** *instance-id*]

Parameter Description

Parameter	Description

broadcast	Specifies the broadcast network type.
non-broadcast	Specifies the non-broadcast network type.
point-to-point	Specifies the point-to-point network type.
point-to-multipoint	Specifies the point-to-multipoint network type.
point-to-multipoint non-broadcast	Specifies the point-to-multipoint non-broadcast network type.
instance instance-id	Configures the specific OSPFv3 instance on the interface with the valid id range from 0 to 255.

Defaults

Point-to-point network type: PPP, SLIP, frame relay point-to-point sub-interface and X.25 point-to-point sub-interface encapsulation.

NBMA network type: frame relay(except for the point-to-point sub-interface) and X.25 encapsulation (except for the point-to-point sub-interface)

Broadcast network type: Ethernet encapsulation.

The point-to-multipoint network type is not the default type.

Command Mode

Interface configuration mode.

Usage Guide

You can set the network type of the interface according to the actual link type applied and the topology.

Configuration Examples

The following example sets the network type of the interface that participates in the OSPFv3 to point-to-point.

```
ipv6 ospf network point-to-point
```

Related Commands

Command	Description
ipv6 ospf priority	Sets the interface priority.
show ipv6 ospf interface	Displays the OSPFv3 interface information.
ipv6 ospf area	Sets the interface to participate in the OSPFv3 routing process.

Platform Description

N/A

3.29 Ipv6 Ospf Priority

Use this command to set the interface priority. Use the **no** form of this command to restore the default setting.

ipv6 ospf priority *number-value* [**instance** *instance-id*]

no ipv6 ospf priority [**instance** *instance-id*]

Parameter Description

Parameter	Description
number-value	The priority of the interface. Its range is from 0 to 255.

instance *instance-id*	Configures the specific OSPFv3 instance on the interface. Its range is from 0 to 255.

Defaults The default priority is 1.

Command Mode Interface configuration mode.

Usage Guide In the broadcast network type, it is necessary to elect the DR/BDR. In electing the DR/BDR, the device of a higher priority is preferred. If several devices are of the same priority, the one with the largest router-ID is preferred. The device with the priority level of 0 does not participate in the election of DR/BDR.

Configuration Examples The following example disables the interface from being elected as the DR/BDR.

```
FS(config)# interface ethernet 1/0

FS(config-if)# ipv6 ospf priority 0
```

Related Commands

Command	Description
ipv6 ospf network	Sets the network type of an interface.
router-id	Sets the ID of a router.
show ipv6 ospf interface	Displays the OSPFv3 interface information.
instance ***instance-id***	Configures the specific OSPFv3 instance on the interface.

Platform Description N/A

3.30 Ipv6 Ospf Retransmit-interval

Use this command to set the interval for the interface to retransmit the LSA. Use the **no** form of this command to restore the default setting.

ipv6 ospf retransmit-interval *seconds* [**instance** *instance-id*]

no ipv6 ospf retransmit-interval [**instance** *instance-id*]

Parameter Description

Parameter	Description
seconds	Interval for retransmitting the LSA. Its range is from 1 to 65535 in the unit of seconds.
instance *instance-id*	Configures the specific OSPFv3 instance on the interface.

Defaults The default is five seconds.

Command Mode Interface configuration mode.

Usage Guide To ensure the reliability of the routing information transmission, the LSA sent to the neighbor shall be acknowledged by the neighbor. You can use this command to set the interval for the acknowledgement by the neighbor. If no acknowledgement is received within the specified period, the LSA information will be retransmitted.

Configuration Examples The following example sets the interval for retransmitting the LSA to 10 seconds.

```
FS(config)# interface ethernet 1/0

FS(config-if)# ipv6 ospf retransmit-interval 10
```

Related Commands

Command	Description
show ipv6 ospf interface	Displays the OSPFv3 interface information.
ipv6 ospf area	Sets the interface to participate in the OSPFv3 routing process.

Platform Description N/A

3.31 Ipv6 Ospf Transmit-delay

Use this command to set the delay on the interface in sending the LSA. Use the **no** form of this command to restore the default setting.

ipv6 ospf transmit-delay *seconds* [**instance** *instance-id*]

no ipv6 ospf transmit-delay [**instance** *instance-id*]

Parameter Description

Parameter	Description
seconds	The delay in sending LSA. Its range is from 1 to 65535 in the unit of seconds.
instance *instance-id*	Configures the ID of a specific OSPFv3 instance on the interface, in the range from 0 to 255.

Defaults The default is one.

Command Mode Interface configuration mode.

Usage Guide Use this command to set the delay on the interface in transmitting the LSA.

Configuration Examples The following example sets the delay on the interface in transmitting the LSA.

```
FS(config)# interface ethernet 1/0

FS(config-if)# ipv6 ospf transmit-delay 2
```

Related Commands

Command	Description
show ipv6 ospf interface	Displays the OSPFv3 interface information.

Platform Description N/A

3.32 Ipv6 Router Ospf

Use this command to start the OSPFv3 routing process. Use the **no** form of this command to restore the default setting.

ipv6 router ospf [*process-id* [vrf vrf-name]

no ipv6 router ospf *process-id*

Parameter Description

Parameter	Description
process-id	OSPFv3 process ID number. Without the process number configured, it indicates that process 1 is started.
vrf-name	Specify the VRF to which the OSPFv3 process belongs

Defaults No OSPFv3 routing process is started.

Command Mode Global configuration mode.

Usage Guide After the OSPFv3 process is started, the routing process configuration mode is entered.

At present, our products support up to 32 OSPFv3 processes.

Related Commands

Command	Description
ipv6 ospf area	Configures an interface to participate in the OSPFv3 routing process.
show ipv6 ospf	Displays the OSPFv3 routing process information.

Platform Description N/A

3.33 Ipv6 Router Ospf Max-concurrent-dd

Use this command to set the maximum concurrent interacting neighbors allowed in all OSPFv3 routing processes. Use the **no** form of this command to restore the default setting.

ipv6 router ospf max-concurrent-dd *number*

no ipv6 router ospf max-concurrent-dd

Parameter

Parameter	Description

Description

number	Maximum concurrent interacting neighbors, in the range from 1 to 65535.

Defaults

The default is 5.

Command Mode

Global configuration mode

Usage Guide

When a router is exchanging data with multiple neighbors at the same time which affects its performance, by configuring this command, the maximum concurrent interacting neighbors allowed in all OSPFv3 routing processes can be restricted.

Configuration Examples

The following example sets the maximum concurrent interacting neighbors allowed in all OSPFv3 routing processes to 4. The result is that in the interaction between a large number of neighbors, interactions with up to 4 neighbors are allowed to be initiated on this device concurrently, and interactions initiated by up to 4 neighbors are allowed to be received concurrently. That is, interaction with up to 8 neighbors is allowed on this device.

FS#conf terminal
FS(config)#ipv6 router ospf **max-concurrent-dd** *4*

Related Commands

Command	Description
max-concurrent-dd	Sets the maximum concurrent interacting neighbors in the OSPFv3 processes

Platform Description

N/A

3.34 Log-adj-changes

Use this command to enable the logging of adjacency changes. Use the **no** form of this command to restore the default setting.

log-adj-changes

no log-adj-changes

Parameter Description

Parameter	Description
detail	Displays details of adjacency changes

Defaults

By default, the adjacency state log on the entry of or exit from the FULL state is output.

Command Mode

Routing process configuration mode

Usage Guide

N/A

Configuration Examples

The following example turns on the log of adjacency state change.

```
FS(config)# router ospf 1
FS(config)# log-adj-changes detail
```

Related Commands

Command	Description
show ipv6 ospf	Displays the OSPF global configuration information

Platform Description

N/A

3.35 Max-concurrent-dd

Use this command to set the maximum number of DD packets that can be processed concurrently in the OSPFv3 routing process. Use the **no** form of this command to restore the default setting.

max-concurrent-dd *number*

no max-concurrent-dd

Parameter Description

Parameter	Description
number	Maximum number of DD packets that can be processed concurrently, in the range from 1 to 65535.

Defaults

The default is 5.

Command Mode

Routing process configuration mode.

Usage Guide

When a router is exchanging data with multiple neighbors at the same time which affects its performance, by configuring this command, the maximum concurrent interacting neighbors allowed in each OSPFv3 instance can be restricted.

Configuration Examples

The following example sets the maximum concurrent interacting neighbors allowed in the current OSPFv3 routing process to 4. The result is that in the interaction between a large number of neighbors, interactions with up to 4 neighbors are allowed to be initiated on this device concurrently, and interactions initiated by up to 4 neighbors are allowed to be received concurrently. That is, interaction with up to 8 neighbors is allowed on this device.

```
router ipv6 ospf 1
max-concurrent-dd 4
```

Related Commands

Command	Description
ipv6 router ospf max-concurrent-dd	Sets the maximum concurrent interacting neighbors allowed in the OSPFv3 processes.

Platform Description N/A

3.36 Passive-interface

Use this command to set the passive interface. Use the **no** form of this command to restore the default setting.

passive-interface { **default** | *interface-type interface-number* }

no passive-interface { **default** | *interface-type interface-number* }

Parameter Description

Parameter	Description
default	Sets all the interfaces to passive ones.
interface-type interface-number	Sets the specified interface to a passive one.

Defaults No passive interface is set by default.

Command Mode Routing process configuration mode

Usage Guide After an interface is set to a passive one, it no longer receives or sends the hello message.

This command applies to the interfaces participating in the OSPFv3 but not to the virtual links.

Configuration Examples The following example enables only the VLAN1 interface to participate in the OSPFv3 process.

```
passive-interface default
no passive-interface vlan 1
```

Related Commands

Command	Description
ipv6 ospf area	Configures an interface to participate in the OSPFv3 routing process.
show ipv6 ospf	Displays the OSPFv3 routing process information.
show ipv6 ospf neighbor	Displays the OSPFv3 neighbor information.

Platform Description N/A

3.37 Redistribute

Use this command to start the route redistribution in order to import the routing information of other routing protocols to the OSPFv3 routing process. Use the **no** form of this command to restore the default setting.

redistribute { **bgp** | **connected** | **isis** [*area-tag*] | **ospf** *process-id* | **rip** | **static** } [{ **level-1** | **level-1-2** | **level-2** } | **match** { **internal** | **external [1|2**] | **nssa-external** [**1 | 2**]} | **metric** *metric-value* | **metric-type** {*1*|*2*} | **route-map** *route-map-name* | **tag** *tag-value*]

no redistribute { **bgp** | **connected** | **isis** [*area-tag*] | **ospf** *process-id* | **rip** | **static** } [{ **level-1** | **level-1-2** | **level-2** } | **match** { **internal** | **external** [**1|2**] | **nssa-external** [**1 | 2**] } | **metric** | **metric-type** { *1*|*2* } | **route-map** *route-map-name* | tag *tag-value*]

Parameter Description

Parameter	Description
bgp	The bgp protocol is redistributed.
connected	The directly connected route is redistributed.
isis*[area-tag]*	The isis is redistributed. The area-tag specifies a particular isis instance.
ospf *process-id*	The ospf is redistributed. The process-id specifies a particular ospf instance within the range of 1-65535.
rip	The rip is redistributed.
static	The static route is redistributed.
level-1| **level-1-2**| **level-2**	It is used in the IS-IS route redistribution only and redistributes the routes at a specified level. .
match	It is used in the OSPFv3 route redistribution only and filters specific routes for redistribution; internal: inter-area and intra-area routes. external [1|2]: E1, E2 or all external routes. Nssa-external [1 | 2]: N1, N2 or all external routes of the NSSA area. All sub-type OSPFv3 routes are redistributed by default.
metric *metric-value*	Specifies the metric for the OSPFv3 external 2 LSA with metric-value. Its range is 0 to 16777214.
metric-type *{ 1|2 }*	Set the metric type for the external route to E-1 or E-2.
route-map *map-map-name*	Specifies the routing policy for route redistribution. The name of map-tag can be composed of up to 32 characters. No route-map is associated by default.
tag *tag-value*	Specifies the tag value redistributed to the OSPFv3 inner route, in the range of 0 to 4294967295.

Defaults

The function is disabled by default;

Metric-type: 2;

Level-2 routes are redistributed in the ISIS redistribution

OSPFv3 routes of all sub-types are redistributed in the OSPFv3 redistribution

No route-map is associated

Command Mode

Routing process configuration mode

Usage Guide

When a device supports multiple routing protocols, the coordination between these protocols becomes an important task. The device can run the protocols at the same time, so it should redistribute the protocols. This is applicable to all IP routing protocols.

The parameters level-1, level-2 or level-1-2 can be configured in the redistribution of the ISIS routes to indicate the level of the routes in the redistribution. By default, the level-2 ISIS routes are redistributed

When redistributing OSPFv3 routes, you can configure *match* to redistribute the routes.of the corresponding sub-type among the redistributed OSPFv3 routes. All types of OSPFv3 routes are redistributed by default.

The *match* parameter of route-map is specific to the source of routes. The parameters *tag*, *metric* and *metric-type* of the set rule of route-map take precedence over the ones configured for the redistribute command.

The metric value of the route-map associated should be in the range of 0 to 16777214. If the metric value is not in this range, the route cannot be introduced.

The rules for the **no** form of the **redistribute** command are as follows:

If some parameters are specified in the no command, restore their default settings;

If no parameters are specified in the **no** command, delete the whole command.

For example, if the configuration is made below:

Now modify the configuration with the command no redistribute isis 112 level-2

According to the above rules, the command only restores level-2 to default and level-2 is default per se, so after the above no command is executed, the configuration remains as

redistribute isis 112 level-2

To delete the whole command, use the command below

Configuration Examples

The following example redistributes the direct route and associates route-map test :

```
ipv6 router ospf 1
redistribute connect metric 10 route-map test
```

The associated route-map is configured as follows:

```
route-map test permit 10
match metric 20
set metric 30
```

The effect of the above configuration is to set the metric value which is 20 of the redistributed routes to 30, and that of other routes to 10

Related Commands

Command	Description
default-information originate	Sets the default route to be redistributed.
default-metric	Sets the default metric for the route to be redistributed.
summary-prefix	Sets the converged address range of the external route.
show ipv6 ospf	Displays the OSPFv3 routing process information.
show ipv6 ospf database	Displays the OSPFv3 link state database information.

Platform Description

N/A

3.38 Router-id

Use this command to set the router ID (device ID). Use the **no** form of this command to restore the default setting.

router-id *router-id*

no router-id

Parameter

Parameter	Description

Description

router-id	ID of the device in the IPv4 address format.

Defaults

The OSPFv3 routing process, the largest IPv4 address of all loopback interfaces is elected as the router ID; If there is no loopback interface with an IPv4 address, the OSPFv3 process will elect the largest IPv4 of all other interfaces as the router ID

Command Mode

Routing process configuration mode

Usage Guide

Each device that runs the OSPFv3 process shall be identified with a router ID. Router ID is in the format of IPv4 address.

Any IPv4 address can be set as the router ID, but the router ID of every routers in the AS must be unique. If multiple OSPFv3 processes are running on the same device, the router ID of every process must be unique. Note that the change of the router ID results in considerable processing work in the protocol. Therefore, it is not recommended to change any router ID without proper reason. A prompt will be given to ask whether you are sure to modify the router ID. It is recommended that you specify a router ID once an OSPFv3 process starts before configuring other parameters for the process

Configuration Examples

The following example sets the ID of the device that participates in the OSPFv3 process to 1.1.1.1.

```
router-id 1.1.1.1
```

Related Commands

Command	Description
ipv6 ospf priority	Sets the interface priority.
show ipv6 ospf	Displays the OSPFv3 routing process information.

Platform Description

N/A

3.39 Show Ipv6 Ospf

Use this command to display the information of the OSPFv3 process.

show ipv6 ospf [*process-id*]

Parameter Description

Parameter	Description
process- id	OSPF process ID number.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the information about the OSPFv3 process.

```
FS# show ipv6 ospf
Routing Process "OSPFv3 (1)" with ID 1.1.1.1
Process uptime is 24 minutes
Enable two-way-maintain
SPF schedule delay 5 secs, Hold time between SPFs 10 secs
Initial LSA throttle delay 0 msecs
Minimum hold time for LSA throttle 5000 msecs
Maximum wait time for LSA throttle 5000 msecs
Lsa Transmit Pacing timer 40 msecs, 1 LS-Upd
LSA interval 5 secs, Minimum LSA arrival 1000 msecs
Pacing lsa-group: 30 secs
Number of incomming current DD exchange neighbors 0/5
Number of outgoing current DD exchange neighbors 0/5
Number of external LSA 0. Checksum Sum 0x0000
Number of AS-Scoped Unknown LSA 0
Number of LSA originated 11
Number of LSA received 4
Log Neighbor Adjency Changes : Enabled
Number of areas in this router is 2
Area BACKBONE(0)
Number of interfaces in this area is 1(1)
SPF algorithm executed 4 times
Number of LSA 3.    Checksum Sum 0x1DDF1
Number of Unknown LSA 0
```

Related Commands

Command	Description
ipv6 router ospf	Starts the OSPFv3 routing process.
default-information originate	Sets the default route to be redistributed.
default-metric	Sets the default metric for the route to be redistributed.
router-id	Sets the OSPFv3 routing process ID
timers spf	Sets the delay and the minimum and maximum intervals for the OSPFv3 to perform SPF calculation after receiving the topology change information.

Platform Description

N/A

3.40 Show Ipv6 Ospf Database

Use this command to display the database information of the OSPFv3 process

show ipv6 ospf [*process- id*] **database** [**lsa-type** [**adv-router** *router-id*]]

Parameter Description

Parameter	Description
process- id	OSPF process ID number
lsa-type	The LSA types are as follows: AS-external-LSAs, Link-LSAs, Inter-Area-Prefix-LSAs, Inter-Area-Router-LSAs, Intra-Area-Prefix-LSAs, Network-LSAs, Router-LSAs If this parameter is not specified, all LSA information will be displayed.
adv-router *router-id*	Displays the LSA information generated by the specified router.

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays the information about the OSPFv3 process database.

```
FS# show ipv6 ospf database
OSPFv3 Router with ID (1.1.1.1) (Process 1)
Link-LSA (Interface FastEthernet 1/0)
Link State ID    ADV Router      Age  Seq#       CkSum  Prefix
0.0.0.2          1.1.1.1         197 0x80000001 0x7cd8     0
0.0.0.5          2.2.2.2         206 0x80000001 0x8c86     0
                 Link-LSA (Interface Loopback 1)
Link State ID    ADV Router      Age  Seq#       CkSum  Prefix
0.0.64.1         1.1.1.1          82 0x80000001 0xb760     0
                 Router-LSA (Area 0.0.0.0)
Link State ID    ADV Router      Age  Seq#       CkSum     Link
0.0.0.0          1.1.1.1         17 0x80000006 0x62a1        1
0.0.0.0          2.2.2.2         156 0x80000003 0x8653       1
                 Network-LSA (Area 0.0.0.0)
Link State ID    ADV Router      Age  Seq#       CkSum
0.0.0.5          2.2.2.2         157 0x80000001 0xf8f6
                 Router-LSA (Area 0.0.0.1)
Link State ID    ADV Router      Age  Seq#       CkSum     Link
0.0.0.0          1.1.1.1          17 0x80000002 0x0529      0
                 Inter-Area-Prefix-LSA (Area 0.0.0.1)
Link State ID    ADV Router      Age  Seq#       CkSum
0.0.0.1          1.1.1.1          77 0x80000002 0x83b4
AS-external-LSA
Link State ID    ADV Router      Age  Seq#       CkSum
0.0.0.1          1.1.1.1           1 0x80000001 0x6035 E2
```

Related Commands

Command	Description
ipv6 router ospf	Starts the OSPFv3 routing process.

Platform Description N/A

3.41 Show Ipv6 Ospf Interface

Use this command to display the OSPFv3 interface information.

show ipv6 ospf [*process- id*] **interface** [*interface-type interface-number* | **brief**]

Parameter Description

Parameter	Description
interface-type interface-number	Specifies the interface type and interface number.
process- id	OSPFv3 process ID
brief	Displays the interface summary.

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays the information about the OSPFv3 interface.

```
FS# show ipv6 ospf interface
FastEthernet 1/0 is up, line protocol is up
Interface ID 2
IPv6 Prefixes
fe80::2d0:22ff:fe22:2223/64 (Link-Local Address)
OSPFv3 Process (1), Area 0.0.0.0, Instance ID 0
Router ID 1.1.1.1, Network Type BROADCAST, Cost: 1
Transmit Delay is 1 sec, State BDR, Priority 1
Designated Router (ID) 2.2.2.2
Interface Address fe80::c800:eff:fe84:1c
Backup Designated Router (ID) 1.1.1.1
Interface Address fe80::2d0:22ff:fe22:2223
Timer interval configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:02
Neighbor Count is 1, Adjacent neighbor count is 1
Hello received 26 sent 26, DD received 5 sent 4
LS-Req received 1 sent 1, LS-Upd received 3 sent 6
LS-Ack received 6 sent 2, Discarded 0
```

Related Commands

Command	Description
ipv6 router ospf	Starts the OSPFv3 routing process.
ipv6 ospf area	Enables the interface to participate in the OSPFv3 process.

Platform Description N/A

3.42 Show Ipv6 Ospf Neighbor

Use this command to display the neighbor information of the OSPFv3 process.

show ipv6 ospf [*process- id*] **neighbor** [**interface-type** *interface-number* [**detail**]| *neighbor-id* |**detail** | **statistics**]

Parameter Description

Parameter	Description
process- id	OSPFv3 process ID number
detail	Displays details about the neighbor.
interface-type interface-number	Interface type and interface number
neighbor-id	Neighbor's router ID

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following command displays the brief information about the OSPFv3 neighbor.

```
FS# show ipv6 ospf neighbor
OSPFv3 Process (1) , 1 Neighbors, 1 is Full:
Neighbor ID    Pri    State        Dead Time     Interface              Instance ID
2.2.2.2          1      Full/DR      00:00:33      FastEthernet 1/0    0
FS# show ipv6 ospf neighbor detail
Neighbor 2.2.2.2, interface address fe80::c800:eff:fe84:1c
In the area 0.0.0.0 via interface FastEthernet 1/0
Neighbor priority is 1, State is Full, 6 state changes
DR is 2.2.2.2 BDR is 1.1.1.1
Options is 0x000013 (-|R|-|-|E|V6)
Dead timer due in 00:00:36
Database Summary List 0
Link State Request List 0
```

```
Link State Retransmission List 0
BFD session state up
```

Related Commands

Command	Description
ipv6 router ospf	Starts the OSPFv3 routing process.
ipv6 ospf area	Enables the interface to participate in the OSPFv3 process.
area virtual-link	Configures the OSPFv3 virtual link.
show ipv6 ospf interface	Displays the OSPFv3 interface information.

Platform Description

N/A

3.43 Show Ipv6 Ospf Restart

Use this command to display the OSPFv3 graceful restart configuration.

show ipv6 ospf [*process- id*] **restart**

Parameter Description

Parameter	Description
process- id	OSPFv3 process ID number.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the restarter status.

```
FS# show ipv6 ospf restart
Routing Process is ospf 1
Graceful-restart enabled
Restart grace period 120 secs
Current Restart status is plannedRestart
Current Restart remaining time 50 secs
Graceful-restart helper support enabled
```

The following example displays the helper status.

```
FS# show ipv6 ospf restart
Routing Process is ospf 1
Neighbor 10.1.1.2, interface addr 10.1.1.2
In the area 0.0.0.0 via interface GigabitEthernet 6/0/0
Graceful-restart helper enabled
```

```
Current helper status is helping
Current helper remaining time 50 secs
```

Related Commands

Command	Description
ipv6 router ospf	Starts the OSPFv3 routing process.

Platform Description N/A

3.44 Show Ipv6 Ospf Route

Use this command to display the OSPFv3 route information.

show ipv6 ospf [*process- id*] **route** [**count**]

Parameter Description

Parameter	Description
process- id	OSPFv3 process ID number.
count	Total number of OSPFv3 routes

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the information about OSPFv3 routes.

```
FS# show ipv6 ospf route
OSPFv3 Process (1)
Codes: C - connected, D - Discard, O - OSPF, IA - OSPF inter area
                    E1 - OSPF external type 1, E2 - OSPF external type 2Destination          Metric     Next-hop
E2 2001:DB8:1::/64     1/20        via fe80::c800:eff:fe84:1c, FastEthernet 1/0
O    2001:DB8:2::/64     11          via fe80::c800:eff:fe84:1c, FastEthernet 1/0, Area 0.0.0.0
```

Related Commands

Command	Description
ipv6 router ospf	Starts the OSPFv3 routing process.

Platform Description N/A

3.45 Show Ipv6 Ospf Summary-prefix

Use this command to display the external route convergence information of OSPFv3

show ipv6 ospf [*process- id*] **summary-prefix**

Parameter Description

Parameter	Description
process- id	OSPFv3 process ID number

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays the external route convergence information of OSPFv3.

```
FS# show ipv6 ospf summary-prefix
OSPFv3 Process 1, Summary-prefix:
2001:db8::/64,Metric 16777215,Type0,Tag0,Match count0,advertise
```

Related Commands

Command	Description
ipv6 router ospf	Starts the OSPFv3 routing process.
summary-prefix	Configures the converge route outside the OSPFv3 routing domain.

Platform Description N/A

3.46 Show Ipv6 Ospf Topology

Use this command to display the topology information about each area of OSPFv3.

show ipv6 ospf [*process- id*] **topology** [**area** *area-id*]

Parameter Description

Parameter	Description
process- id	OSPFv3 process ID number
area-id	Area ID

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following command displays the topology information about each area of OSPFv3.

```
FS# show ipv6 ospf topology
```

```
OSPFv3 Process (1)
OSPFv3 paths to Area (0.0.0.0) routers
Router ID          Bits   Metric      Next-Hop
Interface
1.1.1.1              B   --
2.2.2.2              EB    1            2.2.2.2/fe80::21a:a9ff:fe41:5b06
GigabitEthernet 0/6

OSPFv3 paths to Area (0.0.0.1) routers
Router ID          Bits   Metric      Next-Hop
Interface
1.1.1.1              V B    --

2.2.2.2              VEB   1              2.2.2.2/fe80::21a:a9ff:fe41:5b06

GigabitEthernet 0/6
```

Related Commands

Command	Description
ipv6 router ospf	Starts the OSPFv3 routing process.
area range	Configures the address range of the OSPF area.

Platform Description

N/A

3.47 Show Ipv6 Ospf Virtual-links

Use this command to display the virtual link information of the OSPFv3 process

show ipv6 ospf [*process- id*] **virtual-links**

Parameter Description

Parameter	Description
process- id	OSPFv3 process ID number

Defaults

N/A

Command Mode

Privileged EXEC mode.

Usage Guide

N/A

Configuration Examples

The following command displays the information about the OSPFv3 virtual link.

```
FS# show ipv6 ospf virtual-links
Virtual Link VLINK1 to router 2.2.2.2 is down
```

```
Transit area 0.0.0.1 via interface FastEthernet 1/0, instance ID 0
Local address *
Remote address 3333::1/128
Transmit Delay is 1 sec, State Down,
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
        Hello due in 00:00:08
        Adajcency state Full
```

Related Commands

Command	Description
ipv6 router ospf	Starts the OSPFv3 routing process.
area virtual-link	Configures the OSPFv3 virtual link.
show ipv6 ospf neighbor	Displays the OSPFv3 neighbor information.

Platform Description

N/A

3.48 Summary-prefix

Use this command to configure external route summarization. Use the **no** form of this command to restore the default setting.

summary-prefix *ipv6-prefix/prefix-length* [**not-advertise** | [**tag** *number*] [**cost** *cost*]]

no summary-prefix *ipv6-prefix/prefix-length* [**not-advertise** | [**tag**] [**cost**]]

Parameter Description

Parameter	Description
ipv6-prefix/prefix-length	Indicates the range of IP addresses to be summarized.
not-advertise	Indicates that the summarized route is not advertised. If this parameter is not specified, the summarized route is advertised.
tag *number*	Specifies the tag value of the route that is redistributed into the OSPFv3 routing domain. The value ranges from 0 to 4,294,967,295.
cost *cost*	The value ranges from 0 to 16,777,214.

Defaults

N/A

Command Mode

Routing process configuration mode

Usage Guide

When routes are redistributed from other routing processes and injected to the OSPFv3 routing process, each route is advertised to the OSPFv3 routers using an external LSA. If the injected routes are a continuous address space, the ABR can advertise only one summarized route to significantly reduce the size of the routing table. **area range** summarizes the routes between OSPFv3 areas, whereas **summary-prefix** summarizes external routes of the OSPFv3 routing domain.

Configuration Examples

```
FS(config)# ipv6 router ospf 1
FS(config-router)# summary-prefix 2001:DB8::/64
```

Related Commands

Command	Description
show ipv6 ospf	Displays OSPFv3 process information, including identifiers of routing devices.

Platform Description

N/A

3.49 Timers Lsa Arrival

Use this command to configure a delay for receiving repeated LSAs. Use the **no** form of this command to restore the default setting.

timers lsa arrival *arrival-time*

no timers lsa arrival

Parameter Description

Parameter	Description
arrival-time	Specifies the delay for receiving repeated LSAs. The range is from 0 to 600000 in the unit of milliseconds.

Defaults

The default is 1000.

Command Mode

Routing process configuration mode

Usage Guide

Configure the device not to process repeated LSAs received within the specific delay.

Configuration Examples

The following example sets the delay for receiving repeated LSAs to 2 seconds.

```
FS(config)# ipv6 router ospf 1
FS(config-router)# timers lsa arrival 2000
```

Related Commands

Command	Description
show ipv6 ospf	Displays OSPFv3 process information, including identifiers of routing devices.

Platform Description

N/A

3.50 Timers Pacing Lsa-group

Use this command to set an LSA group pace interval. Use the **no** form of this command to restore the default setting.

timers pacing lsa-group *seconds*

no timers pacing lsa-group

Parameter Description

Parameter	Description
seconds	Specifies the LSA group pace interval. The range is from 10 to 1800 in the unit of seconds. The default value is 30.

Defaults

The default is 30.

Command Mode

Routing process configuration mode

Usage Guide

Each LSA has its own lifetime, that is, LSA aging time. An LSA existing for 1800s will be refreshed so that the living time of the LSA will not exceed its aging time. This ensures that normal LSAs are not cleared due to timeout of aging time. If update and aging operations of each LSA are separately computed, a large number of CPU resources will be consumed.

To effectively utilize CPU resources, configure the device to group LSAs for uniform refreshment. The time for refreshing a group of LSAs is called an LSA group pace interval. Grouping refreshment is to put the LSAs to be refreshed within an LSA group pace interval into a group and refresh them uniformly.

When the number of LSAs is fixed, a longer LSA group pace interval will allow the CPU to process more LSAs when the timer expires for one time. To keep the stability of the CPU, you are recommended not to set an over long LSA group pace interval. This prevents the CPU from processing excessive LSAs when the timer expires each time. If the CPU processes a large number of LSAs each time, it is recommended to shorten the LSA group pace interval. For example, if the database has 10000 LSAs, you need to reduce the LSA group pace interval. If it has only 40 to 100 LSAs, you can adjust the group pace interval to 10 through 20 minutes.

Configuration Examples

The following example sets the LSA group pace interval to 120 seconds.

```
FS(config)# ipv6 router ospf 1
FS(config-router)#timers pacing lsa-group 120
```

Related Commands

Command	Description
show ipv6 ospf	Displays OSPFv3 configuration information.

Platform Description

N/A

3.51 Timers Pacing Lsa-transmit

Use this command to set an interval for sending LSA groups. Use the **no** form of this command to restore the default setting.

timers pacing lsa-transmit *transmit-time transmit-count*

no timers pacing lsa-transmit

Parameter Description

Parameter	Description
transmit-time	Specifies the interval for sending LSA groups. The range is from 10 to 1000 in the unit of milliseconds.
transmit-count	Specifies the number of LS-UPD packets in an LSA group. The range is from 1 to 200.

Defaults

The default transmit-time is 40 and the transmit-count is 1.

Command Mode

Routing process configuration mode

Usage Guide

There are usually a lot of LSAs on a network; therefore, the load of the device is very high. Setting proper **transimit-time** and **transimit-count** values can restrict flooding of LS-UPD packets on the network.
When the CPU load is not high and network bandwidth usage is not large, you can reduce the **transimit-time** value and increase the **transimit-count** value to accelerate route convergence.

Configuration Examples

The following example sets the interval for sending LS-UPDs to 50 milliseconds and the specified 20 packets to be sent each time.

```
FS(config)# ipv6 router ospf 1
FS(config-router)# timers pacing lsa-transmit 50 20
```

Related Commands

Command	Description
show ipv6 ospf	Displays OSPFv3 process information.

Platform Description

N/A

3.52 Timers Spf

Use this command to set the delay and interval for the OSPFv3 to calculate SPF after receiving the topology change. Use the **no** format of this command to restore the default setting.

timers spf *delay holdtime*

no timers spf

Parameter Description

Parameter	Description
spf-delay	Defines the waiting time for the SPF calculation, which ranges from 0 to 2147483647 seconds. After receiving the topology change information, the OSPF routing process has to waiting for a given period before making the SPF

	calculation.
spf-holdtime	Defines the interval between two SPF calculations, which ranges from 0 to 2147483647 seconds. If the interval has not passed even if the waiting time has elapsed, no SPF calculation can be made yet.

Defaults

There are two default situations: 1. The versions earlier than FSOS 10.4 do not support the command **timers throttle spf**. The system default is timers spf 5 10. 2. The FSOS 10.4 and the later versions do support the command **timers throttle spf**, where **timer spf** takes no effect by default. The delay for SPF calculation is subject to the default setting of the command **timers throttle spf**. Refer to the description of the command.

Command Mode

Routing process configuration mode

Usage Guide

The smaller the *spf-delay* and *spf-holdtime*, the shorter time the OSPF takes to adapt to the topology change, but the more CPU time will be used of the router.

The **timer spf** configuration and the **timers throttle spf** configuration will overwrite each other.

Configuration Examples

The following example sets the delay and holdtime of the OSPFv3 to 3 seconds and 9 seconds respectively.

FS(config)# **ipv6 router ospf** 20
FS(config-router)# **timers spf** 3 9

Related Commands

Command	Description
clear ipv6 ospf	Restarts part of the function of the OSPFv3.
show ipv6 ospf	Displays the OSPFv3 routing process information.
timers throttle spf	Configures the exponential backoff delay of the SPF calculation

Platform Description

N/A

3.51Timers Throttle Lsa All

Use this command to configure an exponential backoff algorithm for generating LSAs. Use the **no** form of this command to restore the default setting.

timers throttle lsa all *delay-time hold-time max-wait-time*

no timers throttle lsa all

Parameter Description

Parameter	Description
delay-time	Specifies a shortest LSA generation delay, in milliseconds (the first batch of LSAs is usually generated immediately). The range is from 0 to 600000 in the unit of milliseconds.
hold-time	Specifies a shortest interval between the first two times of LSA refreshment, in milliseconds.

	The range is from 1 to 600000 in the unit of milliseconds
max-wait-time	Specifies a longest interval for consecutive two times of LSA refreshment, in milliseconds. The value is used to determine whether LSAs are refreshed consecutively. The range is from 1 to 600000 in the unit of milliseconds.

Defaults

The default *delay-time* is 0, *hold-time* is 5000 and *max-wait-time* is 5000.

Command Mode

Routing process configuration mode

Usage Guide

If high route convergence capability is needed when links are changed, set a small *delay-time* value.

To reduce CPU consumption, you can properly increase the values of the parameters.

The *hold-time* value cannot be smaller than the *delay-time* value and must be smaller than or equal to the *max-wait-time* value.

Configuration Examples

The following example sets *delay-time* to 10 milliseconds, *hold-time* to one second, and *max-wait-time* to five seconds.

```
FS(config)# ipv6 router ospf 1
FS(config-router)# timers throttle lsa all 10 1000 5000
```

Related Commands

Command	Description
show ipv6 ospf	Displays OSPFv3 process information.

Platform Description

N/A

3.53 Timers Throttle Route

Use this command to configure the delay time of route calculation on receiving the ASBR summary LSA and the external summary LSA. Use the **no** form of this command to restore the default setting.

timers throttle route { **inter-area** *ia-delay* | **ase** *ase-delay* }

no timers throttle route { **inter-area** | **ase** }

Parameter Description

Parameter	Description
inter-area	Calculates the inter area routes.
ia-delay	Sets the delay time of the inter-area route calculation, in the range from 0 to 600000 in the unit of milliseconds. On receiving the ASBR summary LSA, the router will not calculate the inter-area routes until the ia-delay time runs out.
ase	Calculates the external routes.
ase-delay	Sets the delay time of the external route calculation, in the range from 0 to 600000 in the unit of milliseconds. On receiving the external summary LSA,

	the router will not calculate the external routes until the ase-delay time runs out.

Defaults The default *ia-delay* is 0 and *ase-delay* is 0.

Command Mode Routing process configuration mode

Usage Guide The default setting is recommended if the network needs to be fast converged. For the instable network where multiple inter-area and external routes exist, if you want to optimize the route calculation and save the CPU resources, increase the delay time.

Configuration Examples The following example sets the delay time of the inter-area route calculation to one second.

```
FS(config)# ipv6 router ospf 1
FS(config-router)# timers throttle route inter-area 1000
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.54 Timers Throttle Spf

Use this command to configure, the delay for SPF calculation as well as the minimum and maximum intervals between two SPF calculations after receiving the topology change information for OSPFv3 in the routing process configuration mode. Use the **no** form of this command to restore the default setting.

timers throttle spf *spf-delay spf-holdtime spf-max-waittime*

no timers throttle spf

Parameter Description

Parameter	Description
spf-delay	Specifies an SPF calculation delay after the topology change information is received. The range is from 1 to 600000 in the unit of milliseconds.
spf-holdtime	Specifies a shortest interval between two SPF calculations. The range is from 1 to 600000 in the unit of milliseconds.
spf-max-waittime	Specifies a longest interval between two SPF calculations. The range is from 1 to 600000 in the unit of milliseconds.

Defaults The default *spf-delay* is 1000. *spf-holdtime* is 5000 and *spf-max-waittime* is 10000.

Command Routing process configuration mode.

Mode

Usage Guide

Spf-delay refers to the delay from the topology change to the SPF calculation. *Spf-holdtime* refers to the minimum interval between the first and the second SPF calculations. Then, the interval of the consecutive SPF calculations is at least twice as the last interval till it reaches to *spf-max-waittime*. If the interval between two SPF calculations has exceeded the required minimum value, the interval of SPF calculation will re-start from *spf-holdtime*.

Smaller *spf-delay* and *spf-holdtime* value can make the topology convergence faster. Greater *spf-max-waittime* value can reduce the SPF calculations. Those configuration are flexible according to the actual stability of the network topology.

Compared with the timers spf command, this command is more flexible. It not only speeds up the SPF convergence calculation, but also reduces the system resources consumption of SPF calculation as the topology changes continuously. Therefore, the timers throttle spf command is recommended.

- The spf-holdtime cannot be smaller than spf-delay, or the spf-holdtime will be set to be equal to spf-delay;
- The spf-max-waitime cannot be smaller than spf-holdtime, or the spf-max-waittime will be set to be equal to spf-holdtime automatically;
- The configuration of the timers spf command and of the timers throttle spf command are overwritten each other.
- With neither timers spf command nor timers throttle spf command configured, the default value refers to the default of the timers throttle spf command

Configuration Examples

The following example configures the delay and holdtime and the maximum time interval of the OSPFv3 as 5ms, 1000ms and 90000ms respectively. If the topology changes consecutively, the time for SPF calculation is: five milliseconds, one second, three seconds, seven seconds, 15 seconds, 31 seconds, 63 seconds, 89 seconds, 179 seconds, 179+90 seconds……

FS(config)# **ipv6** router ospf *20*
FS(config-router)# **timers spf** *5 1000 90000*

Related Commands

Command	Description
clear ipv6 ospf	Restarts part of the OSPFv3 function.
show ipv6 ospf	Displays the routing process information of the OSFPv3
timers spf	Configures the SPF calculation delay .

Platform Description

N/A

3.55 Two-way-maintain

Use this command to enable two-way OSPFv3 maintenance. Use the **no** form of this command to disable this function.

two-way-maintain

no two-way-maintain

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Two-way OSPFv3 maintenance is enabled by default.

Command Mode

Routing process configuration mode

Usage Guide

Sometimes, there are a lot of sent and received packets on a network, occupying large CPU and memory resources. As a result, some packets cannot be processed immediately or are directly lost. If hello packets from a neighbor cannot be processed within the dead interval of neighbors, the connection with the neighbor will be interrupted due to connection timeout. If two-way OSPFv3 maintenance is enabled and a large number of packets exist on the network, besides hello packets, the two-way neighboring relationship between the device and the neighbor can also be maintained by DD, LSU, LSR, and LSAck packets from the neighbor. This prevents the neighboring relationship from failing due to receiving delay or discarding of hello packets.

Configuration Examples

The following example disables two-way OSPFv3 maintenance.

```
FS(config)# ipv6 router ospf 1
FS(config-router)# no two-way-maintain
```

Related Commands

Command	Description
show ipv6 ospf	Displays global OSPFv3 configuration information.

Platform Description

N/A

4. IS-IS Commands

4.1 address-family ipv6

	Use this command to enter the **address-family ipv6** mode. Use the **no** form of this command to delete all configurations in the **address-family ipv6**.	
	address-family ipv6 [*unicast*]	
	no address-family ipv6 [*unicast*]	
Parameter Description	**Parameter**	**Description**
	unicast	IPv6 unicast address prefix.
Defaults	By default, no address-family ipv6 is configured.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	This command is used for the IPv6 special configurations. To exit to the IS-IS routing process configuration mode, use the **exit-address-family** command.	
Configuration Examples	FS(config)# **router isis** FS(config-router)# **address-family ipv6 unicast**	
Related Commands	**Command**	**Description**
	exit-address-family	Exits the address-family ipv6 mode.
Platform Description	N/A	

4.2 adjacency-check

	Use this command to detect protocols supported by the adjacency in the Hello packets. Use the **no** form of this command is to cancel this detection.	
	adjacency-check	
	no adjacency-check	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	By default, this detection is enabled.	

Command Mode	IS-IS routing process configuration mode or address-family ipv6 mode
Usage Guide	N/A
Configuration Examples	FS(config)# **router isis** FS(config-router)# **adjacency-check** FS(config-router)# **address-family ipv6** FS(config-router-af)# **adjacency-check**
Related Commands	**Command** / **Description**
	N/A / N/A
Platform Description	N/A

4.3 area-password

	Use this command to set the plain-text authentication password for the Level-1 area. Use the **no** form of this command to cancel the password set.
	area-password [**0** | **7**] *password-string* [**send-only**]
	no area-password [**send-only**]
Parameter Description	**Parameter** / **Description**
	0 / Indicates that the key is displayed in plaintext.
	7 / Indicates that the key is displayed in ciphertext.
	password-string / Indicates the password string for plaintext authentication. The string can contain up to 126 characters.
	send-only / Indicates that the plaintext authentication password is only used to authenticate sent Hello packets in Level-1 areas. Received Hello packets are not authenticate.
Defaults	By default, no authentication password is set.
Command Mode	IS-IS routing process configuration mode
Usage Guide	Run this command to enable authentication of received LSPs, CSNPs, and PSNPs in Level-1 areas and include authentication information in these packets before they are sent. All IS-IS devices in an area must be configured with the same password. This command does not take effect if the **authentication mode** command is executed. You need to first delete the previous command configuration.

	To delete the password, run the **no area-password** command. If you run the **no area-password send-only** command, only the **send-only** setting is canceled. If you run the **area-password** *psw* **send-only** and **no area-password send-only** commands in sequence, the configuration is changed to **area-password** *psw*.
Configuration Examples	The following example specifies the authentication in the IS-IS area using the plaintext mode with the password being *redgiant* and the password applicable to the packets sent only, but not to the packets received. FS(config)# **router isis** FS(config-router)# **area-password** *redgiant* **send-only**
Related Commands	**Command** / **Description**
	domain-password / Sets the Level-2 domain password.
	authentication mode / Specifies the IS-IS authentication mode.
Platform Description	N/A

4.4 authentication key-chain

	Use this command to specify the key-chain used by the IS-IS authentication. Use the **no** form of this command to cancel the key-chain specified.
	authentication key-chain *name-of-chain* [**level-1** | **level-2**]
	no authentication key-chain *name-of-chain* [**level-1** | **level-2**]
Parameter Description	**Parameter** / **Description**
	name-of-chain / Key-chain name with the maximum length being 255.
	level-1 / Specifies the authentication key-chain of the Level-1.
	level-2 / Specifies the authentication key-chain of the Level-2.
Defaults	By default, the authentication key-chain is not specified.
Command Mode	IS-IS routing process configuration mode
Usage Guide	If the **key chain** command is not used to configure the corresponding key-chain, the authentication will not be performed. In addition, to make the IS-IS key-chain authentication effective, you need to configure the **authentication mode** command at the same time. This key-chain can apply to the plain-text authentication mode and MD5 encrypted authentication mode. You can use the **authentication mode** command to set the authentication mode. The length of the password key-string in the key-chain shall not be larger than 80 characters if the plain-text authentication mode is used, otherwise this configuration will fail. Only one key-chain is used at one time. So, when configuring this command, the said key-chain will be replaced by the new specified one. If the Level is not specified, the key-chain will apply to both Level-1 and Level-2.

	The key-chain specified by this command works on the LSP, CSNP and PSNP packets. The IS-IS will send or receive the password that belongs to this key-chain. There may contain multiple passwords in the key-chain. When sending the packets, use the password with small number first. While receiving the packets, the packet will be received as long as the password of this packet received corresponds to any password in the key-chain.
Configuration Examples	The following example specifies the authentication in the IS-IS area using the key-chain named *kc*: FS(config)# **router isis** FS(config-router)# authentication key-chain *kc* level-1

Related Commands	**Command**	**Description**
	authentication mode	Specifies the IS-IS authentication mode.
	authentication send-only	Specifies the IS-IS authentication applicable to the sent packets only, but not to packets received.
	key-chain	Configures the key-chain.
Platform Description	N/A	

4.5 authentication mode

	Use this command to specify the mode of IS-IS authentication. Use the **no** form of this command to cancel the specified IS-IS authentication mode.
	authentication mode { **md5** | **text** } [**level-1** | **level-2**]
	no authentication mode { **md5** | **text** } [**level-1** | **level-2**]

Parameter Description	**Parameter**	**Description**
	md5	Specifies the MD5 authentication mode to use.
	text	Specifies the plain-text authentication mode to use.
	level-1	Specifies the authentication mode taking effect on the Level-1.
	level-2	Specifies the authentication mode taking effect on the Level-2.
Defaults	By default, the authentication mode is not specified.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	To make the key-chain configured by the **authentication key-chain** command effective, you must use the **authentication mode** command to specify the authentication mode. If no Level is specified, the authentication mode specified is applicable to both Level-1 and Level-2. When configuring the **authentication mode** command, if the **area-password** or **domain-password** command has been executed to configure the plaintext authentication before, the said commands will be	

	overwritten by the new command. If the **authentication mode** command has been configured, the **area-password** or **domain-password** will not be configured successfully, you need to delete the **authentication mode** command first.
Configuration Examples	The following example specifies authentication in the IS-IS area to be the MD5 authentication mode. FS(config)# **router isis** FS(config-router)# authentication mode md5 level-1

Related Commands	**Command**	**Description**
	area-password	Sets the area plaintext authentication password.
	authentication key-chain	Specifies the key-chain used by the IS-IS authentication.
	authentication send-only	Specifies the IS-IS authentication applicable to the packets sent only, but not to the packets received.
	domain-password	Sets the domain plaintext authentication password.
Platform Description	N/A	

4.6 authentication send-only

	Use this command to specify the IS-IS authentication only applicable to the packets sent, but not to the packets received. Use the **no** form of this command to perform the authentication on the packets received.
	authentication send-only [**level-1** | **level-2**]
	no authentication send-only [**level-1** | **level-2**]

Parameter Description	**Parameter**	**Description**
	level-1	Specifies setting **send-only** on the Level-1.
	level-2	Specifies setting **send-only** on the Level-2.

Defaults	By default, this command is not configured. If the IS-IS authentication is configured, the authentication will be performed on the packets both sent and recieved.
Command Mode	IS-IS routing process configuration mode
Usage Guide	With this command configured, the IS-IS will set the authentication password in the packets sent, however, the authentication will not be performed on the packets received. It can apply to the following two occasions: 1. before deploying the IS-IS authentication for all devices in the network. 2. before changing the authentication password or authentication mode. Before the above two tasks start, you need to configure the **authentication send-only** command first to make each device perform no authentication on the packets received, so as to avoid the network oscillation caused during the subsequent authentication password deployment. After the deployment of the entire network authentication finished, execute the **no isis authentication send-only**

	command to cancel the **send-only** authentication mode. This command can apply to the plain-text authentication mode and MD5 authentication mode. You can use the **authentication mode** command to set the authentication mode. If the Level is not specified, the authentication mode specified is applicable to both Level-1 and Level-2.
Configuration Examples	The following example specifies the authentication in the IS-IS area to be the **send-only** mode. FS(config)# **router isis** FS(config-router)# authentication send-only level-1
Related Commands	**Command** / **Description**
	authentication key-chain / Specifies the IS-IS authentication key-chain.
	authentication mode / Specifies the mode of IS-IS authentication.
	key-chain / Configures the key-chain.
Platform Description	N/A

4.7 bfd all-interfaces

	Use this command to configure all interfaces running the IS-IS protocol to conduct BFD link detection. **bfd all-interfaces** [**anti-congestion**]
	Use the **no** form of this command to configure all interfaces running the IS-IS protocol to not conduct BFD link detection. **no bfd all-interfaces** [**anti-congestion**]
Parameter Description	**Parameter** / **Description**
	anti-congestion / IS-IS BFD anti-flapping option
Defaults	The IS-IS support for BFD is disabled on all interfaces by default.
Command Mode	IS-IS routing process configuration mode
Default Level	14
Usage Guide	There are two methods for enabling or disabling the IS-IS support for BFD on interfaces. Method 1: In IS-IS routing process configuration mode, run the [**no**] **bfd all-interfaces** [**anti-congestion**] command to enable or disable the IS-IS support for BFD on all interfaces running the IS-IS protocol. Method 2: In interface configuration mode, run the **isis bfd** [**disable	anti-congestion**] command to enable or disable the IS-IS support for BFD on a specified interface. In normal cases, the BFD function enables to send detection packets to detect the link status at an interval of several milliseconds. When a link exception such as link interruption occurs, the BFD function enables to rapidly detect the

	link exception, and notify a device running the IS-IS protocol to delete neighbors and delete neighbor availability information from LSP packets. The device running the IS-IS protocol performs route re-calculation and generates a new route, to bypass the failure link, thereby implementing fast convergence. With the introduction of some new technologies such as the Multi-Service Transport Platform (MSTP), link congestion easily occurs in peak hours. When congestion occurs, the BFD function allows to rapidly detect a link exception, notify a device running the IS-IS protocol to delete a neighbor and delete neighbor availability information from LSP packets, and perform link switching to bypass the congested link. The interval for an IS-IS neighbor to send a Hello detection packet is 10 seconds and the timeout time is 30 seconds. When an exception is detected via the BFD function, IS-IS Hello packets can be normally received, an IS-IS neighbor relationship can be rapidly established, and the route is restored to pass the congested link. Then, BFD is performed again. If there is still a link exception, link switching is performed again, and the process repeats. The route switches between the congested link and other links and flapping occurs. The anti-flapping function can be enabled to prevent route flapping in the case of link congestion. After the anti-flapping function is enabled, if a link is congested, the IS-IS neighbor status keeps alive but the neighbor availability information in LSP packets is deleted, and the route switches to a non-congested link. After the link is restored, that is, congestion is removed, the neighbor availability information is restored in LSP packets, and the route switches back to the originally congested link, thereby preventing route flapping. When IS-IS anti-flapping is enabled, the BFD anti-flapping command (**bfd up-dampening**) must be configured on an interface. The two commands must be configured simultaneously. If only one of them is configured, the anti-flapping function does not take effect or a network exception is incurred. For details about how to enable the BFD anti-flapping function on an interface, see the configuration example of the ISIS BFD command. Before the IS-IS support for BFD is configured, a BFD session must be configured on an interface. When the BFD anti-flapping command is configured on an interface, if the IS-IS support for BFD is already configured on the interface, the anti-flapping function must be enabled for a device running the IS-IS protocol. When the IS-IS anti-flapping option is configured, the BFD anti-flapping command must be configured on an interface.
Configuration Examples	The following example configures all interfaces running the IS-IS protocol to conduct BFD. FS(config)# router isis 123 FS(config-router)# bfd all-interface

4.8 clear clns neighbors

	Use this command to clear all IS-IS neighbor relation tables.
	clear clns neighbors

Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	This command is used in the condition of needing to refresh the IS-IS neighbor relation table immediately.	
Configuration Examples	The following example clears all IS-IS neighbor relation tables.	
	FS# clear clns neighbors	
Related Commands	**Command**	**Description**
	clear isis	Clears all IS-IS data structure.
Platform Description	N/A	

4.9 clear isis *

	Use this command to clear the data structure of all IS-ISs.	
	clear isis *	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	This command is used in the condition of needing to refresh the LSP immediately. For example, after executing the **area-password** and **domain-password** commands, the previous LSPs still exist in this router, you can use this command to clear these LSPs.	
Configuration Examples	FS# **clear isis** *	

Related Commands	Command	Description
	clear clns neighbors	Clears all IS-IS neighbors.
Platform Description	N/A	

4.10 clear isis counter

	Use this command to clear various statistics of IS-IS.	
	clear isis [*tag*] **counter**	
Parameter Description	**Parameter**	**Description**
	tag	IS-IS instance
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	N/A	
Configuration Examples	The following example clears various statistics of IS-IS.	
	FS# **clear isis counter**	
Related Commands	**Command**	**Description**
	clear isis *	Clears the data structure of all IS-ISs.
Platform Description	N/A	

4.11 default-information originate

	Use this command to generate a default routing information and advertise it by LSP. Use the **no** form of this command to delete the default routing information from LSP.	
	default-information originate [**route-map** *map-name*]	
	no default-information originate [**route-map** *map-name*]	
Parameter Description	**Parameter**	**Description**
	map-name	(Optional) Associated route-map's name, with the maximum length being 32. By default, the route-map is not associated.

Defaults	By default, there is no default route.
Command Mode	IS-IS routing process configuration mode or address-family ipv6 mode.
Usage Guide	The default route is not generated in the Level-2 domain. Use this command to allow the default route to enter the Level-2 domain.
Configuration Examples	The following example generates a default routing information and advertises it by LSP
	FS(config)# **router isis** FS(config-router)# **default-information originate** FS(config-router)# **address-family ipv6** FS(config-router-af)# default-information originate
Related Commands	**Command** / **Description**
	N/A / N/A
Platform Description	N/A

4.12 distance

	Use this command to set the management distance of the IS-IS routes. Use the **no** form of this command to restore the default settings.
	distance *my-cost*
	no distance
Parameter Description	**Parameter** / **Description**
	my-cost / Distance value in the range of 1 to 255.
Defaults	By default, the distance is 115.
Command Mode	IS-IS routing process configuration mode or IS-IS address-family ipv6 configuration mode
Usage Guide	Use this command to configure the management distance of the IS-IS routes. The shorter the management distance, the more reliable the routing information is.
Configuration Examples	The following example sets the management distance of the IS-IS routes.
	FS(config)# **router isis** FS(config-router)# **distance** 100

Related Commands	Command	Description
	isis metric	Sets the metric value of the interface.
Platform Description	N/A	

4.13 domain-password

	Use this command to set the plain-text authentication password of Level-2 domain. Use the **no** form of this command to cancel the password configured.
	domain-password [**0** | **7**] *password-string* [**send-only**]
	no domain-password [**send-only**]

Parameter Description	Parameter	Description
	0	Indicates that the key is displayed in plaintext.
	7	Indicates that the key is displayed in ciphertext.
	password-string	Indicates the password string for plaintext authentication. The string can contain up to 126 characters.
	send-only	Indicates that the plaintext authentication password is only used to authenticate sent Hello packets in Level-1 areas. Received Hello packets are not authenticated.

Defaults	By default, no authentication password is set.
Command Mode	IS-IS routing process configuration mode
Usage Guide	Run this command to enable authentication of received LSPs, CSNPs, and PSNPs in Level-2 domains and include authentication information in these packets before they are sent. All IS-IS devices in a Level-2 domain must be configured with the same password. This command does not take effect if the **authentication mode** command is executed. You need to first delete the previous command configuration. To delete the password, run the **no domain-password** command. If you run the **no domain-password send-only** command, only the **send-only** setting is canceled. If you run the **domain-password** *psw* **send-only** and **no domain-password send-only** commands in sequence, the configuration is changed to **domain-password** *psw*.
Configuration Examples	FS(config)# **router isis** FS(config-router)# **domain-password** *redgiant*

Related Commands	Command	Description
	area-password	Sets the plain-text authentication password of Level-1 area.
	authentication mode	Specifies the IS-IS authentication mode.
Platform Description	N/A	

4.14 enable mib-binding

	Use this command to bind MIBs with an IS-IS process. Use the **no** form of this command to unbind the MIB from the IS-IS process.	
	enable mib-binding	
	no enable mib-binding	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	By default, MIBs are bound with IS-IS process 1.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	By default, MIBs are bound with IS-IS process 1. The IS-IS process support multiple processes. The administrator can use this command to bind MIBs with the IS-IS process.	
Configuration Examples	The following example binds the MIB with an IS-IS process. FS# configure terminal FS(config)# **router isis** FS(config-router)# enable mib-binding	
Related Commands	**Command**	**Description**
	graceful-restart helper disable	Disables the IS-IS GR Help capability.
	isis hello-interval	Sets the interval of sending Hello packets.
	isis hello-multiplier	Sets the Hello holdtime multiplier for the IS-IS interface.
Platform Description	N/A	

4.15 enable traps

	Use this command to enable the system to send one or multiple types of IS-IS trap packets. Use the **no** form of this command to disable the system to send IS-IS trap packets.
	enable traps { **all** | *traps set* }
	no enable traps { **all** | *traps set* }
Parameter Description	**Parameter** / **Description**
	all / Indicates all types of IS-IS trap packets.
	traps set / Indicates the specified type of IS-IS trap packet.
Defaults	By default, no IS-IS trap is sent.
Command Mode	IS-IS routing process configuration mode
Usage Guide	There are 18 types of IS-IS packets. The IS-IS packets can be classified into multiple sets. Each set includes several types of trap packets. To enable the system to send the IS-IS trap packet, you need to enable the global IS-IS trap using the **snmp-server enable traps isis** command, specify the host to receive the IS-IS trap packets, and use the **enable traps** { **all** | *traps set* } command to specify the type of IS-IS trap packet to be sent.
Configuration Examples	The following example enables the system to send all IS-IS trap packets to the host of IP address 192.168.1.1. FS# configure terminal FS(config)#snmp-server enable traps isis FS(config)#snmp-server host 10.1.1.1 traps version 2c public FS(config)#router isis FS(config-router)# enable traps all
Related Commands	**Command** / **Description**
	graceful-restart helper disable / Disables the IS-IS GR Help capability.
	isis hello-interval / Sets the interval of sending Hello packets.
	isis hello-multiplier / Sets the Hello holdtime multiplier for the IS-IS interface.
Platform Description	N/A

4.16 exit-address-family

	Use this command to exit IS-IS address family IPv6 configuration mode and return to IS-IS routing process configuration mode.
	exit-address-family

Parameter Description	Parameter	Description
	N/A	N/A
Defaults	N/A	
Command Mode	IS-IS address-family IPv6 configuration mode	
Usage Guide	N/A	
Configuration Examples	The following example exits IS-IS address family IPv6 configuration mode. FS (config-router-af)#exit-address-family FS (config-router)#	

Related Commands	Command	Description
	graceful-restart helper disable	Disables the IS-IS GR Help capability.
	isis hello-interval	Sets the interval of sending Hello packets.
	isis hello-multiplier	Sets the Hello holdtime multiplier for the IS-IS interface.
Platform Description	N/A	

4.17 graceful-restart

	Use this command to enable the IS-IS GR Restart capability. Use the **no** form of this command to disable this capability.
	graceful-restart
	no graceful-restart

Parameter Description	Parameter	Description
	N/A	N/A
Defaults	IS-IS GR is enabled by default.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	Use this command to enable the IS-IS GR Restart capability. As long as the network conditions remain unchanged, IS-IS can be restarted and restored to the pre-restart state without impact on data forwarding.	

Configuration Examples	The following example enables the IS-IS GR Restart capability. FS(config)# **router isis** FS(config-router)# **graceful-restart**	
Related Commands	**Command**	**Description**
	graceful-restart helper disable	Disables the IS-IS GR Help capability.
	isis hello-interval	Sets the interval of sending Hello packets.
	isis hello-multiplier	Sets the Hello holdtime multiplier for the IS-IS interface.
Platform Description	N/A	

4.18 graceful-restart grace-period

	Use this command to configure the maximal interval for the graceful-restart. Use the **no** form of this command to restore the default interval.	
	graceful-restart grace-period *seconds*	
	no graceful-restart grace-period	
Parameter Description	**Parameter**	**Description**
	seconds	Time interval allowed for the device graceful-restart, in the range of 1 to 65,535 seconds.
Defaults	The default value is 300 seconds.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	N/A	
Configuration Examples	The following example sets the interval of the grace-restart to 40 seconds. FS(config)# **router isis** FS(config-router)# graceful-restart grace-period *40*	
Related Commands	**Command**	**Description**
	graceful-restart	Enables the IS-IS GR Restart capability.
	show isis graceful-restart	Displays the status information of the IS-IS GR Restart.
Platform	N/A	

Description	

4.19 graceful-restart helper disable

	Use this command to disable the IS-IS GR Helper capability. Use the **no** form of this command to enable this capability.	
	graceful-restart helper disable	
	no graceful-restart helper disable	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	IS-IS GR Helper capacity is enabled by default.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	To disable the IS-IS GR Helper capability, execute this command. In this case, the IS-IS will ignore the request of graceful-restarting the device.	
Configuration Examples	The following example disables the IS-IS GR Helper capability. FS(config)# **router isis** FS(config-router)# graceful-restart helper disable	
Related Commands	**Command**	**Description**
	graceful-restart	Enables the IS-IS GR Restart capability.
Platform Description	N/A	

4.20 hello padding

	Use this command to pad IS-IS Hello packets. **hello padding** [**multi-point** | **point-to-point**]	
	Use the **no** form of this command to cancel the padding of IS-IS Hello packets. **no hello padding** [**multi-point** | **point-to-point**]	
Parameter Description	**Parameter**	**Description**
	multi-point	Pads Hello packets of the LAN type.
	point-to-point	Pads Hello packets of the P2P type.

Defaults	Padding is enabled for Hello packets of the LAN type and P2P type by default.
Command Mode	IS-IS routing process configuration mode
Default Level	14
Usage Guide	Hello packets can be padded to notify a neighbor of the MTU supported by the local device. You can use this command to set whether to pad all Hello packets sent by the IS-IS process. You can also separately specify the type of Hello packets for padding, for example, you can set not to pad all Hello packets of the LAN type or not to pad all Hello packets of the P2P type. The **isis hello padding** command is available in interface configuration mode. Hello packets sent by a specific interface are not padded if the padding of such Hello packets is cancelled in IS-IS routing process configuration mode or the padding of Hello packets sent by the interface is cancelled in interface configuration mode.
Configuration Examples	The following example configures to cancel the padding of Hello packets of the P2P type. FS(config)# router isis FS(config-router)# no hello padding point-to-point

4.21 hostname dynamic

	Use this command to replace the System ID of the router with the destination router's hostname. Use the **no** form of this command to cancel this replacement.	
	hostname dynamic	
	no hostname dynamic	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	By default, the hostname dynamic function is disabled.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	With this command configured, the hostname of the destination router replaces the System ID. The System IDs shown in the execution of the command such as **show isis database**, **show isis neighbors** are all replaced by the hostname of the destination router.	
Configuration Examples	FS(config)# **router isis** FS(config-router)# **hostname dynamic**	

Related Commands	Command	Description
	N/A	N/A
Platform Description	N/A	

4.22 ignore-lsp-errors

	Use this command to ignore the LSP checksum errors. Use the **no** form of this command to not ignore the LSP checksum errors.
	ignore-lsp-errors
	no ignore-lsp-errors

Parameter Description	Parameter	Description
	N/A	N/A

Defaults	By default, the LSP checksum errors are not ignored.
Command Mode	IS-IS routing process configuration mode
Usage Guide	When the local IS-IS receives a LSP, it will calculate the checksum of LSP received and compare the calculated checksum with that in the LSP packets. By default, if the checksum in the LSP packets is different from the checksum calculated, this LSP will be discarded without processing. If we execute the ignore-lsp-errors command to ignore the checksum errors, the LSP packets with the incorrect checksum will be processed as the normal packets.
Configuration Examples	FS(config)# **router isis** FS(config-router)# **ignore-lsp-errors**

Related Commands	Command	Description
	N/A	N/A
Platform Description	N/A	

4.23 ip router isis

	Use this command to enable the IPv4 IS-IS on the specified interface. Use the **no** form of this command to disable the IPv4 IS-IS routing on the specified interface.
	ip router isis [*tag*]
	no ip router isis [*tag*]

Parameter Description	**Parameter**	**Description**
	tag	IS-IS instance name.
Defaults	By default, the Ipv4 IS-IS is disabled on the interface.	
Command Mode	Interface configuration mode	
Usage Guide	Use this command to enable the IS-IS IPv4 routing protocol on the interface. The **no** form of this command disables the IS-IS IPv4 routing. If the **no ipv4 unicast-routing** is executed in global configuration mode, the IS-IS will disable the IPv4 routing function on all interfaces, namely execute the **no ipv4 router isis** [*tag*] on all interfaces automatically, while other IS-IS configurations will remain unchanged.	
Configuration Examples	FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)# **ip router isis**	
Related Commands	**Command**	**Description**
	ipv6 router isis	Enables the IPv6 IS-IS on the interface.
	router isis	Creates IS-IS instances.
Platform Description	N/A	

4.24 ipv6 router isis

	Use this command to enable the IPv6 IS-IS routing on the specified interface. This command must be configured in the IS-IS configuration. The interface will run on the IS-IS instance named with Tag. If this IS-IS instance is inexistent or this IS-IS instance is not enabled and not initialized, the interface will not enable the IS-IS routing. Use the **no** form of this command to disable the IPv6 IS-IS routing on the specified interface.	
	ipv6 router isis [*tag*]	
	no ipv6 router isis [*tag*]	
Parameter Description	**Parameter**	**Description**
	tag	IS-IS instance name
Defaults	By default, the Ipv6 IS-IS routiong is not supported on the interface.	
Command Mode	Interface configuration mode	

Usage Guide	Configure this command to enable the IS-IS IPv6 routing protocol on the interface. The **no** form of this command disables the IS-IS IPv6 routing. If the **no ipv6 unicast-routing** is executed in the global configuration mode, the IS-IS will disable the IPv6 routing function on all interfaces, namely execute the **no ipv6 router isis** [*tag*] on all interfaces automatically, while other IS-IS configurations will remain unchanged.
Configuration Examples	FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)# **ipv6 router isis**
Related Commands	**Command** / **Description**
	ip router isis / Enables the IPv4 IS-IS on the interface.
	router isis / Creates IS-IS instances.
Platform Description	N/A

4.25 isis authentication key-chain

	Use this command to set the key-chain used by the IS-IS interface authentication. Use the **no** form of this command to cancel the specified key-chain.
	isis authentication key-chain *name-of-chain* [**level-1** | **level-2**]
	no isis authentication key-chain *name-of-chain* [**level-1** | **level-2**]
Parameter Description	**Parameter** / **Description**
	name-of-chain / Key-chain name with the maximum length being 255.
	level-1 / Specifies the authentication key-chain of the Level-1.
	level-2 / Specifies the authentication key-chain of the Level-2.
Defaults	By default, no IS-IS interface authentication key-chain is specified.
Command Mode	Interface configuration mode
Usage Guide	If the **key chain** command is not used to configure the corresponding key-chain, the authentication will not be performed. In addition, to make the IS-IS key-chain authentication effective, you need to configure the **isis authentication mode** command at the same time. This key-chain can apply to the plain-text authentication mode and MD5 encrypted authentication mode. You can use the **isis authentication mode** command to set the authentication mode. The length of the password key-string in the key-chain shall not be larger than 254 characters if the plain-text authentication mode is used, otherwise this configuration will fail. Only one key-chain is used at one time. So, when configuring this command, the said key-chain will be overwritten by the new specified one.

	If the Level is not specified, the key-chain will apply to both Level-1 and Level-2. The key-chain specified by this command works on the Hello packets. The IS-IS will send or receive the password that belongs to this key-chain. There may contain multiple passwords in the key-chain. When sending the packets, use the password with small number first. While receiving the packets, the packet will be received as long as the password of this packet received corresponds to any password in the key-chain. The authentication commands configured in the IS-IS configuration mode such as authentication key-chain are effective to the LSP, SNP packets, but take no effect on the IS-IS interface.
Configuration Examples	The following example specifies the authentication key-chain of the interface GigabitEthernet *0/1* named as *kc*. FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)# isis authentication key-chain *kc*

Related Commands	**Command**	**Description**
	isis authentication mode	Specifies the mode of IS-IS interface authentication.
	isis authentication send-only	Specifies the IS-IS interface authentication only applicable to the packets sent, but not to the packets received.
	key-chain	Configures the key-chain.
Platform Description	N/A	

4.26 isis authentication mode

	Use this command to specify the mode of IS-IS interface authentication. Use the **no** form of this command to remove the configuration.
	isis authentication mode { **md5** | **text** } [**level-1** | **level-2**]
	no isis authentication mode { **md5** | **text** } [**level-1** | **level-2**]

Parameter Description	**Parameter**	**Description**
	md5	Specifies the MD5 authentication mode.
	text	Specifies the plain-text authentication mode.
	level-1	Specifies the interface authentication mode to take effect on the Level-1.
	level-2	Specifies the interface authentication mode to take effect on the Level-2.

Defaults	By default, no interface authentication mode is specified.
Command Mode	Interface configuration mode
Usage Guide	To make the key-chain configured by the **isis authentication key-chain** command take effect, you must use the

	isis authentication mode command to specify the authentication mode. If the Level is not specified, the authentication mode specified will apply on both Level-1 and Level-2. When configuring the **isis authentication mode** command, if the isis password has been executed, the set command will be overwritten by this command. If the **isis authentication mode** command has been executed, the **isis password** will not be configured successfully. So, you need to delete the **isis authentication mode** command first.
Configuration Examples	The following example specifies the authentication mode on the Level-2 of the interface GigabitEthernet 0/1 to be the MD5 authentication mode. FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)# isis authentication mode md5 level-2

Related Commands	**Command**	**Description**
	isis authentication key-chain	Specifies the key-chain used by the IS-IS interface authentication.
	isis authentication send-only	Specifies the IS-IS interface authentication to only apply on the packets sent, but not on the packets received.
	key-chain	Configures the key-chain.
	isis password	Sets the plain-text authentication password for the packets transmit on the IS-IS interface.
Platform Description	N/A	

4.27 isis authentication send-only

	Use this command to specify the IS-IS interface authentication to only apply to the packets sent and not to the packets received. Use the **no** form of this command to restore the authentication of packets received on the interface.
	isis authentication send-only [**level-1** | **level-2**]
	no isis authentication send-only [**level-1** | **level-2**]

Parameter Description	**Parameter**	**Description**
	level-1	Set the **send-only** on the Level-1 of the interface.
	level-2	Set the **send-only** on the Level-2 of the interface.
Defaults	By default, this command is not configured. If the IS-IS interface authentication has been configured, then the authentication will be performed on the packets sent and recieved at the same time.	
Command Mode	Interface configuration mode	

Usage Guide	With this command configured, the IS-IS will set the authentication password in the Hello packets sent from the interface, however, the authentication will not be performed on the Hello packets received. It can apply to the following two occasions: 1. before deploying the IS-IS interface authentication for all devices in the network. 2. before changing the authentication password or authentication mode. Before the above two tasks start, you need to configure the **isis authentication send-only** command first to make each device perform no authentication on the Hello packets received, so as to avoid the network oscillation caused during the subsequent IS-IS interface authentication deployment. After the deployment of the entire network authentication finished, execute the **no isis authentication send-only** command to cancel the **send-only** authentication mode. This command can apply to the plain-text authentication mode and MD5 authentication mode. You can use the **isis authentication mode** command to set the mode used by the IS-IS interface authentication. If the Level is not specified, the authentication mode specified is applicable to the Level-1 and Level-2.
Configuration Examples	The following example specifies the authentication on the Level-1 of the interface GigabitEthernet 0/1 using send-only authentication mode. FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)# isis authentication send-only level-1

Related Commands	**Command**	**Description**
	isis authentication key-chain	Specifies the key-chain used by the IS-IS interface authentication.
	isis authentication mode	Specifies the mode of the IS-IS interface authentication.
	key-chain	Configures the key-chain.
Platform Description	N/A	

4.28 isis bfd

	Use this command to enable association between IS-IS and BFD on an interface. **isis bfd** [**disable** | **anti-congestion**]
	Use the **no** form of this command to disable association between IS-IS and BFD on an interface. **no isis bfd** [**disable** | **anti-congestion**]

Parameter Description	**Parameter**	**Description**
	disable	Disables association between IS-IS and BFD on an interface.
	anti-congestion	Indicates the IS-IS BFD anti-flapping option.

Defaults	If the **bfd all-interfaces** command is configured, association between IS-IS and BFD is enabled on an interface. If the **bfd all-interfaces** command is not configured, association between IS-IS and BFD is disabled on an interface.
	By default, the anti-flapping function is disabled.

Command Mode	Interface configuration mode
Default Level	14
Usage Guide	There are two methods for enabling or disabling association between IS-IS and BFD on interfaces. Method 1: In IS-IS routing process configuration mode, run the [**no**] **bfd all-interfaces** [**anti-congestion**] command to enable or disable association between IS-IS and BFD on all interfaces running the IS-IS protocol. Method 2: In interface configuration mode, run the **isis bfd** [**disable | anti-congestion**] command to enable or disable association between IS-IS and BFD on a specified interface. In normal cases, the device with the BFD function enabled sends detection packets to detect the link status at an interval of several milliseconds. When a link exception such as link interruption occurs, the device with the BFD function enabled rapidly detects the link exception and informs a device running the IS-IS protocol to delete neighbors and delete neighbor availability information from LSP packets. The device running the IS-IS protocol performs route re-calculation and generates a new route, to bypass the failed link, thereby implementing fast convergence. With the introduction of some new technologies such as the Multi-Service Transport Platform (MSTP), link congestion easily occurs in peak hours. When congestion occurs, the device with the BFD function enabled rapidly detects a link exception, informs a device running the IS-IS protocol to delete a neighbor and delete neighbor availability information from LSP packets, and performs link switching to bypass the congested link. The interval for an IS-IS neighbor to send a Hello detection packet is 10 seconds, and the timeout time is 30 seconds. When an exception is detected via the BFD function, IS-IS Hello packets can be normally received, the IS-IS neighbor relationship can be rapidly reestablished, and the route is restored to pass the congested link. Then, BFD is performed again. If there is still a link exception, link switching is performed repeatedly. The route switches between the congested link and other links and flapping occurs. The anti-flapping function can be enabled to prevent route flapping in the case of link congestion. After the anti-flapping function is enabled, if a link is congested, the IS-IS neighbor keeps alive but the neighbor availability information in LSP packets is deleted, and the route switches to a non-congested link. After the link is restored, that is, congestion is eliminated, the neighbor availability information is restored in LSP packets, and the route switches back to the originally congested link, thereby preventing route flapping. When IS-IS anti-flapping is enabled, the BFD anti-flapping command (**bfd up-dampening**) must be configured on an interface. The two commands must be configured simultaneously. If only one of them is configured, the anti-flapping function does not take effect or a network exception is incurred. Before association between IS-IS and BFD is configured, a BFD session must be configured on an interface. When the BFD anti-flapping command is configured on an interface, if association between IS-IS and BFD is already configured on the interface, the anti-flapping function must be enabled for a device running the IS-IS protocol. When the IS-IS anti-flapping option is configured, the BFD anti-flapping command must be configured on an interface.

Configuration Examples	1. The following example disables association between IS-IS and BFD on GigabitEthernet 0/1. FS(config)# interface GigabitEthernet 0/1 FS(config-if)# no switchport FS(config-if)# isis bfd disable
	2. The following example enables the IS-IS BFD anti-flapping option and configures the BFD anti-flapping command on GigabitEthernet 0/1.
	FS(config)# interface GigabitEthernet 0/1 FS(config-if)# no switchport FS(config-if)# isis bfd anti-congestion FS(config-if)# bfd up-dampening 60000

4.29 isis circuit-type

	Use this command to set the circuit-type for the IS-IS interface. Use the **no** form of this command to restore the default settings.	
	isis circuit-type { **level-1** | **level-1-2** | **level-2-only** }	
	no isis circuit-type	
Parameter Description	**Parameter**	**Description**
	level-1	Forms the Level-1 adjacency.
	leve-2-only	Forms the Level-2 adjacency.
	level-1-2	Forms the Level-1-2 adjacency.
	external	Uses the interface as an external domain interface.
Defaults	By default, the circuit-type is Level-1-2.	
Command Mode	Interface configuration mode	
Usage Guide	If the circuit type is set to Level-1 or Level-2-only, IS-IS will only send PDUs of the corresponding Level. If the system type is set to Level-1 or Level-2-only, IS-IS only processes the instances of the corresponding Level, and the interface only sends the PDUs of the same Level specified by the **is-type** and **circuit-type** commands. If the interface is set to **external**, the interface will work as an external domain interface and IS-IS will not send PDUs of the corresponding Level.	
Configuration Examples	FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)# isis circuit-type level-2-only	
Related Commands	**Command**	**Description**
	isis-type	Sets the Level of IS-IS instance.

Platform Description	N/A

4.30 isis csnp-interval

	Use this command to set the interval for broadcasting the CSNP packets on the IS-IS interface, with the unit being second. Use the **no** form of this command to restore the default interval.	
	isis csnp-interval *interval* [**level-1** | **level-2**]	
	no isis csnp-interval [*interval*] [**level-1** | **level-2**]	
Parameter Description	**Parameter**	**Description**
	interval	Interval for sending the CSNP packets in the range of 0 to 65535, with the unit being second.
	level-1	Interval for sending the CSNP packets configured only on the Level-1.
	level-2	Interval for sending the CSNP packets configured only on the Level-2.
Defaults	By default, in the broadcast network, the interval for sending the CSNP packets is 10 seconds. While in the P2P interface network, no CSNP packet is sent by default. When using this command without the parameter Level-1 and Level-2, the new setting is defaulted to be applicable to the Level-1 and Level-2 at the time.	
Command Mode	Interface configuration mode	
Usage Guide	Configure this command to change the interval for sending the CSNP packets. By default, the DIS on the broadcast network sends the CSNP packets every 10 seconds. For the P2P interface network, by default, the CSNP packets will only be sent at the beginning of adjacency formation. If the interface is set to mesh-groups, you can configure the periodic sending of the CSNP packets. If the csnp-interval is set to 0, no CSNP packets will be sent.	
Configuration Examples	FS(config)# interface GigabitEthernet 0/1 FS(config-if)# isis csnp-interval 20	
Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

4.31 isis hello-interval

	Use this command to set the interval for sending Hello packets on the interface, with the unit being second. Use

	the **no** form of this command to restore the default interval.
	isis hello-interval { *interval* | **minimal** } [**level-1** | **level-2**]
	no isis hello-interval [**level-1** | **level-2**]
Parameter Description	

Parameter	Description
interval	Interval for sending the Hello packet, in the range of 1 to 65536.
minimal	The holdtime is set to the minimal value 1.
level-1	This interval applies on the Level-1.
level-2	This interval applies on the Level-2.

Defaults	By default, the interval value is 10 seconds, which is applicable to the Level-1 and Level-2 at the same time. When using this command without the parameter Level-1 and Level-2, the new setting is defaulted to be applicable to the Level-1 and Level-2 at the time.
Command Mode	Interface configuration mode
Usage Guide	Configure this command to change the interval for sending Hello packets. By default, the multiplier of the Hello holdtime is 3, and the DIS in broadcast network sends Hello packets at an interval which is three times of non-DIS. If this IS is elected as DIS on this interface, the interface will send Hello packets every 3.3 seconds by default. If the key word "minimal" is used, then the "holdtime" in Hello packets will be set to 1, and hello interval will be calculated based on the hello-multiplier. For example, if hello-multiplier is configured to 4 and "isis hello-interval minimal" is configured at the same time, the value of hello-interval shall be 1s/4 (250ms). By default, the CPU protection is enabled on the switch, so that the number of packets corresponding to the destination group addresses of ISIS (AllISSystems, AllL1ISSystems, AllL2ISSystems) is limited when they are sent to the CPU, for example , the default limited value is 400pps. The number of packets received by the switch may be larger than the default value if there are many neighbors or the interval for sending Hello packets is short, resulting in continual vibration of the adjacent relation. In this case, you need to raise the limit of IS-IS packets using the global commands **cpu-protect type isis-is pps**, **cpu-protect type isis-l1is pps** and **cpu-protect type isis-l2is pps**.
Configuration Examples	The following example sets the interval for sending Hello packets on the interface.
	FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)# **isis hello-interval** *5 level-1*
	The following example sets the Holdtime for sending Hello packets on the interface to the minimum value 1.
	FS(config)# interface GigabitEthernet 0/1 FS(config-if)# isis hello-interval minimal
Related Commands	

Command	Description
isis hello-multiplier	Sets the multiplier of the Hello hold timer.

Platform	N/A

Description	

4.32 isis hello-multiplier

	Use this command to set the multiplier of Hello hold timer. Use the **no** form of this command to restore the default settings.	
	isis hello-multiplier *multiplier-number* [**level-1 | level-2**]	
	no isis hello-multiplier [*multiplier-number*] [**level-1 | level-2**]	
Parameter Description	**Parameter**	**Description**
	multiplier-number	Multiplier value in the range of 2 to 100.
Defaults	By default, the multiplier is 3..	
Command Mode	Interface configuration mode	
Usage Guide	Use this command to set the multiplier of Hello holdtime. The holdtime value in the Hello packet is the product of hello-interval and this multiplier.	
Configuration Examples	FS(config)# **router isis** FS(config-router)# **isis hello-multiplier** *5*	
Related Commands	**Command**	**Description**
	isis hello-interval	Sets the interval for sending the Hello packets.
Platform Description	N/A	

4.33 isis hello padding

	Use this command to specify the filling mode for the IS-IS Hello packets. Use the **no** form of this command to fill no IS-IS Hello packets.	
	isis hello padding	
	no isis hello padding	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Command Mode	Interface configuration mode	

Usage Guide	Fill the IS-IS Hello packets to advertise the MTU supported to the neighbors. Hello packets can be padded to notify a neighbor of the MTU supported by the local device. In IS-IS routing process configuration mode, the corresponding **hello padding** command also exists. Hello packets sent by a specific interface are not padded if the padding of such Hello packets is cancelled in IS-IS routing process configuration mode or the padding of Hello packets sent by the local interface is cancelled in interface configuration mode.
Configuration Examples	The following example fills no IS-IS Hello packets. FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)# no isis hello padding
Related Commands	**Command** / **Description**
	isis hello-interval / Sets the interval for sending the Hello packets.
Platform Description	N/A

4.34 isis lsp-interval

	Use this command to set the interval for the LSP PDU transmission. Use the **no** form of this command to restore the default interval.
	isis lsp-interval *milliseconds* [**level-1 | level-2**]
	no isis lsp-interval [**level-1 | level-2**]
Parameter Description	**Parameter** / **Description**
	milliseconds / Indicates the LSP interval. The value range is 1 to 4,294,967,295, in the unit of milliseconds.
	level-1 / Applies the setting only to Level-1 LSPs.
	level-2 / Applies the setting only to Level-2 LSPs.
Defaults	By default, the lsp-interval is 33ms.
Command Mode	Interface configuration mode
Usage Guide	N/A
Configuration Examples	The following example sets the interval for the LSP PDU transmission to 100. FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)# **isis lsp-interval** *100*

Related Commands	Command	Description
	isis retransmit-interval	Sets the LSP retransmission interval in the P2P network.
Platform Description	N/A	

4.35 isis mesh-group

	Use this command to add the interface to the specified mesh-group. Use the **no** form of this command to separate the interface from the mesh-group.
	isis mesh-group { **blocked** | *mesh-group-id* }
	no isis mesh-group

Parameter Description	Parameter	Description
	blocked	Blocks all LSP forwarding on the interface.
	mesh-group-id	Adds the interface to the mesh-group of specified mesh-group-id with the range being 1 to 4,294,967,295.

Defaults	By default, the interface is not added to any mesh-group.
Command Mode	Interface configuration mode
Usage Guide	Mesh-groups can control the exceeding and redundant LSP spreading in the NBMA network. In the normal condition, the IS-IS router spreads out the LSP from all interfaces except for the receiving one, that is, if a router is configured multiple subintefaces, the LSP will be sent from all subinterfaces and the neighbors will receive many same LSPs, which wastes a large number of CPU and bandwidth. The IS-IS mesh-group allows grouping the router interfaces, so if a LSP is received by one subinterface in the group, this LSP will not be spread out through other subinterfaces in the group. And if the router receives the LSP from the interface out of the group, it will spread out the LSP from other interfaces as usual. If you need to configure the **mesh-group** on the IS-IS interface, use the **isis csnp-interval** command to configure the interval for sending the non-0 CSNP packets, so as to send the CNSP packets regularly to synchronize the LSP and ensure the integrity of LSP synchronization between neighbors in network.
Configuration Examples	FS#**configure terminal** FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)#**isis mesh-group** *1*

Related Commands	Command	Description
	isis network point-to-point	Sets the Broadcast interface type of IS-IS to Point-to-Point.

Platform Description	N/A

4.36 isis metric

	Use this command to set the metric for the interface. Use the **no** form of this command to restore the default metric.	
	isis metric *metric* [**level-1** | **level-2**]	
	no isis metric [*metric*] [**level-1** | **level-2**]	
Parameter Description	**Parameter**	**Description**
	metric	Metric value in the range of 1 to 63.
	level-1	Sets this metric to apply on the Level-1 circuit.
	level-2	Sets this metric to apply on the Level-2 circuit.
Defaults	By default, the metric is 10, which applies on both Level-1 and Level-2 circuit.	
Command Mode	Interface configuration mode	
Usage Guide	The Metric value is in the TLV of the IP reachable information and is applied to the SPF calculation. The greater metric value means the more routing cost on this interface and the longer path calculated by SPF. This value is effective only when the metric-style includes narrow.	
Configuration Examples	FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)#**isis metric** *1*	
Related Commands	**Command**	**Description**
	metic-style	Sets the metric type.
	isis wide-metric	Sets the wide metric of the IS-IS interface.
Platform Description	N/A	

4.37 isis network point-to-point

	Use this command to set the IS-IS Broadcast interface to the Point-to-Point type. Use the **no** form of this command to restore the interface type to the Broadcast.	
	isis network point-to-point	
	no isis network point-to-point	
Parameter	**Parameter**	**Description**

Description		
	point-to-point	Point-to-Point type interface.
Defaults	By default, it is Broadcast type.	
Command Mode	Interface configuration mode	
Usage Guide	N/A	
Configuration Examples	FS(config)# interface GigabitEthernet *0/1* FS(config-if)# isis network point-to-point	
Related Commands	**Command**	**Description**
	isis mesh-group	Adds the IS-IS interface into the specified mesh group.
Platform Description	N/A	

4.38 isis password

	Use this command to set the plain-text authentication password for the Hello packet transmitted on the interface. Use the **no** form of this command to remove the configurations.	
	isis password *password-string* [**send-only**] [**level-1** | **level-2**]	
	no isis password [**send-only**] [**level-1** | **level-2**]	
Parameter Description	**Parameter**	**Description**
	0	Indicates that the key is displayed in plaintext.
	7	Indicates that the key is displayed in ciphertext.
	password-string	Indicates the password string for plaintext authentication. The string can contain up to 126 characters.
	send-only	Indicates that the plaintext authentication password is only used to authenticate sent packets. Received packets are not authenticated.
	level-1	Applies the setting to the Level-1 circuit type.
	level-2	Applies the setting to the Level-2 circuit type.
Defaults	By default, both the passwords on the Level-1 and Level-2 are not configured.	
Command Mode	Interface configuration mode	

Usage Guide	This command is used to set the plain-text authentication password for the Hello packets transmitted on the interface. Use the **no** form of this command to clear the passwords. When the Level is not specified, the authentication password configured is by default applicable to every Level. If the **isis authentication mode** command has been executed, this command will not be configured successfully. To configure this command, you need to delete the **isis authentication mode** command first. Running the **no isis password send-only** command can only disable the **send-only** option.
Configuration Examples	FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)# **isis password** *redgiant*
Related Commands	**Command** / **Description**
	isis authentication mode / Specifies the mode of the IS-IS interface authentication.
Platform Description	N/A

4.39 isis priority

	Use this command to set the priority for the DIS election on the LAN. Use the **no** form of this command to restore the default priority.
	isis priority *value* [**level-1** | **level-2**]
	no isis priority [*value*] [**level-1** | **level-2**]
Parameter Description	**Parameter** / **Description**
	value / Value of the priority in the range of 0 to 127.
	level-1 / Applies to the Level-1 circuit.
	level-2 / Applies to the Level-2 circuit.
Defaults	The default priority value is 64 and it is applied on both Level-1 and Leve-2 circuit.
Command Mode	Interface configuration mode
Usage Guide	Use this command to change the priority value in the Hello of LAN. The low priority value has the lower priority in the DIS election than the high priority value. This command takes no effect on the Point-to-Point network interface. The **no isis priority** command is used to restore the priority to the default value no matter whether the parameter is followed. If you want to modify the configured priority, you can either use the **isis priority** command with parameter specified to overwrite the configured command directly, or configure a new parameter after restoring the priority to the default value.
Configuration	FS# **configure terminal**

Examples	FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)# **isis priority** *127* **level-1**
Related Commands	**Command** / **Description**
	N/A / N/A
Platform Description	N/A

4.40 isis psnp-interval

	Use this command to set the minimum transmission interval of PSNP packets. **isis psnp-interval** *seconds* [**level-1** | **level-2**]
	Use the **no** form of this command to cancel the specified minimum transmission interval of PSNP packets. **no isis psnp-interval** [**level-1** | **level-2**]
Parameter Description	**Parameter** / **Description**
	seconds / Indicates that the value range is **1** to **120** in seconds.
	level-1 / Indicates that the configuration takes effect only at Level-1.
	level-2 / Indicates that the configuration takes effect only at Level-2.
Defaults	This command is not configured by default. The default minimum transmission interval is 2 seconds and takes effect both at Level-1 and Level-2.
Command Mode	Interface configuration mode
Default Level	14
Usage Guide	PSNP packets are used to request for LSP packets or respond to received LSP packets in a point-to-point network. In both cases, it is recommended to send PSNP packets rapidly. If there are excessive LSP packets but the device performance is poor, you can set the PSNP packet transmission interval and LSP retransmission time to larger values, to reduce the device load.
Configuration Examples	The following example sets the PSNP packet transmission interval to 5 seconds for Interface GigabitEthernet 0/1 at Level-2. FS(config)# interface GigabitEthernet 0/1 FS(config-if)# isis psnp-interval 5 level-2

4.41 isis retansmit-interval

	Use this command to set the LSP retransmission interval. Use the **no** form of this command to restore the default

	interval.
	isis retransmit-interval *seconds* [**level-1** | **level-2**]
	no isis retransmit-interval [**level-1** | **level-2**]

Parameter Description	**Parameter**	**Description**
	seconds	Indicates the LSP retransmission interval. The value range is 0 to 65,535, in the unit of seconds.
	level-1	Applies the setting only to Level-1 LSPs.
	level-2	Applies the setting only to Level-2 LSPs.

Defaults	The default value is 5s.
Command Mode	Interface configuration mode
Usage Guide	Use this command to configure the LSP retransmission interval. In a P2P network, after a device sends an LSP, if the device receives no PSNP response within the time specified by this command, it will resend the LSP. If the retransmission interval is set to 0, the LSP will not be resent.
	The following example sets the LSP retransmission interval to 10s.
Configuration Examples	FS(config)# interface serial 0/1 FS(config-if)# isis retransmit-interval 10 level-2

Related Commands	**Command**	**Description**
	isis lsp-interval	Configures the interval for LSP advertisement on the interface.

Platform Description	N/A

4.42 isis subvlan

	Use this command to enable IS-IS on super VLANs. Use the no form of this command to restore the default setting.	
	isis subvlan [all | vid]	
	no isis subvlan	
Parameter Description	**Parameter**	**Description**
	all	Indicates that packets are allowed to be sent to all sub VLANs.
	vid	Specifies the sub VLAN ID. The value ranges from 1 to 4094.
Defaults	The default setting takes effect only on super VLANs with IS-IS disabled.	
Command Mode	Interface configuration mode.	
Usage Guide	In normal cases, a super VLAN contains multiple sub VLANs. Multicast packets of a super VLAN are also sent to its sub VLANs. In this case, when IS-IS multicast packets are sent over a super VLAN containing multiple sub VLANs, the IS-IS multicast packets are replicated multiple times, and the device processing capability is insufficient. As a result, a large number of packets are discarded, causing the neighbor down error. In most scenarios, the IS-IS function does not need to be enabled on a super VLAN. Therefore, the IS-IS function is disabled by default. However, in some scenarios, the IS-IS function must be run on the super VLAN, but packets only need to be sent to one sub VLAN. In this case, run this command to specify a particular sub VLAN. You must be cautious in configuring packet transmission to all sub VLANs, as the large number of sub VLANs may cause a device processing bottleneck, which will lead to the neighbor down error.	
Configuration Examples	The following example sends the IS-IS multicast packets to sub VLAN 1024 of super VLAN 300. FS(config)# interface vlan 300 FS(config-if-VLAN 300)# isis subvlan 1024	

4.43 isis three-way-handshake disable

	Use this command to disable three-way handshake for point-to-point network. Use the **no** form of this command to enable three-way handshake for point-to-point network.	
	isis three-way-handshake disable	
	no isis three-way-handshake disable	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	By default, three-way handshake is enabled.	
Command	Interface configuration mode	

Mode	
Usage Guide	In the point-to-point network, three-way handshake is enabled by default. That is to say, the IS-IS neigbor can be established only after three-way handshake is successful. You can use this command to cancel three-way handshake negotiation to accelerate IS-IS neighbor establishment or for the the device not supporting three-way handshake.
Configuration Examples	The following example disables three-way handshake on interface GigabitEthernet 0/0. FS(config)#int GigabitEthernet 0/0 FS(config-if)# isis network point-to-point FS(config-if)# isis three-way-handshake disable
Related Commands	**Command** / **Description**
	metric-type / Sets the metric type.
	isis metric / Sets the metric value of the interface.
Platform Description	N/A

4.44 isis wide-metric

	Use this command to set the wide metric of the interface. Use the **no** form of this command to restore the default wide metric.
	isis wide-metric *metric* [**level-1** | **level-2**]
	no isis wide-metric [*metric*] [**level-1** | **level-2**]
Parameter Description	**Parameter** / **Description**
	metric / Metric value in the range of 1 to 16,777,241.
	level-1 / Sets this Metric to apply on the Level-1 circuit.
	level-2 / Sets this Metric to apply on the Level-2 circuit.
Defaults	By default, the metric value is 10 and it is applicable to both Level-1, Level-2 circuit.
Command Mode	Interface configuration mode
Usage Guide	The Metric value is in the TLV of the IP reachable information and is applied to the SPF calculation. The greater metric value means the more routing cost on this interface and the longer path calculated by SPF. This value is effective only when the metric-style includes wide.
Configuration Examples	FS(config)# **interface GigabitEthernet** *0/1* FS(config-if)#**isis wide-metric** *1000*

Related Commands	**Command**	**Description**
	metric-type	Sets the metric type.
	isis metric	Sets the metric value of the interface.
Platform Description	N/A	

4.45 is-type

	Use this command to specify the level for the IS-IS process. Use the **no** form of this command to restore the default level for IS-IS process.	
	is-type { **level-1** | **level-1-2** | **level-2-only** }	
	no is-type	
Parameter Description	**Parameter**	**Description**
	level-1	Specifies the IS-IS process running on the Level-1 only.
	level-1-2	Specifies the IS-IS process running on both Level-1 and Level-2.
	level-2-only	Specifies the IS-IS process running on the Level-2 only.
Defaults	By default, the IS-IS process runs on Level-1-2.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	Changing the is-type enables or disables the route of one Level.	
Configuration Examples	FS(config)# **router isis** FS(config-router)# **is-type level-1**	
Related Commands	**Command**	**Description**
	isis circuit-type	Sets the type of Interface circuit.
Platform Description	N/A	

4.46 log-adjacency-changes

	Use this command to log the changes of the IS adjacency status in case of debug disabled. Use the **no** form of this command to disable this function.
	log- adjacency-changes
	no log- adjacency-changes

Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	By default, this function is enabled.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	You can also use the **debug** command to log the changes of the IS adjacency status. But using the IS-IS debug command will exhaust large numbers of resources.	
Configuration Examples	FS(config)# router isis FS(config-router)# **log-adjacency-changes**	
Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

4.47 lsp-fragments-extend

	Use this command to enable the LSP fragment extension mode for a level. Use the **no** form of this command to disable the LSP fragment extension mode for a level.	
	lsp-fragments-extend [**level-1 | level-2**] [**compatible rfc3786**]	
	no lsp-fragments-extend [**level-1 | level-2**] [**compatible rfc3786**]	
Parameter Description	**Parameter**	**Description**
	level-1	Enables the LSP fragment extension mode for the Level-1 only.
	level-2	Enables the LSP fragment extension mode for the Level-2 only.
	compatible	Compatible with RFC3786
	rfc3786	The older version of extended LSP implementation.
Defaults	By default, LSP fragment extension is disabled. If no level is specified, the LSP fragment extension mode is enabled for both Level-1 and Level-2.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	The originating LSP can be divided up to 256 fragments. After the 256 fragments are filled, the subsequent link	

	state information, such as the neighbor and IP routing, will be discarded, resulting in network problem. To avoid the above problem, you can enable the LSP fragment extension function, and configure the additional system ID using the **virtual-system** command. If there are other vendor's device supporting RFC3786 standard in the network, you need to display the link state database of the device when enabling or disabling the **compatible** option. If there is indeed the vendor's device, you can use the **clear isis** * command to clear the remaining LSP packets to trigger the system to update the link state database.
Configuration Examples	The following example enables the LSP fragment extension mode for the Level-2. FS(config)# router isis FS(config-router)# lsp-fragments-extend level-2
Related Commands	**Command** / **Description** N/A / N/A
Platform Description	N/A

4.48 lsp-gen-interval

	Use this command to set the minimal interval of the LSP generation. Use the **no** form of this command to restore the default value.
	lsp-gen-interval [**level-1 | level-2**] *maximum-interval* [*initial-interval hold-interval*]
	no lsp-gen-interval [**level-1 | level-2**]
Parameter Description	**Parameter** / **Description**
	level-1 / Applies the configuration only to Level-1.
	level-2 / Applies the configuration only to Level-2.
	maximum-interval / Indicates the maximum interval for generating two consecutive LSP packets. The value range is **1** to **65535** (in seconds). The default value is **5**.
	initial-interval / Indicates the waiting time for generating an LSP packet for the first time. The value range is **0** to **60000** (in milliseconds). The default value is **50**.
	hold-interval / Indicates the minimum interval for generating an LSP packet for the second time. The value range is **10** to **60000** (in milliseconds). The default value is **200**.
Defaults	By default, this command is not configured and the interval of the minimal generation is 5s, it is effective on both Level-1 an Level-2
Command Mode	IS-IS routing process configuration mode
Usage Guide	The LSP packet generation interval refers to the interval for generating two different LSP packets. A smaller

	generation interval indicates faster network convergence, which, however, will be accompanied by frequent flooding on the network. The waiting time for generating an LSP packet for the first time is the initial interval. If the network becomes unstable, the LSP packet regeneration interval is changed to be less than the maximum interval, and the interval for generating an LSP packet for the second time becomes the hold interval. A corresponding penalty will be added to this interval: The next interval for regenerating a LSP packet doubles the previous interval for generating the same LSP packet, until the regeneration interval reaches the maximum interval. Subsequent LSP packets will be generated at the maximum interval. When the network becomes stable, the LSP packet regeneration interval becomes greater than the maximum interval, and the waiting time for LSP packet generation is restored to the initial interval. Link changes have high requirements for convergence. The initial interval can be set to a small value. The preceding parameters can also be adjusted to larger values to reduce CPU consumption. The value of **initial-interval** cannot be greater than that of **maximum-interval**. Otherwise, the value of **initial-interval** will be used as the value of **maximum-interval**. The value of **hold-interval** cannot be greater than that of **maximum-interval**. Otherwise, the value of **hold-interval** will be used as the value of **maximum-interval**. The value of **initial-interval** cannot be greater than that of **hold-interval**. Otherwise, the value of **initial-interval** will be used as the value of **hold-interval**.
Configuration Examples	The following example sets the minimum interval for generating two duplicate LSP packets to 10 seconds, the interval for generating a duplicate LSP packet for the first time to 100 ms, and the interval for generating a duplicate LSP packet for the second time to 200 ms.
	FS(config)# router isis FS(config-router)# lsp-gen-interval 10 100 200
	The following example sets the minimum interval for generating two duplicate LSP packets to 5 seconds.
	FS(config)# **router isis** FS(config-router)# **lsp-gen-interval** *5*
Related Commands	**Command** / **Description**
	lsp-refresh-interval / Configures the interval for LSP refresh.
Platform Description	N/A

4.49 lsp-length originate

	Use this command to set the maximum length for transmitting LSP packets. **lsp-length originate** *size* [**level-1** | **level-2**]	
	Use the **no** form of this command to restore the default value. **no lsp-length originate** [**level-1** | **level-2**]	
Parameter	**Parameter**	**Description**

Description		
	size	Specifies the maximum length for transmitting LSP packets. The value range is **512** to **16000** in bytes.
	level-1	Indicates that the configuration takes effect only at Level-1.
	level-2	Indicates that the configuration takes effect only at Level-2.
Defaults	The default value of the maximum length for transmitting LSP packets is **1492**. If no level is specified, the default value is **level-1-2**, that is, the configuration takes effect at both Level-1 and Level-2.	
Command Mode	IS-IS routing process configuration mode	
Default Level	14	
Usage Guide	In principle, the length of LSP and SNP packets cannot be greater than the interface MTU. Otherwise, LSP packets and SNP packets are directly discarded upon being sent.	
Configuration Examples	The following example sets the maximum length for transmitting LSP packets at Level-2 to 1498 bytes. FS(config)# router isis 1 FS(config-router)# lsp-length originate 1498 level-2	

4.50 lsp-length receive

	Use this command to set the maximum length for receiving LSP packets. **lsp-length receive** *size*	
	Use the **no** form of this command to restore the default value. **no lsp-length receive**	
Parameter Description	**Parameter**	**Description**
	size	Specifies the maximum length of LSP packets. The value range is **1,492** to **16,000** in bytes according to the RFC.
Defaults	The default value is **1492**.	
Command Mode	IS-IS routing process configuration mode	
Default Level	14	
Usage Guide	This command is used to control the maximum length of LSP packets that can be received by the local device. In fact, to prevent a route convergence failure, intermediate nodes need to receive LSP packets with the maximum length of the interface MTU as long as the memory permits. In this sense, this command seems nominal. The maximum length	

	for receiving LSP packets cannot be less than the maximum length for transmitting LSP packets. If the maximum length for receiving LSP packets is less than the maximum length for transmitting LSP packets, the maximum length for receiving LSP packets is automatically adjusted to the maximum length for transmitting LSP packets.
Configuration Examples	The following example configures the maximum length for receiving LSP packets to 1498 bytes. FS(config)# router isis FS(config-router)# lsp-length receive 1498

4.51 lsp-refresh-interval

	Use this command to set the LSP refresh interval. Use the **no** form of this command to restore the default value.	
	lsp-refresh-interval *interval*	
	no lsp-refresh-interval	
Parameter Description	**Parameter**	**Description**
	interval	LSP refresh interval in the range of 1 to 65535 with unit being second.
Defaults	By default, the lsp-refresh-interval is 900 seconds.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	If the LSP stable status lasts for the time of refresh interval, LSP will refresh this LSP and update the LSP version and publish it. It should be noted that the lsp-refresh-interval must be less than the max lifetime.	
Configuration Examples	FS(config)# **router isis** FS(config-router)# **lsp-refresh-interval** *600*	
Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

4.52 max-area-addresses

	Use this command to set the maximal number of area address allowed. Use the **no** form of this command to restore the default value.	
	max-area-addresses *value*	
	no max-area-addresses	
Parameter	**Parameter**	**Description**

Description		
	value	The maximal number of area address allowed, in the range of 3 to 6.
Defaults	By default, the max-area-addreses is 3.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	For the IS routers of Level-1, only the ones with the same max-area-addresses are allowed to establish the adjacency relation.	
Configuration Examples	FS(config)# **router isis** FS(config-router)# **max-area-addresses** *5*	
Related Commands	**Command**	**Description**
	net	Sets the IS-IS NET(Network Entry Title) address.
Platform Description	N/A	

4.53 maximum-paths

	Use this command to set the maximum number of IS-IS equal-cost routing entries in the routing table. **maximum-paths** *maximum*	
	Use the **no** form of this command to restore the default value. **no maximum-paths**	
Parameter Description	**Parameter**	**Description**
	maximum	Maximum number of IS-IS equal-cost routing entries in the routing table. The value range is **1** to **device capacity**.
Defaults	The default value is **2**.	
Command Mode	IS-IS routing process configuration mode, IS-IS address-family IPv6 configuration mode	
Default Level	14	
Usage Guide	This command is used by the IS-IS protocol to control the number of IS-IS equal-cost routing entries in the routing table. The routing table itself also has a command for controlling the number of equal-cost routing entries. The effective number of equal-cost routing entries is the smaller of the two values.	

Configuration Examples	The following example sets the maximum number of IS-IS IPv4 equal-cost routing entries in the routing table to **5**. FS(config)# router isis FS(config-router)# maximum-paths 5
	The following example sets the maximum number of IS-IS IPv6 equal-cost routing entries in the routing table to **6**. FS(config)# router isis FS(config-router)# address-family ipv6 FS(config-router-af)# maximum-paths 6

4.54 max-lsp-lifetime

	Use this command to set the maximum value of the LSP lifetime. Use the **no** form of this command to restore the default value.	
	max-lsp-lifetime *value*	
	no max-lsp-lifetime	
Parameter Description	**Parameter**	**Description**
	value	Maximum value of the LSP lifetime in the range of 1 to 65,535, with unit being second.
Defaults	By default, the max-lsp-lifetime is 1200 seconds.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	It should be noted that the max-lsp-lifetime must be greater the lsp-refresh-interval 300.	
Configuration Examples	FS(config)# **router isis** FS(config-router)# **max-lsp-lifetime** *1500*	
Related Commands	**Command**	**Description**
	lsp-refresh-interval	Configures the interval for LSP refresh.
Platform Description	N/A	

4.55 metric-style

	Use this command to set the metric style. Use the **no** form of this command to restore the default metric style.
	metric-style { **narrow** [**transition**] | **wide** [**transition**] | **transition** } [**level-1** | **level-1-2** | **level-2** |]
	no metric-style { **narrow** [**transition**] | **wide** [**transition**] | **transition** } [**level-1** | **level-1-2** | **level-2** |]

Parameter Description	**Parameter**	**Description**
	narrow	Uses the old metric style with the router interface metric ranging from 1 to 63.
	wide	Uses the new metric style with the router interface metric ranging from 1 to 16777214
	transition	Allows the router to send and receive the new and old metric style.
	level-1	This metric-style on the Level-1 circuit.
	level-2	This metric-style applies on the Level-2 circuit.
	level-1-2	This metric-style applies on the Level-1-2 circuit.
Defaults	By default, the metric-style is narrow.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	The metric value of the interface is specified by the **isis metric** *metric* when the metric-style is set to narrow, while the metric value is specified by the **isis wide-metric** *metric* in case that the metric-style is set to wide or **transition**.	
Configuration Examples	FS(config)# **router isis** FS(config-router)# **metric-style wide**	
Related Commands	**Command**	**Description**
	isis metric	Sets the metric of the interface.
	isis wide-metric	Sets the wide metric of the interface.
Platform Description	N/A	

4.56 multi-topology

	Use this command to enable IS-IS to support IPv6 unicast topology. Use the **no** form of this command to restore the default setting.
	multi-topology [**transition**]
	no multi-topology [**transition**]

Parameter Description	Parameter	Description
	transition	Configures the MT transition mode.
Defaults	By default, multitopology is not configured, namely, IS-IS does not support IPv6 unicast topology.	
Command Mode	IS-IS address-family IPv6 configuration mode	
Usage Guide	1. When this command is not configured, IPv4 and IPv6 share the same IS-IS physical topology, which is also called default topology. 2. If the **transition** parameter is not specified, the device runs in multi-topology mode, the IS-IS v4 process works in the default topology while the IS-IS v6 process works in the IPv6 unicast topology. 3. If the **transition** parameter is specified, the device runs in multi-topology transition mode and the IS-IS v6 process runs in both the default topology and IPv6 unicast topology. The above three configurations are exclusive. The device which runs in multi-topology transition mode can transmit the multi-topology TLV and the default topology TLV. The multi-topology transition mode can be applied in incremental deployment to ensure smooth network migration. However, this mode may cause leaking of routes between the default topology and IPv6 unicast topology. Be careful to configure multi-topology transition mode, as this configuration may lead to network problems such as route blackhole and network loop. Before you configure this command, you need to set the metric style as wide or transition mode. Configuring the metric style as narrow and configuring only one Level to support wide or transition mode will disable the multitopology routing (MTR) function.	
Configuration Examples	The following example configures multi-topology. FS(config)# **router isis** FS(config-router)# address-family ipv6 FS(config-router-af)# multi-topology	
Related Commands	**Command**	**Description**
	router isis	Creates IS-IS instances.
Platform Description	N/A	

4.57 net

	Use this command to set the IS-IS NET (Network Entry Title) address. Use the **no** form of this command to delete this NET address.	
	net *net-address*	
	no net *net-address*	
Parameter	**Parameter**	**Description**

Description		
	net-address	The format of net-address is shown as below: XX..XXXX.YYYY.YYYY.YYYY.00, the XX…XXXX is the area address and the YYYY.YYYY.YYYY is the system ID.
Defaults	By default, no NET address is set.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	This command is used to set the Area ID and System ID for the IS-IS. Up to three NET addresses are allowed to be set by default, namely three addresses with different Area can be set. However, the System ID must be the same.	
Configuration Examples	FS(config)# **router isis** FS(config-router)# **net** *49.0000.0001.0002.0003.00*	
Related Commands	**Command**	**Description**
	router isis	Creates IS-IS instances.
Platform Description	N/A	

4.58 passive-interface

	Use this command to configure the passive interface. Use the **no** form of this command to remove the passive interface.	
	passive-interface [**default**] { *interface-type interface-number* }	
	no passive-interface [**default**] { *interface-type interface-number* }	
Parameter Description	**Parameter**	**Description**
	default	Configures IS-IS disabled interfaces as passive.
	interface-type	Indicates the interface type.
	interface-number	Indicates the interface number.
Defaults	The passive interface is not configured by default.	
Command Mode	IS-IS routing process configuration mode	
Usage Guide	Use this command to disable the interface to receive and send the IS-IS packets, but to advertise the IP address of the interface.	

	After the **default** option is configured, if the number of IS-IS disabled interfaces exceeds 255, the first 255 interfaces are configured as passive and the remaining interfaces are non-passive.
Configuration Examples	The following example configures interface GigabitEthernet 0/0 as passive. FS(config)# router isis 1 FS(config-router)# passive-interface GigabitEthernet 0/0

Related Commands	**Command**	**Description**
	router isis	Creates IS-IS instances.
Platform Description	N/A	

4.59 redistribute

	Use this command to redistribute the routes from one routing protocol into another routing protocol. Use the **no** form of this command to delete the redistribution.
	redistribute { **bgp** | **ospf** *process-id* **match** { **internal** | **external** [**1** | **2**] | **nssa-external** [**1** | **2**] }] | **rip** | **connected** | **static**} [**metric** *metric-value*] [**metric-type** *type-value*] [**route-map** *map-tag*] [**level-1** | **level-1-2** | **level-2**]
	no redistribute { **bgp** | **ospf** *process-id* [**match** { **internal** | **external** [**1** | **2**] | **nssa-external** [**1** | **2**] }] | **rip** | **connected** | **static** } [**metric** *metric-value*] [**metric-type** { **internal** | **external** }] [**route-map** *map-tag*] [**level-1** | **level-1-2** | **level-2**]

Parameter Description	**Parameter**	**Description**
	process-id	OSPF process ID, in the range of 1 to 65535.
	match { internal | external [1 | 2] | nssa-external [1 | 2] }	Redistributes the OSPF routes to perform the filtering on the subtype of the OSPF routes. If the match option is not specified, all routes of the ospf subtype by default are received. If the 1 or 2 followed by the **match external** is not specified, then redistribute the route of the OSPF **external1** and **external 2**. if the 1 or 2 following the **match nssa-external** is not specified, then redistribute the routes of OSPF **nssa-external 1** and **nssa-external 2**.
	metric *metric-value*	Sets the metric value of redistributing the route, in the range of 0 to 4261412864. If the metric option is not specified, the external metric value is used.
	metric-type { internal | external }	Sets the metric type of redistributing the route. **internal**: use the internal metric type. **external**: use the external metric type. If the metric-type is not specified, the **internal** type is used by default.
	route-map *map-tag*	Sets the route-map during the external routes redistribution, which is used to filter the redistributed routes or set attributions of the routes. The name of *map-tag* shall not be over 32 characters. No route-map is configured by default.

	level-1 | level-1-2 | level-2	Specifies the Level of receiving the redistributed routing information. If the Level is not specified, it is defaulted to be redistributed into the Level-2 . The format is shown as below: **level-1**: redistribute into the Level-1 **level-1-2**: redistribute into both Level-1 and Level-2. **level-2**: redistribute into the Level-2.
Defaults	By default, no redistribution is configured.	
Command Mode	IS-IS routing process configuration mode , IS-IS address-family ipv6 mode	
Usage Guide	Configure "**no redistritbue** { **bgp** | **ospf** *processs-id* | **rip** | **connected** | **static** }" to disable protocol redistribution. If "**no redistribute**" is followed by any other parameter, it means that this parameter is restored to the default setting instead of disabling protocol redistribution. For example: "**no redistribute bgp**" will disable bgp redistribution, while "**no redistribute bgp route-map aa**" will disable route-map aa filtering during redistribution instead of disabling bgp redistribution. The routing information will be placed into the IP External Reachability Information TLV of LSP when redistributing external route in the IPv4 mode. The routing information will be placed to the IPv6 Reachable TLV of LSP when redistributing external route in the IPv6 mode. In the old version of some vendors, after configuring the **metric-type** to the **external**, the redistributed route metric will be added by 64 and then perform the routing according to the metric value during the routing calculation, which violates the protocol. In actual application, the priority of the external route may be higher than that of the internal route. When connecting with these old version of some vendors, the related configuration (such as the **metric** or the **metric-type**)of each device can be modified to ensure that the priority of the internal route is higher than the external.	
	The following example sets the metric value to 10.	
Configuration Examples	FS(config)# **router isis** FS(config-router)# **redistribute ospf** *1* **metric** *10* **level-1**	
Related Commands	**Command**	**Description**
	redistribute isis [**tag**] **level-2 into level-1**	Redistributes the reachable routing information from Level-2 into Level-1.
	redistribute isis [**tag**] **level-1 into level-2**	Redistributes the reachable routing information from Level-1 into Level-2.
	route-map	Configures the route map.
Platform Description	N/A	

4.60 redistribute isis level-1 into level-2

	Use this command to redistribute the Level-1 reachable routing information of the IS-IS instance into the Level-2 of current instance. Use the **no** form of this command to disable this redistribution.
	redistribute isis [*tag*] **level-1 into level-2** [**route-map** *route-map-name* | **distribute-list** *access-list-name*]
	no redistribute isis [*tag*] **level-1 into level-2** [**route-map** *route-map-name* | **distribute-list** *access-list-name*]
Parameter Description	**Parameter** / **Description**
	tag / Name of the IS-IS instance.
	route-map *route-map-name* / Sets the route map during the route redistribution, which is used to filter the redistributed route and set attributions of this route. Name of the *route-map-name* shall not be over 32 characters. No **route-map** is configured by default.
	distribute-list *access-list-name* / Uses the **distribute-list** to filter the redistributed routes. Access-list-name is the prefix list associated, it can be the standard, extended or naming prefix list. The format is shown as below: {*<1-99>* | *<100-199>* | *<1300-1999>* | *<2000-2699>* | *acl-name*} In the IS-IS **address-family ipv6** mode, you can use only the naming prefix list with the format being *acl-name*.
Defaults	If the IS-IS Level-2 instance exists, all IS-IS Level-1 routes are by default redistributed into the IS-IS Level-2 instace.
Command Mode	IS-IS routing process configuration mode or IS-IS **address-family ipv6** mode.
Usage Guide	Use the **route-map** or **distribute-list** to filter the Level-1 route of the specified instance to be redistributed. Only the route that meets the condition can be redistributed into the Level-1 of current instance. You can only choose one of the two parameters **route-map** and **distribute-list**. Configure the **no distribute isis** [*tag*] **level-2 into level-1** to disable the specified instance redistribution. If the **no redistribute** is followed by any other parameters, it means that this parameter is restored to the default setting instead of disabling the specified instance redistribution. For example: "**no redistribute isis** *tag1* **level-1 into level-2**" will disable the isis tag1 redistribution, while " **no redistritbue isis** *tag1* **level-1 into level-2 route-map** aa " will disable route-map aa filtering during redistribution instead of disabling the isis tag1 redistribution.
Configuration Examples	FS(config)# router isis *aa* FS(config-router)# redistribute isis bb level-1 into level-2
Related Commands	**Command** / **Description**
	redistribute / Redistributes the routing information from another routing protocol.
	redistribute isis level-2 into level-1 / Redistributes the reachable routing information from Level-2 into Level-1.

Platform Description	N/A

4.61 redistribute isis level-2 into level-1

	Use this command to redistribute the Level-2 reachable routing information of the IS-IS instance into the Level-1 of current instance. Use the **no** form of this command to remove the redistribution.
	redistribute isis [*tag*] **level-2 into level-1** [**route-map** *route-map-name* | **distribute-list** *access-list-name* | **prefix** *ip-address net-mask*]
	no redistribute isis [*tag*] **level-2 into level-1** [**route-map** *route-map-name* | **distribute-list** *access-list-name* | **prefix** *ip-address net-mask*]
Parameter Description	**Parameter** / **Description**
	tag / Name of the IS-IS instance to be redistributed.
	route-map *route-map-name* / Sets the route map during the route redistribution, which is used to filter the redistributed routes and set attributions of the routes. Name of the *route-map-name* shall not be over 32 characters. ● No route-map is configured by default.
	distribute-list *access-list-name* / ● Uses the distribute-list to filter the redistributed routes. ● Access-list-name is the prefix list associated, it can be the standard, extended or naming prefix list. The format is shown as below: ● {*<1-99>* | *<100-199>* | *<1300-1999>* | *<2000-2699>* | *acl-name*} ● In the IS-IS address-family ipv6 mode, you can use only the naming prefix list with the format being *acl-name.*
Defaults	N/A
Command Mode	IS-IS routing process configuration mode or IS-IS **address-family ipv6** mode.
Usage Guide	Use the **route-map** or **distribute-list** to filter the Level-2 route of the specified instance to be redistributed. Only the route that meets the condition can be redistributed into the Level-1 of current instance. You can only choose one of the two parameters **route-map** and **distribute-list**. Configure the **no distribute isis** [*tag*] **level-2 into level-1** to disable the specified instance redistribution. If the **no redistribute** is followed by any other parameters, it means that this parameter is restored to the default setting instead of disabling the specified instance redistribution. For example: "**no redistribute isis** *tag1* **level-2 into level-1**" will disable the isis *tag1* redistribution, while " **no redistritbue isis** *tag1* **level-2 into level-1 route-map** *a* " will disable route-map aa filtering during redistribution instead of disabling the isis *tag1* redistribution.
Configuration Examples	FS(config)# router isis *aa* FS(config-router)# redistribute isis *bb* level-2 into level-1

Related Commands	**Command**	**Description**
	redistribute	Redistributes the routing information from another routing protocol.
	redistribute isis level-1 into level-2	Redistributes the reachable routing information from Level-1 into Level-2.
Platform Description	N/A	

4.62 router isis

	Use this command to create the IS-IS instance. Use the **no** form of this command to delete this instance.	
	router isis [*tag*]	
	no router isis [*tag*]	
Parameter Description	**Parameter**	**Description**
	tag	Instance name
Defaults	By default, no IS-IS instance is configured.	
Command Mode	Global configuration mode	
Usage Guide	Use this command to initialize the IS-IS instance and enter the IS-IS routing process configuration mode. The IS-IS instance will not be executed unless one NET address is configured at least. When enabling the IS-IS routing process with the parameter *tag*, the parameter *tag* will be used as well when disabling the IS-IS routing process. By default, the CPU protection is enabled on the switch, so that the number of packets corresponding to the destination group addresses of ISIS (AllISSystems, AllL1ISSystems, AllL2ISSystems) is limited when they are sent to the CPU, for example , the default limited value is 400pps. The number of packets received by the switch may be larger than the default value if there are many neighbors or the interval for sending Hello packets is short, resulting in continual vibration of the adjacent relation. In this case, you need to raise the limit of IS-IS packets using the global commands **cpu-protect type isis-is pps**, **cpu-protect type isis-l1is pps** and **cpu-protect type isis-l2is pps**.	
Configuration Examples	FS# **configure terminal** FS(config)# **router isis**	
Related Commands	**Command**	**Description**
	ip router isis	Enables the IS-IS IPv4 routing protocol on the interface.

	ipv6 router isis	Enables the IS-IS IPv6 routing protocol on the interface.
	net	Sets the NET address.
Platform Description	N/A	

4.63 set-overload-bit

	Use this command to instruct a neighbor not to use the local IS-IS node as a transit device for forwarding data. **set-overload-bit** [**on-startup** *seconds*] [**suppress** { [**interlevel**] [**external**] }] [**level-1** | **level-2**]	
	Use the **no** form of this command to disable the function of instructing a neighbor not to use the local IS-IS node as a transit device for forwarding data. **no set-overload-bit** [**level-1** | **level-2**]	
Parameter Description	**Parameter**	**Description**
	on-startup *seconds*	Indicates that an IS-IS node automatically enters the OVERLOAD state after restart. ***seconds*** is the duration of the IS-IS node in the OVERLOAD state after restart. The value range is **5** to **86,400** in seconds.
	suppress	Indicates that internal routes (IS-IS inter-area routes and intra-area routes) or external routes are not advertised to neighbors when the IS-IS node is in the OVERLOAD state.
	interlevel	Indicates that IS-IS inter-area routes and intra-area routes are not advertised to neighbors when the IS-IS node is in the OVERLOAD state. It is used in combination with the **suppress** keyword.
	external	Indicates that external routes are not advertised to neighbors when the IS-IS node is in the OVERLOAD state. It is used in combination with the **suppress** keyword.
	level-1	Sends LSP packets that carry the OVERLOAD bit only to Level-1 neighbors.
	level-2	Sends LSP packets that carry the OVERLOAD bit only to Level-2 neighbors.
Defaults	The function of instructing a neighbor not to use the local IS-IS node as a transit device for forwarding data is disabled by default.	
Command Mode	IS-IS routing process configuration mode	
Default Level	14	
Usage Guide	This command forces a IS-IS node to set the OVERLOAD bit in non-virtual LSP packets, to instruct IS-IS neighbors not to use the local node as a transit device. If the **on-startup** keyword is carried, the device automatically enters the OVERLOAD state after restart. If the **on-startup** keyword is not carried, the device immediately enters the OVERLOAD state upon restart.	

The **on-startup** keyword takes effect for only one level.

The OVERLOAD bit is mainly used in the following cases:

- Device overload

The overload of the local IS-IS node, for example, memory insufficiency or CPU full load, may cause incomplete routes in the local routing table or no resource for data forwarding. You can set the OVERLOAD bit in LSP packets to instruct neighbors not to use the local node as a transit device.

In this case, the **on-startup** keyword is not carried in the configuration. The OVERLOAD bit is manually set or cancelled. You must manually cancel this command after the local IS-IS node restores to the normal state. Otherwise, the local IS-IS node is always in the OVERLOAD state

- Instantaneous black hole

In the scenario described in RFC3277, the IS-IS converges faster than BGP does. After an IS-IS node restarts, the route fails instantaneously, that is, instantaneous black hole occurs. You can set the OVERLOAD bit in LSP packets to instruct neighbors not to use the local node as a transit device till the specified timer expires.

In this case, the configuration must carry the **on-startup** field. The OVERLOAD bit is automatically set or cancelled by the IS-IS node based on the configuration.

After the **on-startup** field is selected, the IS-IS node automatically enters the instantaneous black hole state after restart. After a new neighbor relationship is established, the IS-IS node immediately sends the LSP packet that carries the OVELOAD bit to notify the neighbor that the local device enters the instantaneous black hole state (or OVERLOAD state) and that the local node cannot be used as a transit device.

When the specified timer expires, the IS-IS node immediately sends the LSP packet without the OVERLOAD bit to notify the neighbor that the local device is no longer in the instantaneous state (or OVERLOAD state) and can be used as a transit device.

The timer time needs to be set based on the number of routes in the network. If there are many routes, set it to a large value; if there are a few routes, set it to a small value.

- The local IS-IS node is not intended to be used for forwarding real data

If the local IS-IS node needs to be connected to the production network for testing or other function requirements and it is not intended to be used for forwarding real data in the network, you can set the OVERLOAD bit in LSP packets to instruct neighbors not to use the local device as a transit device.

In this case, the **on-startup** field is not carried in the configuration and the OVERLOAD bit is manually set or cancelled.

You can configure **suppress** as required to restrict the routing information carried in LSP packets in the OVERLOAD state, for example, suppress internal routes and external routes and advertise only local direct routes.

Configuration Examples

The following example sets an IS-IS node to immediately enter the instantaneous black hole state after restart till the specified timer expires (set the specified waiting time to 300 seconds) and advertises only local direct routes to neighbors.

```
FS(config)# router isis
FS(config-router)#set-overload-bit on-startup 300 suppress interlevel external
```

The following example connects the local IS-IS node to the production network as a test device and set its not to forward real data of the production network, to avoid impact on production.

```
FS(config)# router isis
FS(config-router)#set-overload-bit suppress interlevel external
```

4.64 spf-interval

	Use this command to set the minimal interval for the SPF calculation. Use the **no** form of this command to restore the default minimal interval.
	spf-interval [**level-1 | level-2**] *maximum-interval* [*initial-interval hold-interval*]
	no spf-interval [**level-1 | level-2**]
Parameter Description	**Parameter** / **Description**
	level-1 / Applies the configuration only to Level-1.
	level-2 / Applies the configuration only to Level-2.
	maximum-interval / Indicates the maximum interval for performing two consecutive SPF calculations. The value range is **1** to **120** (in seconds). The default value is **10**.
	initial-interval / Indicates the waiting time for performing the SPF calculation for the first time. The value range is **0** to **60000** (in milliseconds). The default value is **50**.
	hold-interval / Indicates the minimum interval for performing the SPF calculation for the second time. The value range is **10** to **60000** (in milliseconds). The default value is **200**.
Defaults	By default, this command is not configured. The default SPF interval is 10 seconds, which takes effect at both Level-1 and Level-2.
Command Mode	IS-IS routing process configuration mode
Usage Guide	Increasing the maximum interval for performing SPF calculations can avoid frequent SPF calculations and waste of CPU resources. However, a larger minimum interval also leads to slower responses to route changes. The waiting time for performing the SPF calculation for the first time is the initial interval. If the network becomes unstable, the SPF calculation interval is less than the maximum interval, and the interval for performing the SPF calculation for the second time becomes the hold interval. A corresponding penalty is added to this interval: The next interval for the SPF calculation doubles the previous interval for the same SPF calculation, until the SPF calculation interval reaches the maximum interval. Subsequent SPF calculations are performed at the maximum interval. When the network becomes stable, the interval for performing the SPF calculation becomes greater than the maximum interval, and the waiting time for performing the SPF calculation is restored to the initial interval. Link changes have high requirements for convergence. The initial interval can be set to a small value. The preceding parameters can also be adjusted to larger values to reduce CPU consumption. The value of **initial-interval** cannot be greater than that of **maximum-interval**. Otherwise, the value of **initial-interval** will be used as the value of **maximum-interval**. The value of **hold-interval** cannot be greater than that of **maximum-interval**. Otherwise, the value of **hold-interval** will be used as the value of **maximum-interval**. The value of **initial-interval** cannot be greater than that of **hold-interval**. Otherwise, the value of **initial-interval** will be used as the value of **hold-interval**.

Configuration Examples	The following example sets the maximum interval for generating two duplicate SPF packets to 5 seconds, the interval for generating a duplicate SPF packet for the first time to 100 ms, and the interval for generating a duplicate SPF packet for the second time to 200 ms.
	FS(config)# router isis FS(config-router)# spf-interval 5 100 200
	The following example sets the maximum interval for generating two duplicate SPF packets to 10 seconds.
	FS(config)# router isis FS(config-router)# spf-interval 10

Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

4.65 summary-address

	Use this command to configure the IPv4 aggregation route. Use the **no** form of this command to delete the aggregation route.
	summary-address *ip-address net-mask* [**level-1 | level-2 | level-1-2**] [metric *number*]
	no summary-address *ip-address net-mask*

Parameter Description	**Parameter**	**Description**
	ip-address	Indicates the IP address of the summary route.
	net-mask	Indicates the subnet mask of the summary route.
	level-1	Applies the setting only to Level-1.
	level-2	Applies the setting only to Level-2. By default, the setting takes effect for Level-2.
	level-1-2	Applies the setting to Level-1 and Level-2.
	number	Indicates the metric of the summary route.

Defaults	By default, no aggregation route is configured.
Command Mode	IS-IS routing process configuration mode
Usage Guide	With the aggregation route configured, if there is any reachable address or reachable network segment route in the aggregation route, it will publish the aggregation route instead of the detailed route.
Configuration	FS(config)# **router isis**

Examples	FS(config-router)# **summary-address** *10.10.0.0/24* **level-1-2**	
Related Commands	**Command**	**Description**
	summary-prefix	Configures the IPv6 aggregation route.
Platform Description	N/A	

4.66 summary-prefix

	Use this command to configure the IPv6 aggregation route. Use the **no** form of this command to delete the aggregation route.	
	summary-prefix *ipv6-prefix/prefix-length* [**level-1** | **level-2** | **level-1-2**]	
	no summary-address *ipv6-prefix/prefix-length*	
Parameter Description	**Parameter**	**Description**
	ipv6-prefix / prefix-length	Aggregation network address and the IP prefix length of the aggregation network address.
	level-1	Applies to the Level-1 only.
	level-2	Applies to the Level-2 only.
	level-1-2	Applies to both Level-1 and Level-2.
Defaults	By default, no aggregation route is configured.	
Command Mode	Address-family ipv6 mode	
Usage Guide	With the aggregation route configured, if there is any reachable address or reachable network segment route in the aggregation route, it will publish the aggregation route instead of the detailed route.	
Configuration Examples	FS(config)# **router isis** FS(config-router)# **address-family ipv6** FS (config-router-af)# **summary-prefix** *1000::/96* **level-1-2**	
Related Commands	**Command**	**Description**
	summary-address	Configures the IPv4 aggregation route.
Platform Description	N/A	

4.67 two-way-maintain

	Use this command to enable the IS-IS two-way maintenance function. **two-way-maintain**
	Use the **no** form of this command to disable the IS-IS two-way maintenance function. **no two-way-maintain**
Parameter Description	**Parameter** / **Description**
	N/A / N/A
Defaults	The IS-IS two-way maintenance function is enabled by default.
Command Mode	IS-IS routing process configuration mode
Default Level	14
Usage Guide	In a large-scale network, a large number of packets are sent and received, which occupies lots of CPU and memory resources, causing the delay or discarding of some IS-IS packets. If the time required for processing hello packets exceeds the neighbor relationship maintenance duration, the corresponding neighbor relationship times out and is removed. When the two-way maintenance function is enabled, if a large number of packets exist on the network, the LSP packets, CSNP packets, and PSNP packets from a neighbor in addition to hello packets can also be used to maintain the two-way relationship with the neighbor, preventing the neighbor failure caused by delay or discarding of hello packets.
Configuration Examples	The following example disables the IS-IS two-way maintenance function. FS(config)# router isis 1 FS(config-router)# no two-way-maintain

4.68 virtual-system

	Use this command to configure an additional system ID for fragment extension. Use the **no** form of this command to remove the additional system ID.
	virtual-system *system-id*
	no virtual-system *system-id*
Parameter Description	**Parameter** / **Description**
	system-id / Additional system ID. The length is 6 bytes.
Defaults	No additional system ID is configured by default.
Command Mode	IS-IS routing process configuration mode

Usage Guide	Use this command to configure an additional system ID for LSP fragment extension. The system must be enabled with fragment extension mode and configured with the additional system ID to enable LSP fragment extension.
Configuration Examples	The following example configures an additional system ID for fragment extension. FS(config)# router isis FS(config-router)# virtual-system 0000.0000.0034
Related Commands	**Command** / **Description** N/A / N/A
Platform Description	N/A

4.69 vrf

	Use this command to bind the ISIS process with a VRF instance. Use the **no** form of this command to unbind the IS-IS process from the VRF instance.
	vrf *vrf-name*
	no vrf *vrf-name*
Parameter Description	**Parameter** / **Description** *vrf-name* / VRF instance name. The VRF instance must be configured.
Defaults	No IS-IS process is bound with the VRF instance.
Command Mode	IS-IS routing process configuration mode
Usage Guide	Before you configure this command, the specified VRF instance must be configured. If you want to build the IS-IS v6 neighbor, the multi-protocol VRF and IPv6 protocol must be enabled. The following restrictions are for binding IS-IS process with VRF instance: 1. The IS-IS process in the same non-default VRF instance must be configured with a different system ID. The IS-IS process in the different VRF instance can be configured with the same system ID. 2. An IS-IS process can be bound with only one VRF instance. A VRF instance can be bound with multiple IS-IS processes. 3. If a VRF instance bound with an IS-IS changes, the IS-IS enabled interfaces which are bound with the VRF instance and the redistribute configuration in IS-IS routing process configuration mode will be removed.
Configuration Examples	The following example binds an IS-IS process with a VRF instance. FS(config)#vrf definition vrf_1 FS(config-vrf)#address-family ipv4 FS(config-vrf-af)#exit-address-family

	FS(config)# router isis FS(config-router)# vrf vrf_1	
Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

4.70 show clns is-neighbors

	Use this command to display all IS neighbors to provide the adjacency relationship of routers.
	show clns [*tag*] **is-neighbors** [*interface-type interface-number*] [**detail**]
Parameter Description	

Parameter	Description
tag	Specifies the IS-IS instance.
interface-type interface-number	Specifies the name of interface.
detail	Displays detailed information of all interfaces.

Defaults	N/A
Command Mode	Privileged EXEC mode, global configuration mode or interface configuration mode.
Usage Guide	N/A
Configuration Examples	The output results of the **show clns is-neighbors detail** command are displayed as below:

```
Area (null):
System Id   Type   IP Address     State   Holtime   Circuit   Interface
r1          L1     1.0.0.2        Up      9         r1.01     GigabitEthernet 0/0
L2     1.0.0.2        Up      9         r1.01     GigabitEthernet 0/0
  Adjacency ID: 1
  Uptime: 00:00:54
  Area Address(es): 49.1111

  SNPA: 00d0.f8bc.de08

  IPv6 Address(es): fe80::2a9:15ff:fe36:5413

  Level-1 MTID: Standard

  Level-2 MTID: Standard

  Level-1 Protocols Supported: IPv4
  Level-2 Protocols Supported: IPv4
```

Related Commands	

Command	Description
show clns neighbors	Displays all IS neighbors to provide the router information and the adjacency relationship of terminal system.

Platform Description	N/A

4.71 show clns neighbors

	Use this command to display all IS neighbors to provide the router information and the adjacency relationship of terminal system.
	show clns [*tag*] **neighbors** [*interface-type interface-number*] [**detail**]
Parameter Description	

Parameter	Description
tag	Specifies the IS-IS instance.
interface-type interface-number	Specifies the name of the interface.
detail	Displays detailed information of all interfaces.

Defaults	N/A
Command Mode	Privileged EXEC mode, global configuration mode or interface configuration mode.
Usage Guide	N/A
Configuration Examples	The following example displays all IS neighbors to provide the router information and the adjacency relationship of terminal system.

```
FS# show clns neighbors detail

Area (null):
System Id        SNPA                State   Holdtime   Type Protocol Interface
r1               00d0.f8bc.de08      Up      7          L1   IS-IS    GigabitEthernet 0/0
                                     Up      9          L2   IS-IS    GigabitEthernet 0/0
  Adjacency ID: 1
  Uptime: 00:01:40
  Area Address(es): 49.1111
  IP Address(es): 1.0.0.2
  IPv6 Address(es): fe80::2a9:15ff:fe36:5413
  Level-1 MTID: Standard
  Level-2 MTID: Standard
  Level-1 Protocols Supported: IPv4, IPv6
  Level-2 Protocols Supported: IPv4, IPv6
  BFD(IPv4) session state: Up
BFD(IPv6) session state: Up
```

Related Commands	

Command	Description
show clns is-neighbors	Displays all IS neighbors to provide the router adjacency relationship.

Platform Description	N/A

4.72 show isis counter

	Use this command to display various statistics of IS-IS.	
	show isis [*tag*] **counter**	
Parameter Description	**Parameter**	**Description**
	tag	Specifies the IS-IS instance.
Defaults	N/A	
Command Mode	Privileged EXEC mode, global configuration mode or interface configuration mode.	
Usage Guide	N/A	
Configuration Examples	The output results of the **show clns neighbors details** are displayed as below: FS# **show isis counter** Area (null): IS-IS Level-1 isisSystemCounterEntry: isisSysStatCorrLSPs: 0 isisSysStatAuthTypeFails: 0 isisSysStatAuthFails: 0 isisSysStatLSPDbaseOloads: 0 isisSysStatManAddrDropFromAreas: 0 isisSysStatAttmptToExMaxSeqNums: 0 isisSysStatSeqNumSkips: 0 isisSysStatOwnLSPPurges: 0 isisSysStatIDFieldLenMismatches: 0 isisSysStatMaxAreaAddrMismatches: 0 isisSysStatPartChanges: 0 isisSysStatSPFRuns: 30 IS-IS Level-2 isisSystemCounterEntry: isisSysStatCorrLSPs: 0 isisSysStatAuthTypeFails: 0 isisSysStatAuthFails: 0 isisSysStatLSPDbaseOloads: 0 isisSysStatManAddrDropFromAreas: 0 isisSysStatAttmptToExMaxSeqNums: 0 isisSysStatSeqNumSkips: 0 isisSysStatOwnLSPPurges: 0 isisSysStatIDFieldLenMismatches: 0	

	isisSysStatMaxAreaAddrMismatches: 0 isisSysStatPartChanges: 0 isisSysStatSPFRuns: 30
Related Commands	**Command** / **Description**
	N/A / N/A
Platform Description	N/A

4.73 show isis database

	Use this command to display the LSP database.
	show isis [*tag*] **database** [*FLAGS* | *LEVEL* | *LSPID*]
Parameter Description	**Parameter** / **Description**
	tag / Specifies the IS-IS instance.
	FLAGS / The format is displayed as below: detail verbose detail: detailed information Verbose: more detailed information than the detail.
	LEVEL / The format is displayed as below: l1 | l2 | level-1 | level-2 l1 and level-1: specify the LSP database of the Level-1. l2 and level-2: specify the LSP database of the Level-2
	LSPID / Specifies the ID number of LSP to show the corresponding LSP information only.
	tag / Specifies the IS-IS instance.
Defaults	N/A
Command Mode	Privileged EXEC mode, global configuration mode or interface configuration mode.
Usage Guide	N/A
Configuration Examples	The output results of the **show isis database detail** command are displayed as below:

```
FS# show isis database detail
Area (null):
IS-IS Level-1 Link State Database:
LSPID                 LSP Seq Num   LSP Checksum   LSP Holdtime      ATT/P/OL
FS.00-00    * 0x00000007   0xCDD5          1011                    0/0/0
   Area Address: 49.1111
```

```
  NLPID:          0xCC
  Hostname:       FS
  IP Address:     1.0.0.1
  Metric:    10          IS r1.01
  Metric:    10          IP 1.0.0.0 255.255.255.0
r1.00-00          0x00000006    0xA771          1032                0/0/0
  Area Address: 49.1111
  NLPID:          0xCC
  Hostname:       r1
  IP Address:     1.0.0.2
  Metric:    10          IS r1.01
  Metric:    10          IP 1.0.0.0 255.255.255.0
r1.01-00          0x00000002    0x062A          989                 0/0/0
  Metric:    0           IS r1.00
  Metric:    0           IS FS.00

IS-IS Level-2 Link State Database:
LSPID                 LSP Seq Num   LSP Checksum   LSP Holdtime      ATT/P/OL
FS.00-00    * 0x0000000A   0xC7D8          1033                0/0/0
  Area Address: 49.1111
  NLPID:          0xCC
  Hostname:       FS
  IP Address:     1.0.0.1
  Metric:    10          IS r1.01
  Metric:    10          IP 1.0.0.0 255.255.255.0
r1.00-00          0x00000006   0xA771          1032                0/0/0
  Area Address: 49.1111
  NLPID:          0xCC
  Hostname:       r1
  IP Address:     1.0.0.2
  Metric:    10          IS r1.01
  Metric:    10          IP 1.0.0.0 255.255.255.0
r1.01-00          0x00000002   0x062A          989                 0/0/0
  Metric:    0           IS r1.00
  Metric:    0           IS FS.00
```

Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

4.74 show isis graceful-restart

	Use this command to display the status information related to the IS-IS GR.
	show isis [*tag*] **graceful-restart**
Parameter Description	**Parameter** / **Description**
	tag / IS-IS instance name
Defaults	N/A
Command Mode	Privileged EXEC mode/ global configuration mode/ interface configuration mode
Usage Guide	N/A
Configuration Examples	The following example displays the GR information of the IS-IS.

```
FS(config)# show isis graceful-restart

Area (null):
  Graceful-restart Helper: enabled
    Level 1:
      GigabitEthernet 0/0: RR received: 0
     Level 2:
      GigabitEthernet 0/0: RR received: 0
  Graceful-restart: enabled
    Graceful-period: 400s, Level timer: 60s, Interface timer: 3s
    Instance GR status: not restarting
```

Related Commands	**Command** / **Description**
	graceful-restart / Enables the IS-IS GR Restart capability.
	graceful-restart grace-period / Configures the maximum interval of the grace-restart.
	graceful-restart helper disable / Disables the IS-IS GR Help capability.
	graceful-restart / Enables the IS-IS GR Restart capability.
Platform Description	N/A

4.75 show isis hostname

	Use this command to display the mapping relation between the router name and system ID.
	show isis [*tag*] **hostname**

Parameter Description	Parameter	Description
	tag	Specifies the IS-IS instance.
Defaults	N/A	
Command Mode	Privileged EXEC mode/ global configuration mode/ interface configuration mode	
Usage Guide	N/A	
Configuration Examples	FS# show isis hostname System ID Dynamic Hostname Area (null) * 5555.5555.5555 FS 1111.1111.1111 R1 System ID Dynamic Hostname Area 1 * 4444.4444.4444 FS 2222.2222.2222 R2	
Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

4.76 show isis ipv6 topology

	Use this command to display information about the IPv6 unicast topology to which an IS-IS router is connected. **show isis** [*tag*] **ipv6 topology** [**l1** | **l2** | **level-1** | **level-2**]
Parameter Description	**Parameter** / **Description**
	tag — IS-IS instance
	l1 — Topology of a specified Level-1 router
	level-1 — Topology of a specified Level-1 router
	l2 — Topology of a specified Level-2 router
	level-2 — Topology of a specified Level-2 router
Command Mode	Privileged EXEC mode, global configuration mode, and interface configuration mode

Default Level	14
Usage Guide	N/A
Configuration Examples	The following example displays the IPv6 unicast topology information.

```
FS#show isis ipv6 topology
Area (null):
IS-IS paths to level-1 routers
System Id      Metric    Next-Hop    SNPA              Interface
r1               10        r1        00d0.f822.33ad    GigabitEthernet 0/0
FS          --
IS-IS paths to level-2 routers
System Id      Metric    Next-Hop    SNPA              Interface
r1               10        r1        00d0.f822.33ad    GigabitEthernet 0/0
FS          --
```

Field description:

Field	Description
Area	Instance tag
System Id	System ID
Metric	Metric value
Next-Hop	Next hop
SNPA	SNPA address
Interface	Interface name

4.77 show isis interface

	Use this command to display the information about IS-IS interface.	
	show isis [*tag*] **interface** [*interface-type interface-number*] [*counter*]	
Parameter Description	**Parameter**	**Description**
	tag	Specifies the IS-IS instance name.
	interface-type interface-number	Specifies the Interface name.
Command Mode	Privileged EXEC mode, global configuration mode or interface configuration mode.	
Usage Guide	N/A	
Configuration Examples	The following example displays the IS-IS interface.	

```
FS# show isis interface
Area (null):
VLAN 1 is up, line protocol is up
```

```
Routing Protocol: IS-IS ((null))
    Network Type: Broadcast
    Circuit Type: level-1-2
    Local circuit ID: 0x01
    Extended Local circuit ID: 0x00000001
    Local SNPA: 00d0.f822.33ab
    IP interface address:
        1.0.0.1/24
    Level-1 Metric: 10/10, Priority: 64, Circuit ID: r1.01

    Level-1 Timer intervals configured, Hello: 10s, Lsp: 33ms, Psnp: 2s, Csnp:10s, Retransmit:5s

    Level-1 LSPs in queue: 0

    Level-1 LSPs flood: 5

    Number of active level-1 adjacencies: 1
    Level-2 Metric: 10/10, Priority: 64, Circuit ID: r1.01

    Level-2 Timer intervals configured, Hello: 10s, Lsp: 33ms, Psnp: 2s, Csnp:10s, Retransmit:5s

    Level-2 LSPs in queue: 0

    Level-2 LSPs flood: 5

    Number of active level-2 adjacencies: 1
    Next IS-IS LAN Level-1 Hello in 5 seconds
    Next IS-IS LAN Level-2 Hello in 5 seconds
    BFD Enabled (Anti-congestion)
    Eligible to backup traffic
```

The following example displays the statistics of the IS-IS interface.

```
FS# show isis interface counter

Area (null):
GigabitEthernet 1/1/0:
    IS-IS LAN Level-1 isisCircuitCounterEntry:
        isisCircAdjChanges: 4
        isisCircNumAdj: 2
        isisCircInitFails: 0
        isisCircRejAdjs: 0
        isisCircIDFieldLenMismatches: 0
        isisCircMaxAreaAddrMismatches: 0
        isisCircAuthTypeFails: 0
        isisCircAuthFails: 0
        isisCircLanDesISChanges: 1
    IS-IS LAN Level-2 isisCircuitCounterEntry:
        isisCircAdjChanges: 4
```

```
    isisCircNumAdj: 2
    isisCircInitFails: 0
    isisCircRejAdjs: 0
    isisCircIDFieldLenMismatches: 0
    isisCircMaxAreaAddrMismatches: 0
    isisCircAuthTypeFails: 0
    isisCircAuthFails: 0
    isisCircLanDesISChanges: 1
IS-IS Level-1 isisPacketCounterEntry:
    isisPacketCountIIHello in/out: 187/278
    isisPacketCountLSP in/out: 10/7
    isisPacketCountCSNP in/out: 0/92
    isisPacketCountPSNP in/out: 0/0
    isisPacketCountUnknown in/out: 0/0
IS-IS Level-2 isisPacketCounterEntry:
    isisPacketCountIIHello in/out: 186/286
    isisPacketCountLSP in/out: 17/9
    isisPacketCountCSNP in/out: 1/91
    isisPacketCountPSNP in/out: 0/0
    isisPacketCountUnknown in/out: 0/0
```

Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

4.78 show isis mesh-groups

	Use this command to display the mesh-group configurations on each interface.	
	show isis [*tag*] **mesh-groups**	
Parameter Description	**Parameter**	**Description**
	tag	Specifies the IS-IS instance.
Defaults	N/A	
Command Mode	Privileged EXEC mode, global configuration mode or interface configuration mode.	
	N/A	
Usage Guide		
Configuration	The following example displays the mesh groups.	

Examples	FS# show isis mesh-groups Mesh group (blocked) FastEthernet 1/1 Mesh group 1 : FastEthernet 1/0
Related Commands	**Command** / **Description**
	N/A / N/A
Platform Description	N/A

4.79 show isis neighbors

	Use this command to display the IS-IS neighbors..
	show isis [*tag*] **neighbors** [*detail*]
Parameter Description	**Parameter** / **Description**
	tag / Displays the IS-IS instance.
	detail / Displays the detailed information of all interfaces.
Defaults	N/A
Command Mode	Privileged EXEC mode, global configuration mode or interface configuration mode.
Usage Guide	N/A
Configuration Examples	The following example displays details of IS-IS neighbors.

```
FS# show isis neighbors detail

Area (null):
System Id   Type   IP Address      State     Holdtime    Circuit    Interface
r1            L1      1.0.0.2         Up         9            r1.01      GigabitEthernet 0/0
              L2      1.0.0.2         Up         9            r1.01      GigabitEthernet 0/0
  Adjacency ID: 1
  Uptime: 00:06:25
  Area Address(es): 49.1111
  SNPA: 00d0.f8bc.de08
  IPv6 Address(es): fe80::2a9:15ff:fe36:5413
  Level-1 MTID: Standard
  Level-2 MTID: Standard
  Level-1 Protocols Supported: IPv4, IPv6
```

	Level-2 Protocols Supported: IPv4, IPv6 BFD(IPv4) session state: Up BFD(IPv6) session state: Up
Related Commands	**Command** / **Description**
	N/A / N/A
Platform Description	N/A

4.80 show isis virtual-neighbors

	Use this command to display the virtual system neighbor information of an IS-IS system.
	show isis [*tag*] **virtual-neighbors**
Parameter Description	**Parameter** / **Description**
	tag / *IS-IS instance.*
Command Mode	Privileged EXEC mode, global configuration mode, and interface configuration mode
Default Level	14
Usage Guide	N/A
Configuration Examples	FS# show isis virtual-neighbors Area (null): Virtual System Id Type State 1111.1111.1111 L1 DOWN L2 UP 2222.2222.2222 L1 DOWN L2 UP

Field description:

Field	Description
Area	Instance tag
Virtual System Id	Virtual system ID
Type	Neighbor type
State	Neighbor status. **UP** indicates the level at which the extended LSP fragment is created.

4.81 show isis protocol

	Use this command to display relevant protocol information about an IS-IS system. **show isis** [*tag*] **protocol**
Parameter Description	

Parameter	Description
tag	IS-IS instance.

Command Mode	Privileged EXEC mode, global configuration mode, and interface configuration mode
Default Level	14
Usage Guide	N/A
Configuration Examples	The following example displays relevant protocol information about an IS-IS system.

```
FS# show isis protocol
IS-IS Router: (null)
  Binding VRF: vrf
  Mib-Binding: off
  System ID: 0000.0000.0036      IS-type: level-1-2
  Virtual System ID:
    1111.1111.1111, 2222.2222.2222
  Manual area address(es):
    49.0001, 49.0003
  Interfaces supported by IS-IS:
    GigabitEthernet 0/0, GigabitEthernet 0/1
  Redistributing IPv4:
    isis 1, isis 2
  Redistributing IPv6:
    isis 3, isis 4
  Distance: 115
  Generate narrow metrics:   Level-1-2
  Accept narrow metrics:     Level-1-2
  Generate wide metrics:     none
  Accept wide metrics:       none
  Two-way-maintain: enable
```

Field description:

Field	Description
IS-IS Router	Instance tag

Binding VRF	Name of the VRF bound to the instance
Mib-Binding	Indicates whether the instance is bound with SNMP.
System ID	System ID
IS-type	Level type supported by the instance
Virtual System ID	Extended system ID
Manual area address(es)	Area ID
Interfaces supported by IS-IS	Interface associated with the instance
Redistributing IPv4	Source of redistributed IPv4 routes
Redistributing IPv6	Source of redistributed IPv6 routes
Distance	IS-IS management weight
Generate narrow metrics	Type of the generated narrow metrics
Accept narrow metrics	Type of the accepted narrow metrics
Generate wide metrics	Type of the generated wide metrics
Accept wide metrics	Type of the accepted wide metrics
Two-way-maintain	Indicates whether the two-way maintenance function enabled for the instance.

4.82 show isis topology

	Use this command to display the topology of the IS-IS router connection.	
	show isis [*tag*] **topology** [*WORD* | **all**}] [**l1** | **l2** | **level-1** | **level-2**]	
Parameter Description	**Parameter**	**Description**
	tag	Specifies the IS-IS instance.
	WORD	System ID or host name.
	self-originate	Displays the topology of the device.
	all	Displays the topology whose root node is the local device or the IS-IS neighbor.
	l1	Specifies the topology of Level-1.
	level-1	Specifies the topology of Level-1.
	l2	Specifies the topology of Level-2.
	level-2	Specifies the topology of Level-2.
Defaults	N/A	
Command Mode	Privileged EXEC mode/ global configuration mode/ interface configuration mode	
Usage Guide	N/A	
Configuration Examples	The following example displays all IS-IS neighbors: FS#show isis topology Area (null):	

	IS-IS paths to level-1 routers System Id Metric Next-Hop SNPA Interface r1 10 r1 00d0.f822.33ad GigabitEthernet 0/0 FS -- IS-IS paths to level-2 routers System Id Metric Next-Hop SNPA Interface r1 10 r1 00d0.f822.33ad GigabitEthernet 0/0 FS --
Related Commands	**Command** / **Description**
	N/A / N/A
Platform Description	N/A

5. BGP4 Commands

5.1 address-family ipv4

	Use this command to enter IPv4 address family configuration mode to configure BGP configuration mode. Use the no or default form of this command to exit BGP address configuration mode. address-family ipv4 [unicast|multicast] **no address-family ipv4** [unicast|multicast] **default address-family ipv4** [unicast]
Parameter Description	**Parameter** / **Description** **unicast** / Optional, detailed IPv4 unicast address prefix
Defaults	The configuration mode is unicast address prefix by default.
Command Mode	BGP configuration mode
Usage Guide	In BGP address configuration mode, use the standard IPv4 address for the configuration. To return to BGP configuration mode, run the command **exit-address-family**.
Configuration Examples	The following example enters the IPv4 address family configuration mode. FS(config)# router bgp 65000 FS(config-router)# address-family ipv4
Related Commands	**Command** / **Description** **exit-address-family** / Exits the mode.
Platform Description	None

5.2 address-family ipv4 vrf

	Use this command to enter the IPv4 VRF address family configuration mode to configure BGP and enable the exchange of route information of a VRF. Use the no or default form of this command to restore the default setting. **address-family ipv4** vrf vrf-name **no address-family ipv4** vrf vrf-name **default address-family ipv4** vrf vrf-name
Parameter Description	**Parameter** / **Description** *vrf-name* / VRF name
Defaults	No vrf is defined by default.
Command	BGP configuration mode

Mode	
Usage Guide	You can execute this command to configure or exit the exchange of route information between PEs and CEs. To return to BGP configuration mode, run the **exit-address-family** command. If IPv4 VRF and IPv6 VRF address family modes of the same VRF are activated at the same time, and the same neighbor is activated in two address family modes, the neighbor's global commands will be displayed in both address family modes at the same time, while its address family commands will be displayed only under respective address family modes.
Configuration Examples	The following example enters the IPv4 VRF address family configuration mode. FS(config)# router bgp 65000 FS(config-router)# address-family ipv4 vrf vpn1
Related Commands	**Command** / **Description** **exit-address-family** / Exits the configuration mode.
Platform Description	N/A

5.3 address-family ipv6

	Use this command to enter IPv6 address family configuration mode and enable the exchange of IPv6 route information. Use the no or default form of this command to restore the default setting. Use the exit-address-family command to exit BGP address-family configuration mode. **address-family ipv6 [unicast]** **no address-family ipv6 [unicast]** **default address-family ipv6 [unicast]**
Parameter Description	**Parameter** / **Description** **unicast** / Optional, enters IPv6 unicast address-family configuration mode.
Defaults	The configuration mode is unicast address prefix by default.
Command Mode	BGP configuration mode or BGP Scope configuration mode
Usage Guide	You can use this command not only to enter IPv6 address-family configuration mode of the BGP to configure the IPv6 neighbors, but also activate neighbors in IPv6 address-family configuration mode after configuring IPv6 neighbors in BGP configuration mode. The **exit-address-family** command is used to return to BGP configuration mode.
Configuration Examples	The following example enters the IPv6 address family configuration mode. FS(config)# router bgp 65000 FS(config-router)# address-family ipv6
Related Commands	**Command** / **Description** **exit-address-family** / Exits the mode.
Platform Description	None

5.4 address-family ipv6 vrf

	Use this command to enter BGP configuration mode, enable the IPv6 route information exchange function under a vrf. Use **no** or **default** form of this command to restore the default setting. Use the **exit-address-family** command to exit BGP address configuration mode.
	address-family ipv6 vrf *vrf-name*
	no address-family ipv6 vrf *vrf-name* **default address-family ipv6 vrf** *vrf-name*
Parameter Description	**Parameter** / **Description** *vrf-name* / VRF name

Defaults	No vrf address family is defined by default.
Command Mode	BGP configuration mode
Usage Guide	You can use this command to start configuring (or quit) the exchange of BGP route information between PE or MCE device and CE. You can use the exit-address-family command to return to BGP configuration mode. If ipv4 vrf and ipv6 vrf address family modes of the same vrf are activated at the same time, and same neighbor is activated in two address family modes, the neighbor's global commands will be displayed in both the address family modes at the same time, while its address family commands will only be displayed under respective address family mode.
Configuration Examples	The following example enters the IPv6 VRF address family configuration mode. FS(config)# router bgp 65000 FS(config-router)# address-family ipv6 vrf vpn1
Configuration Examples	**Command** / **Description**
	exit-address-family / Exits the mode.
Platform Description	N/A

5.5 address-family l2vpn

	Use this command to enter the L2VPN address family configuration mode and enable the exchange of L2VPN route information between BGP neighbors. Use the no or default form of this command to restore the default settings. **address-family l2vpn {evpn}** **no address-family l2vpn {evpn }** **default address-family l2vpn {evpn }**
Parameter Description	**Parameter** / **Description**
	evpn / L2VPN EVPN address family.
Defaults	No L2VPN address family is defined by default.
Command Mode	BGP configuration mode / BGP scope global configuration mode
Usage Guide	Use the **exit-address-family** command to exit the L2VPN address family configuration mode.

Configuration Examples	The following example enters the L2VPN VPLS address family configuration mode. FS(config)# router bgp 100 FS(config-router)# address-family l2vpn vpls
Related Commands	**Command** / **Description** N/A / N/A
Platform Description	N/A

5.6 advertise ipv4 unicast

	Use this command to configure IPv4 VRF re-distribution. Use the no form of this command to disable the IPv4 VRF re-distribution. Use the default form of this command to restore the default settings. **advertise ipv4 unicast** **no advertise ipv4 unicast** **default advertise ipv4 unicast**
Parameter Description	**Parameter** / **Description** **N/A** / N/A
Defaults	The IPv4 VRF re-distribution function is disabled by default.
Command Mode	BGP L2VPN EVPN address family mode.
Usage Guide	Limitations on re-distribution of IPv4 unicast routes into BGP: 1. The re-distribution of IPv4 unicast routes into BGP function can only take effect in BGP L2VPN EVPN address family mode. 2. Only after the VXLAN module has advertised the L3 virtual MAC address, the IPv4 unicast routes can be re-distributed. 3. Only after the route-target import attribute of EVI instance matches the route-target attribute of VRF, the IPv4 unicast routes can be re-distributed. 4. The non-VRF IPv4 unicast routes cannot be re-distributed.
Configuration Examples	The following example configures the re-distribution of IPv4 unicast routes into BGP. FS(config)# router bgp 65000 FS(config-router)# address-family l2vpn evpn FS(config-router-af)# advertise ipv4 unicast
Related Commands	**Command** / **Description** **N/A** / N/A
Platform Description	N/A

5.7 advertise ipv6 unicast

	Use this command to configure IPv4 VRF re-distribution. Use the no form of this command to disable the IPv4 VRF re-distribution. Use the default form of this command to restore the default settings. **advertise ipv6 unicast** **no advertise ipv6 unicast** **default advertise ipv6 unicast**
Parameter Description	**Parameter** / **Description** N/A / N/A
Defaults	The IPv6 VRF re-distribution function is disabled by default.
Command Mode	BGP L2VPN EVPN address family mode.
Usage Guide	Limitations on re-distribution of IPv6 unicast routes into BGP: 1. The re-distribution of IPv6 unicast routes into BGP function can only take effect in BGP L2VPN EVPN address family mode. 2. Only after the VXLAN module has advertised the L3 virtual MAC address, the IPv6 unicast routes can be re-distributed. 3. Only after the route-target import attribute of EVI instance matches the route-target attribute of VRF, the IPv6 unicast routes can be re-distributed. 4. The non-VRF IPv6 unicast routes cannot be re-distributed.
Configuration Examples	The following example configures the re-distribution of IPv6 unicast routes into BGP. FS(config)# router bgp 65000 FS(config-router)# address-family l2vpn evpn FS(config-router-af)# advertise ipv6 unicast
Related Commands	**Command** / **Description** N/A / N/A
Platform Description	N/A

5.8 aggregate-address (IPv4)

	Use this command to set the aggregate IPv4 route. Use the no or default form of this command to restore the default setting. **aggregate-address ip-address** mask [as-set] [summary-only] [attribute-map map-tag] **no aggregate-address ip-address** mask **default aggregate-address ip-address** mask
Parameter Description	

Parameter	Description
ip address	IP address of the aggregate route
mask	Mask of the aggregate route
as-set	Keeps the AS path information of the path in the aggregate address range.
summary-only	Advertises only the aggregate route.
attribute-map	Configures the routing policy to control the route attribute.
map-tag	Route map name. Up to 32 characters is allowed.

Defaults	The address aggregation is not configured by default.
Command Mode	BGP configuration mode, IPv4 address family configuration mode, or IPv4 VRF address family configuration mode
Usage Guide	The BGP-enabled device will advertise all path information both before and after aggregation by default. Use the **aggregate-address summary-only** command to advertise the aggregate route only.
Configuration Examples	The following example sets the aggregate IPv4 route. FS(config)# router bgp 65000 FS(config-router)# aggregate-address 10.0.0.0 255.0.0.0 as-set
Related Commands	

Command	Description
router bgp	Enables the BGP protocol.

Platform Description	None

5.9 bgp advertise non-transitive extcommunity

	Use this command to allow carried non-transitive extcommunty when BGP is notifying EBGP neighbors of a route. Use the **no** or **default** form of this command to restore the default setting.
	bgp advertise non-transitive extcommunity
	no bgp advertise non-transitive extcommunity **default bgp advertise non-transitive extcommunity**

Parameter Description	Parameter	Description
	N/A	N/A
Defaults	Non-transitive extcommunty is removed when notifying EBGP neighbors of a route.	
Command Mode	BGP configuration mode / Scope global configuration mode	
Usage Guide	By default, when notifying EBGP neighbors of a route, neighbors will not be notified of extcommunty with the "non-transitive" flag. This configuration can enable the notification of non-transitive extcommunty. Non-transitive extcommunty will be carried when notifying alliance EBGP or IBGP neighbors of a route.	
Configuration Examples	The following example allows carried non-transitive extcommunty. FS(config)# router bgp 65000 FS(config-router)# bgp advertise non-transitive extcommunity	
Configuration Examples	**Command**	**Description**
	router bgp	Enables BGP protocol.
Platform Description	N/A	

5.10 bgp always-compare-med

	Use this command to compare Multi Exit Discriminator (MED) all the time. Use the no or default form of this command to restore the default setting. **bgp always-compare-med** **no bgp always-compare-med** **default bgp always-compare-med**	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	MED of peer paths from the same AS is compared by default.	
Command Mode	BGP configuration mode / Scope global configuration mode	
Usage Guide	The MED value is compared for paths of peers from the same AS by default. This command can be used to allow comparing MED values for paths from different ASs. If there are multiple valid paths to the same destination, the one with lower MED value has higher priority. This command is not recommended unless you are sure that different ASs are using the same IGP and routing	

	method.
Configuration Examples	The following example compares Multi Exit Discriminator (MED) all the time. FS(config)# router bgp 65000 FS(config-router)# bgp always-compare-med
Related Commands	**Command** / **Description** **show ip bgp** / Displays the BGP route entry. **bgp bestpath med confed** / Compares the MED value of paths of peers from different ASs when selecting the optimal path. **bgp bestpath med missing-as-worst** / Sets the priority of the path without MED attribute as the lowest when selecting the optimal path. **bgp deterministic-med** / Compares paths of peers from the same AS when selecting the optimal path.
Platform Description	None

5.11 bgp asnotation dot

	Use this command to modify the displaying mode of the 4-byte AS notation and the matching type of the regular expression as the dot mode (that is, two dotted decimal numbers). Use the no or default form of this command to restore the default setting. **bgp asnotation dot** **no bgp asnotation dot** **default bgp asnotation dot**
Parameter Description	**Parameter** / **Description** N/A / N/A
Defaults	The 4-byte AS notation is shown in decimal digit, and the regular expression also matches the 4-byte AS notation with decimal digit by default.
Command Mode	BGP configuration mode / Scope global configuration mode
Usage Guide	Our devices support two modes of representing the 4-byte AS notation. One is decimal digit, and the other one is dot mode which represents the 65536 with 1.0. The decimal format is same as the default format, which represents the 4-byte AS notation with decimal digits. The dot mode displays the 4-byte AS notation in the format of ([two high bytes.] two low bytes). If the [two high bytes.] is zero, it will not be displayed. That is, the AS notation represented as 65536 in decimal is 1.0 in the dot mode. In another example, the AS notation is 65534 represented in decimal, while it is represented as 65534 in the dot mode without the zero in front. No matter which mode will be adopted to display the 4-byte AS notation, both modes can be used when entering the configuration commands. But the representation and displaying mode of the 4-byte AS notation in the regular expression must be the same. Otherwise, the matching will fail.

	After executing the **bgp asnotation** command, you must use the clear ip bgp * to perform the resetting, so as to re-match the filtering condition of the regular expression. The AS notation is represented as 1 to 65535 no matter using decimal or dot mode.
Configuration Examples	The following example modifies the showing mode of the 4-byte AS notation. FS(config)# router bgp 1.0 FS(config-router)# bgp asnotation dot
Related Commands	**Command**: **show ip bgp summary** **Description**: Displays the related information of BGP neighbor.
Platform Description	None

5.12 bgp bestpath as-path ignore

	Use this command to disregard the length of the AS path. Use the no or default form of this command to restore the default setting. **bgp bestpath as-path ignore** **no bgp bestpath as-path ignore** **default bgp bestpath as-path ignore**
Parameter Description	**Parameter**: N/A **Description**: N/A
Defaults	The AS path length is considered in choosing the optimal path by default.
Command Mode	BGP configuration mode / Scope global configuration mode
Usage Guide	BGP will not take the length of the AS path into account when it selects the optimal path as specified in RFC1771. In general, the shorter the length of the AS path, the higher the path priority is. Hence, we take the length of the AS path into account when we select the optimal path. You can determine whether it is necessary to take the length of the AS path into account when you select the optimal path according to the actual condition.
Configuration Examples	The following example disregard the length of the AS path. FS(config)# router bgp 65000 FS(config-router)# bgp bestpath as-path ignore
Related Commands	**Command**: **show ip bgp** **Description**: Displays the BGP route entry.
Platform Description	None

5.13 bgp bestpath as-path multipath-relax

	Use this command to enable AS path multipath-relax (only comparing the AS path length) for BGP multipathing load. Use the **no** or **default** form of this command to restore the default setting.
	bgp bestpath as-path multipath-relax
	no bgp bestpath as-path multipath-relax **default bgp bestpath as-path multipath-relax**
Parameter Description	**Parameter** / **Description**
	N/A / N/A
Command Mode	BGP requires that AS path attributes must be the same when calculating equal-cost multipath (ECMP) by default.
Defaults	BGP configuration mode / Scope global configuration mode
Usage Guide	BGP compares AS path attributes in a precise way when selecting the optimal path as ECMP by default. Only paths with same AS path attributes can constitute equal-cost paths. As a result, BGP multipathing load balancing cannot be implemented in an application scenario. After AS path multipath-relax is enabled, only the AS path length is compared, allowing the implementation of BGP multipathing load balancing.
Configuration Examples	The following example enables AS path multipath-relax for BGP multipathing load. FS(config)# router bgp 65530 FS(config-router)# bgp bestpath as-path multipath-relax
Related Commands	**Command** / **Description**
	router bgp / Enables BGP.
	show ip bgp / Displays BGP routing entries.
Platform Description	None

5.14 bgp bestpath compare-confed-aspath

	Use this command to compare the AS path length of the confederation from the same external routes when selecting the optimal path, with smaller AS path in the confederation for higher path priority. Use the no or default form of this command to restore the default setting. **bgp bestpath compare-confed-aspath** **no bgp bestpath compare-confed-aspath** **default bgp bestpath compare-confed-aspath**
Parameter Description	**Parameter** / **Description**
	N/A / N/A
Defaults	The AS path of the EBGP peer routes inside the same confederation is not compared by default when selecting

	the optimal path. Instead, the routing method is implemented.
Command Mode	BGP configuration mode / Scope global configuration mode
Usage Guide	During the selection of the same routing information from the peer of the internal EBGP By default, the AS path of the confederation is not compared. This command is used to compare the AS path of the confederation. Note that if a route contain no AS path of the confederation, it is impossible to implement the AS path comparison for that route.
Configuration Examples	The following example compares the AS path length of the confederation. FS(config)# router bgp 65000 FS(config-router)# bgp bestpath compare-confed-aspath
Related Commands	**Command** / **Description** **show ip bgp** / Displays the BGP route entry. **bgp router-id** / Sets the BGP Device ID.
Platform Description	None

5.15 bgp bestpath compare-routerid

	Use this command to compare the router ID of the same external routes when selecting the optimal path, with smaller router ID for higher path priority. Use the no or default form of this command to restore the default setting. **bgp bestpath compare-routerid** **no bgp bestpath compare-routerid** **default bgp bestpath compare-routerid**
Parameter Description	**Parameter** / **Description** N/A / N/A
Defaults	If two paths received from different EBGP peers have the same path, the first one is considered with higher priority by default.
Command Mode	BGP configuration mode / Scope global configuration mode
Usage Guide	If two paths with identical path attributes are received from different EBGP peers during the selection of the optimal path, we will select the optimal path according to the sequence of receiving the paths by default. You can select the path with smaller Device ID as the optimal path by configuring the following commands.
Configuration	The following example compares the router ID of the same external routes.

Examples	FS(config)# router bgp 65000 FS(config-router)# bgp bestpath compare-routerid
Related Commands	**Command** / **Description** **show ip bgp** / Displays the BGP route entry. **bgp router-id** / Sets the BGP Device ID.
Platform Description	None

5.16 bgp bestpath med confed

	Use this command to compare the MED value of the path of the internal peer from AS confederation during selecting the optimal path. Use the no or default form of this command to restore the default setting. **bgp bestpath med confed [missing-as-worst]** **no bgp bestpath med confed [missing-as-worst]** **default bgp bestpath med confed [missing-as-worst]**
Parameter Description	**Parameter** / **Description** **missing-as-worst** / Sets the priority of the path without MED attribute as the lowest.
Defaults	The MED value of the path of the peer inside the AS confederation is not compared by default when selecting the optimal path.
Command Mode	BGP configuration mode / Scope global configuration mode
Usage Guide	The MED attribute of the path is transferred between the ASs inside the confederation. You may set always comparing this value.
Configuration Examples	The following example compares the MED value of the path of the internal peer. FS(config)# router bgp 65000 FS(config-router)# bgp bestpath med confed
Related Commands	**Command** / **Description** **show ip bgp** / Displays the BGP route entry. **bgp always-compare-med** / Compares the MED value of paths of peers from different ASs when selecting the optimal path. **bgp bestpath med missing-as-worst** / Sets the priority of the path without MED attribute as the lowest when selecting the optimal path. **bgp deterministic-med** / Compares paths of peers from the same AS when selecting the optimal path.
Platform Description	None

5.17 bgp bestpath med missing-as-worst

	Use this command to set the priority of the path without MED attribute as the lowest when selecting the optimal path. Use the no or default form of this command to restore the default setting. **bgp bestpath med missing-as-worst** **no bgp bestpath med missing-as-worst** **default bgp bestpath med missing-as-worst**
Parameter Description	**Parameter** / **Description** N/A / N/A
Defaults	If a path without MED attribute is received, the MED value of the path is 0 by default. Such route has the highest priority according to the above-mentioned rule.
Command Mode	BGP configuration mode / Scope global configuration mode
Usage Guide	The MED value of a path without MED attribute will be 0 by default. For the smaller the MED value, the higher the priority of the path is, the MED value of this path has the highest priority. This command can be used to figure the path without MED attribute has the lowest priority.
Configuration Examples	The following example sets the priority of the path without MED attribute as the lowest. FS(config)# router bgp 65000 FS(config-router)# bgp bestpath medmissing-as-worst
Related Commands	**Command** / **Description** **show ip bgp** / Displays the BGP route entry. **bgp always-compare-med** / Compares the MED value of paths of peers from different ASs when selecting the optimal path. **bgp bestpath med confed** / Sets the priority of the path without MED attribute as the lowest when selecting the optimal path. **bgp deterministic-med** / Compares paths of peers from the same AS when selecting the optimal path.
Platform Description	None

5.18 bgp bestpath multipath-compare-routerid

	Use this command to enable the router ID comparison among multiple BGP paths. Load balancing can be implemented only when multiple paths (same router ID) are from the same device. Use the **no** form of this command to disable the router ID comparison among multiple BGP paths. Use the **default** form of this command to restore the default settings. **bgp bestpath multipath-compare-routerid**
	no bgp bestpath multipath-compare-routerid

	default bgp bestpath multipath-compare-routerid
Parameter Description	**Parameter** / **Description**
	N/A / N/A
Defaults	The router ID comparison among multiple BGP paths is disabled by default.
Command Mode	BGP configuration mode, BGP Scope Global Configuration Mode
Default Level	14
Usage Guide	N/A
Configuration Example	The following example enables the router ID comparison among multiple BGP paths. FS(config)# router bgp 65000 FS(config-router)# bgp bestpath multipath-compare-routerid
Verification	Run the **show running-config** command to display the BGP configuration.

5.19 bgp client-to-client reflection

	Use this command to enable the route reflection function between clients on the device. Use the no or default form of this command disables the route reflection function between clients. **bgp client-to-client reflection** **no bgp client-to-client reflection** **default bgp client-to-client reflection**
Parameter Description	**Parameter** / **Description**
	N/A / N/A
Defaults	This function is enabled without the client for route reflection by default.
Command Mode	BGP configuration mode / Scope global configuration mode
Usage Guide	In general, it is unnecessary to establish the connection relationship between the clients of the route reflector within the cluster, and the route reflector will reflect the route among clients. However, if the full connection relationship is established for all clients, the function for the route reflector to reflect the client route can be disabled. To disable the route reflection function, use the command **no bgp client-to-client reflection**.
	The following example shows how to enable the route reflection function between clients on the device.

Configuration Examples	FS(config)# router bgp 65000 FS(config-router)# no bgp client-to-client reflection
Related Commands	**Command** / **Description** **bgp cluster-id** — Configures the cluster ID of the route reflector. **neighbor route-reflector-client** — Configures the client of the route reflector and configure itself as the route reflector.
Platform Description	None

5.20 bgp cluster-id

	Use this command to configure the cluster ID of the route reflector. Use the no or default form of this command to restore it to the default setting. **bgp cluster-id cluster-id** **no bgp cluster-id** **default bgp cluster-id**
Parameter Description	**Parameter** / **Description** *cluster-id* — Cluster ID of the route reflector, an IP address of up to four bytes or an integer (must be entered in form of IP address)
Defaults	The cluster id is the router-id of the route reflector by default.
Command Mode	BGP configuration mode / Scope global configuration mode
Usage Guide	In general, one group is only configured with one route reflector. In this case, the Device ID of the route reflector can be used to identify this cluster. To increase the redundancy, you can set more than one route reflector within this cluster. In this case, you must configure the cluster ID, so that one route reflector can identify the route update from other route reflectors of this cluster.
Configuration Examples	The following example configures the cluster ID of the route reflector. FS(config)# router bgp 65000 FS(config-router)# bgp cluster-id 10.0.0.1
Related Commands	**Command** / **Description** **bgp client-to-client reflection** — Configures the route reflection between clients. **neighbor route-reflector-client** — Configures the client of the route reflector and configures itself as the route reflector.

Platform Description	None

5.21 bgp confederation identifier

	Use this command to configure the AS confederation identifier. Use the no or default form of this command to restore the default setting. **bgp confederation identifier as-number** **no bgp confederation identifier** **default bgp confederation identifier**
Parameter Description	**Parameter** / **Description** *as-number* / AS confederation identifier in the range from 1 to 65535 In the 10.4(3) or later versions, the 4-byte AS notation is supported, namely, the new range of the new AS notation is from 1 to 4294967295, which is represented as 1 to 65535.65535 in dot mode.
Defaults	There is no confederation identifier by default
Command Mode	BGP configuration mode or BGP Scope Global configuration mode
Usage Guide	The confederation is a measure to reduce the connections of IBGP peers within the AS. One AS is divided into several sub ASs and one unified confederation ID (namely, confederation AS number) is set to constitute these sub ASs into a confederation. For the external confederation, the whole confederation is still considered as one AS, and only the confederation AS number is visible for the external network. Within the confederation, the full IBGP peer connection is still established among the BGP Speakers within the sub AS, and the EBGP connection is established among the BGP Speakers within the sub AS. Despite of the EBGP connections established between the BGP speakers in an AS, the next-hop, MED and local priority information remains unchanged in exchanging the information.
Configuration Examples	The following example configures the AS confederation identifier. FS(config-router)# bgp confederation identifier 65000
Related Commands	**Command** / **Description** **bgp confederation peers** / Adds member AS of the AS confederation.
Platform Description	None

5.22 bgp confederation peers

	Use this command to configure member ASs of the AS confederation. Use the no or default form of this command to restore the default setting. **bgp confederation peers** as-number […as-number]

	no bgp confederation peers as-number […as-number] **default bgp confederation peers** [as-number […as-number]]
Parameter Description	**Parameter** / **Description** *as-number* — Member ASs in the confederation range from 1 to 65535. In the 10.4(3) or later versions, the 4-byte AS notation is supported, namely, the new range of the new AS notation is from 1 to 4294967295, represented as 1 to 65535.65535 in dot mode.
Defaults	There is no confederation member by default.
Command Mode	BGP configuration mode or BGP Scople Global configuration mode
Usage Guide	The confederation is a measure to reduce the connections of BGP peers within the AS. One AS is divided into several sub ASs and one unified confederation ID (namely, confederation AS number) is set to constitute these sub ASs into a confederation. The whole external confederation is still considered as one AS, and only the confederation AS number is visible for the external network. Within the confederation, the full IBGP peer connection is still established among the BGP Speakers within the sub AS, and the EBGP connection is established among the BGP Speakers within the sub AS. Despite of the EBGP connections established between the BGP speakers in an AS, the next-hop, MED and local priority information remains unchanged in exchanging the information. This command is used to specify the member AS of a confederation. This command can configure up to 25 members of a confederation at one time. For more members, enter them for several times.
Configuration Examples	The following example configures member ASs of the AS confederation. FS(config-router)# bgp confederation peers 65000 65100
Related Commands	**Command** / **Description** **bgp confederation identifier** — Configures the confederation identifier.
Platform Description	None

5.23 bgp dampening

	Use this command to enable the routing attenuation and set the attenuation parameters in the address-family or routing configuration mode. Use the no or default form of this command to restore the default setting. **bgp dampening** [half-life [reusing suppressing duration] | route-map name] **no bgp dampening** **default bgp dampening**
Parameter	**Parameter** / **Description**

Description	*half-life*	Half-life period, ranging from 1 to 45 minutes
	reusing	When the penalty value reaches this value, the routing suppression is cancelled. The value ranges from 1 to 10000.
	suppressing	When the penalty value reaches this value, routing is suspended. The value ranges from 1 to 20000.
	duration	Maximum time for routing suppression, ranging from 1 to 255 minutes
	name	Route-map name, apply the routing attenuation to the specified route through the route-map.
Defaults	This function is disabled by default.	
Command Mode	BGP configuration mode, BGP IPv4 unicast address-family configuration mode, BGP IPv4 VRF address-family configuration mode, BGP IPv6 unicast address-family configuration mode, BGP IPv6 VRF address-family configuration mode, BGP L2VPN EVPN address-family configuration mode and BGP Scope configuration mode	
Usage Guide	The **bgp dampening** command is used to suppress unstable EBGP routes and does not take effect to IBGP routes. The BGP uses the penalty value to describe the route stability. A larger penalty value indicates a more unstable route. The penalty value increases by 1000 when route oscillation occurs (upon receiving withdraw packets).The penalty value does not increase when the upper limit is reached. The upper limit is determined based on the configured duration value and calculated using the following formula: Penalty upper limit = 2 ^ (Duration/Half-life) x Reusing. In addition, the penalty upper limit cannot be greater than 20000. Therefore, the duration, half-life, and reusing values need to be adjusted based on the network conditions. The relationship among these parameters are as follows: Half-life ≤ Duration Reusing ≤ Suppressing ≤ Penalty upper limit You can also specify only the half-life value. In this case, the duration value is (half-life x 4), the reusing value is 750, and the suppressing value is 2000. EBGP routes whose penalty value exceeds the suppressing value will be suppressed. Suppressed routes will not be used during BGP route election and will not be advertised to other BGP peers. If route oscillation occurs in suppressed routes, the penalty value will continue to increase until the penalty upper limit is reached. The penalty value of suppressed routes will decrease by a half each time the half-life time passes. When the penalty value decreases to the reusing value, routes whose attribute is update in the last update will participate in BGP route election again. When the penalty value decreases to 0, routes whose attribute is withdraw in the last update will be deleted from the BGP route table.	
Configuration Examples	The following example enables the routing attenuation and set the attenuation parameters. FS(config-router)# bgp dampening 30 1500 10000 120	

	Command	Description
Related Commands	**clear ip bgp dampening**	Clears the BGP suppression and cancels the suppression for the routes.
	show ip bgp dampening dampened-paths	Displays the suppressed route information.
Platform Description	None	

5.24 bgp default ipv4-unicast

	Use this command to set the IPv4 unicast address as the default address family. Use the no or default form of this command to restore the default setting. **bgp default ipv4-unicast** **no bgp default ipv4-unicast** **default bgp default ipv4-unicast**
Parameter Description	**Parameter** / **Description** N/A / N/A
Defaults	The IPv4 unicast address is the default address family.
Command Mode	BGP configuration mode or BGP Scope Global configuration mode
Usage Guide	This command is used to set the default address family of BGP as the IPv4 unicast address.
Configuration Examples	The following example sets the IPv4 unicast address as the default address family. FS(config-router)#bgp default ipv4-unicast
Related Commands	**Command** / **Description** **address-family ipv4** / Enters the IPv4 address mode.
Platform Description	None

5.25 bgp default local-preference

	Use this command to set the default local-preference attribute value. Use the no or default form of this command to restore the default setting. **bgp default local-preference value** **no bgp default local-preference** **default bgp default local-preference**
Parameter Description	**Parameter** / **Description** *value* / Local priority attribute, in the range from 0 to 4294967295

Defaults	The local preference value is 100 by default.
Command Mode	BGP configuration mode or BGP Scope configuration mode.
Usage Guide	The BGP takes the local preference as the foundation to compare with the priority of the path learned from IBGP peers. The larger the local preference value, the higher the priority of the path is. The BGP speaker sends the external route received to the IBGP peers to add the local priority value.
Configuration Examples	The following example sets the default local-preference attribute value. FS(config-router)# bgp default local-preference 200

Related Commands

Command	Description
show ip bgp	Displays the BGP route entry.
bgp always-compare-med	Allows comparing the MED value of the path of the peer from different ASs when electing the optimal path.
bgp bestpath med confed	Allows comparing the MED value of paths of internal peers from AS community when electing the optimal path.
bgp bestpath med missing-as-worst	Allows setting the priority of the path without MED attribute as the lowest when electing the optimal path.

Platform Description	None

5.26 bgp default route-target filter

Use this command to enable the route-target filtering. For the VPNV4 routes, filter the community attributes of the route-target by default. Use the no or default form of this command to disable this function.

bgp default route-target filter

no bgp default route-target filter

default bgp default route-target filter

Parameter Description

Parameter	Description
N/A	N/A

Defaults	This function is enabled by default.
Command Mode	BGP configuration mode, VPNv4/VPNv6 address-family configuration mode, BGP L2VPN EVPN address-family configuration mode or BGP Scope Global configuration mode.
Usage Guide	After receiving the VPNV4 route, use the community attributes list of the route-target to filter and distribute different VRFs. With the no form of this command used, the BGP will receive all VPNV4 routes no matter whether these filtered VPNV4 routes will be received by route-target of local VRF.

	With the PE route-reflector-client configured for the BGP, the VPNV4 route will not be processed through the route-target filtering. In this case, whether the BGP is enabled, the actions are the same without the route-target filtering.
Configuration Examples	The following example enables the route-target filtering. FS(config)# router bgp 65000 FS(config-router)# no bgp default route-target filter
Related Commands	**Command** / **Description** **neighbor route-reflector-client** / Configures the route-reflector-client, and sets itself as the route reflector.
Platform Description	N/A

5.27 bgp deterministic-med

	Use this command to set comparing preferentially the MED values of peer paths from the same AS. By default, the comparison is based on the received order, and the one received the last is compared first. Use the no or default form of this command to restore the default setting. **bgp deterministic med** **no bgp deterministic med** **default bgp deterministic-med**
Parameter Description	**Parameter** / **Description** N/A / N/A
Defaults	This function is disabled by default.
Command Mode	BGP configuration mode or BGP Scope Global configuration mode
Usage Guide	They will be compared with each other according to the sequence the paths are received when the optimal path is selected by default. Execute the following operations in the BGP configuration mode to compare paths of peers from the same AS firstly:
Configuration Examples	The following example sets the comparing preferentially MED values. FS(config-router)# bgp deterministic med
Related Commands	**Command** / **Description** **show ip bgp** / Displays the BGP route entry. **bgp always-compare-med** / Compares the MED value of paths of peers from different ASs when selecting the optimal path. **bgp bestpath med confed** / Sets the priority of the path without MED attribute as the lowest when selecting the optimal path.

	bgp bestpath med missing-as-worst	Compares paths of peers from the same AS when selecting the optimal path.
Platform Description	None	

5.28 bgp enforce-first-as

	Use this command to reject the UPDATE messages whose first AS_PATH path section is not the neighbor-configured AS number. Use the no or default form of this command to disable this function. **bgp enforce-first-as** **no bgp enforce-first-as** **default bgp enforce-first-as**	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	This function is enabled by default.	
Command Mode	BGP configuration mode or BGP Scope Global configuration mode	
Usage Guide	The AS number of the device is put into the path section by default to update the update message.	
Configuration Examples	The following example rejects the UPDATE messages whose first AS_PATH path section is not the neighbor-configured AS number. FS(config-router)# bgp enforce-first-as	
Related Commands	**Command**	**Description**
	show ip bgp	Displays the BGP route entry.
Platform Description	None	

5.29 bgp fast-external-fallover

	When the network interface used in establishing the connection of the directly-connected EBGP peer fails, use this command to establish the BGP session connection quickly. Use the no or default form of this command to disable this function. **bgp fast-external-fallover** **no bgp fast-external-fallover** **default bgp fast-external-fallover**	
Parameter Description	**Parameter**	**Description**
	N/A	N/A

Defaults	This function is enabled by default.
Command Mode	BGP configuration mode or BGP Scope Global configuration mode
Usage Guide	This command takes effect only for the directly-connected EBGP neighbor.
Configuration Examples	The following example creates the fast BGP session. FS(config-router)# bgp faster-external-fallover

Related Commands	**Command**	**Description**
	router bgp	Enables the BGP protocol.

Platform Description	None

5.30 bgp fast-reroute

	Use this command to enable BGP Fast Reroute. Use the no or default form of this command to restore the default setting. **bgp fast-reroute** **no bgp fast-reroute** **default bgp fast-reroute**

Parameter Description	**Parameter**	**Description**
	N/A	N/A

Defaults	This function is disabled by default.
Command Mode	BGP configuration mode/ BGP IPv4 unicast address family configuration mode/ BGP IPv4 VRF address family configuration mode/ BGP scope global configuration mode.
Usage Guide	The BGP Fast Reroute function is supported in the BGP IPv4 unicast address family configuration mode and the BGP IPv4 VRF address family configuration mode. Only one backup route will be generated and the next-hop of this backup route cannot be the same as that of the preferred route. When ECMP is enabled, the FRR cannot generate backup route. When this function is enabled in the BGP IPv4 VRF address family configuration mode, the priority of BGP FRR is lower than that of VPN FRR. So when the VPN FRR is enabled in IPv4 VRF configuration mode, BGP FRR does not take effect unless VPN FRR is unable to calculate the backup route.
Configuration Examples	The following example enables BGP Fast Reroute. FS(config)# router bgp 65530

	FS(config-router)# bgp faster-reroute
Related Commands	**Command** / **Description** N/A / N/A
Platform Description	N/A

5.31 bgp graceful-restart

	Use this command to enable the global BGP graceful restart function. Use the no or default form of this command to disable BGP graceful restart. **bgp graceful-restart** **no bgp graceful-restart** **default bgp graceful-restart**
Parameter Description	**Parameter** / **Description** N/A / N/A
Defaults	By default, BGP graceful restart is enabled so as to help neighbors to perform graceful restart.
Command Mode	BGP configuration mode or BGP Scope Global configuration mode
Usage Guide	The ability of the BGP is advertised and negotiated through the ability field of the Open message. The ability is negotiated during initially setting up the connection. So both sides must reach the consistency of the ability. If it is not supported by any side, this router device will perform the GR incorrectly. With the GR function enabled, the connected Open message will carry the GR ability field to perform the negotiation of the GR ability. To implement the GR correctly, the GR function must be enabled on both sides of the neighbors. This command does not take effect immediately on all BGP connections that are set up successfully. To negotiate the GR ability immediately, you need to restart the BGP connection to make the local device negotiate the GR ability with the Peer again by using the clear ip bgp command. The BGP graceful-restart is used to forward data continuously of the whole network, it requires the device to keep the BGP routing entry valid and forward data continuously when restarting the BGP protocol. Supporting the continuous forwarding during the restarting is related to the hardware ability.
Configuration Examples	The following example enables the graceful restart function of the global BGP. FS(config)# router bgp 500 FS(config-router)# bgp graceful-restart

	Command	Description
Related Commands	**router bgp**	Enables the BGP protocol.
	bgp graceful-restart restart-time	Configures the restart time of the BGP graceful-restart.
Platform Description	N/A	

5.32 bgp graceful-restart disable

	Use this command to disable GR capability of a BGP address family. Use the **no** or **default** form of this command to restore the default setting.	
	bgp graceful-restart disable	
	no bgp graceful-restart disable **default bgp graceful-restart disable**	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	The function is enabled by default.	
Command Mode	BGP configuration mode, IPv4 unicast address family mode, VPNv4 address family mode, VPNv4 address family mode, BGP L2VPN EVPN address-family configuration mode or BGP Scope configuration mode	
Usage Guide	When BGP GR function is enabled, the GR capability for all address families is enabled by default, except for address families that do not support GR capability. After GR capability is enabled, you can use this command in the address family mode to disable the address family's GR capability. The Configuration of this command in BGP mode is effective on IPv4 Unicast address family. When BGP GP function is disabled, GR capability is disabled for all address families.	
Configuration Examples	The following example disables the graceful restart function of the BGP IPv4 address family. FS(config)# router bgp 65000 FS(config-router)# bgp graceful-restart FS(config-router)# address-family ipv4 FS(config-router-af)# bgp graceful-restart disable	
Configuration Examples	**Command**	**Description**
	bgp graceful-restart	Enables BGP's GR capability.
	address-family ipv4	Enters BGP IPv4 address family mode.
Platform Description	N/A	

5.33 bgp graceful-restart restart-time

	Use this command to configure the restart time of the BGP graceful-restart. Use the no or default form of this command to restore the default setting. **bgp graceful-restart restart-time restart-time** **no bgp graceful-restart restart-time** **default bgp graceful-restart restart-time**
Parameter Description	**Parameter** / **Description** *restart-time* / GR Restarter-hoped longest waiting time before re-establishing the connection between the GR Helper and the GR Restarter, in the range from 1 to 3600 in the unit of seconds.
Defaults	The default is 120.
Command Mode	BGP configuration mode or BGP Scope Global configuration mode.
Usage Guide	The restart time is advertised by GR Restarter to GR Helper, it is GR Restarter-hoped longest waiting time before re-establishing the connection between GR Helper and GR Restarter. After this time, if the BGP connection with GR Restarter is not in Established status, GR Helper will consider this BGP session failed and will restore the normal BGP. All the routing of the neighbor will be deleted during this period, affecting the data redistribution. The restart time is advertised in the GR ability field of the BGP Open message. The GR restart time of the two ends of the session is not required to be the same, but it is recommended. This command does not take effect immediately on all BGP connections that are set up successfully. To advertise the newly set restart time to the GR helper, you need to restart the BGP connection to negotiate the GR ability again and advertise the restart time by using the clear ip bgp command. The configured restart time should not be greater than the Hold Time of the BGP peer, if so, the Hold time will be the restart time when the GR ability is advertised to the BGP peer.
Configuration Examples	The following example configures the restart time of the BGP graceful-restart. FS(config)# router bgp 500 FS(config-router)# bgp graceful-restart FS(config-router)# bgp graceful-restart restart-time 150 FS(config-router)# no bgp graceful-restart restart-time
Related Commands	**Command** / **Description** **bgp graceful-restart** / Enables the BGP graceful-restart.
Platform Description	N/A

5.34 bgp graceful-restart stalepath-time

	Use this command to configure the time to help the device keep the route valid when executing the BGP graceful-restart. Use the no or default form of this command to restore the default setting. **bgp graceful-restart stalepath-time stalepath-time time** **no bgp graceful-restart stalepath-time** **default bgp graceful-restart stalepath-time**
Parameter Description	**Parameter** / **Description** *time* / Longest time used to keep the stale route valid after restoring the connection with the neighbors, in the range from 1 to 3600 in the unit of seconds
Defaults	The default is 360.
Command Mode	BGP configuration mode
Usage Guide	This command is configured for the parameters of the GR Helper. The stalepath-time is the longest time of the GR Helper waiting to receive the EOR mark of the Restarter after restoring the connection with the GR Restarter. When the GR Helper detects that the connection with the GR Restarter fails, the original route of the Restarter is marked as the "Stale". However these routes are still used for the routing calculation and forwarding. The GR Helper updates the routes and cancels the "Stale" mark according to route updating information received from the GR Restarter. If routes marked as "Stale" are not updated in the stalepath-time period, they will be deleted. This mechanism is used to avoid failure in convergence of routes when the GR Helper fails to receive the EOR mark of the GR Restarter for a long time.
Configuration Examples	The following example configures the restart time of the BGP graceful-restart. FS(config)# router bgp 500 FS(config-router)# bgp graceful-restart FS(config-router)# bgp graceful-restart stalepath-time 240
Related Commands	**Command** / **Description** **bgp graceful-restart** / Enables the BGP graceful-restart.
Platform Description	N/A

5.35 bgp initial-advertise-delay

	Use this command to configure the delay period before a BGP device sends its initial updates to peers. Use the no form or default form of this command to restore the default setting. **bgp initial-advertise-delay delay-time [startup-time]** **no bgp initial-advertise-delay** **default bgp initial-advertise-delay**

	Use this command to enable the BGP delayed advertisement upon system restart. Thus, the route will be immediately sent after the prefix-list policy is matched. Use the no form or default form of this command to restore the default setting. **bgp initial-advertise-delay prefix-list prefix-list-name** **no bgp initial-advertise-delay prefix-list** **default bgp initial-advertise-delay prefix-list**

Parameter Description

Parameter	Description
delay-time	The delay period, in seconds, before a BGP device sends its updates. The range is from 1 to 600. The default value is 1 second.
startup-time	The time for the BGP device restart. In the period, the neighbor does not send its updates to peers. The range is from 5 to 584,000. The unit is second and the default value is 600 seconds.
prefix-list-name	Name of the prefix-list. It cannot exceed 32 characters.

Defaults

The initial advertisement delay is disabled by default.

Command Mode

BGP configuration mode

Usage Guide

This command is used to configure parameters for delayed neighbor route advertisement during device restart.

delay-time indicates the longest time for sending a route to a neighbor after the BGP neighbor relationship is established. In normal cases, after the neighbor relationship is established, the first route is advertised immediately and subsequent routes are advertised based on the default time. For details, see the neighbor advertisement-interval command. **startup-time** indicates the configurable startup time and starts to count when the configuration command takes effect. Within the time specified by **startup-time**, routes to BGP neighbors are advertised periodically based on **delay-time**. This command can be used to change the route advertisement behavior from the BGP peer to neighbors after device restart.

The prefix-list policy is configured to ensure that partial routes can be normally delivered. The prefix-list policy applies to distributed routes. Matched routes will be normally delivered without being affected by delayed advertisement. For details about the address family scope to which the prefix-list policy applies, see the **neighbor prefix-list** command.

This command is used by the administrator to adjust the BGP route advertisement behavior during device restart based on the hardware conditions, number of neighbors, number of routes, and actual deployment requirements.

Configuration Examples

The following example configures initial delay to 60 seconds within 500 seconds after BGP restart.

```
FS(config)# router bgp 500
FS(config-router)# bgp initial-advertise-delay 60 500
```

Related Commands

Command	Description
bgp graceful-restart	Enables the BGP graceful-restart.

Platform Description

N/A

5.36 bgp log-neighbor-changes

	Use this command to log the BGP status changes without turning on debug. Use the no or default form of this command to disable this function. **bgp log-neighbor-changes** **no bgp log-neighbor-changes** **default bgp log-neighbor-changes**
Parameter Description	**Parameter** / **Description** N/A / N/A
Defaults	This function is enabled by default.
Command Mode	BGP configuration mode or BGP Scope Global configuration mode
Usage Guide	The debug command can also be used to log BGP status changes. But this command may consume many resources.
Configuration Examples	The following example logs the BGP status changes without turning on debug. FS(config-router)# bgp log-neighbor-changes
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol.
Platform Description	None

5.37 bgp maxas-limit

	Use this command to set the maximum number of ASs in the BGP AS-PATH attribute. Use the no or default form of the command to restore the default configuration. **bgp maxas-limit number** **no bgp maxas-limit** **default bgp maxas-limit**
Parameter Description	**Parameter** / **Description** *number* / The maximum number of ASs in the BGP AS-PATH attribute. The range is from 1 to 512.
Defaults	No maximum number of ASs is set by default.
Command Mode	BGP configuration mode/ BGP scope global configuration mode.

Usage Guide	The routes exceeding the AS number limit are discarded directly, After changing the configuration, use the **clear** command to reset the neighbor and make the configuration take effect.
Configuration Examples	The following example sets the maximum number of ASs in the BGP AS-PATH attribute to 100. FS(config-router)# bgp maxas-limit 100
Related Commands	**Command** / **Description** N/A / N/A
Platform Description	N/A

5.38 bgp maximum-prefix

	Use this command to restrict the maximum number of routes in the BGP global or specified VRF. Use the **no** or **default** form of the command to restore the default configuration. **bgp maximum-prefix** *numbers* [**vrf** *vrf-name*] **no bgp maximum-prefix** [**vrf** *vrf-name*] **default bgp maximum-prefix** [**vrf** *vrf-name*]
Parameter Description	**Parameter** / **Description** *vrf-name* / Indicates name of a specific VRF. *numbers* / Indicates number of routes. Range: 1 to 4,294,967,295.
Defaults	The function is disabled by default.
Command Mode	BGP configuration mode/ BGP scope global configuration mode.
Usage Guide	When a route advertisement in an address family causes the current number of BGP routes to exceed the maximum number, a prompt indicating route overflow in the global or specified VRF is displayed, and the BGP global or specified VRF is set to the overflow state. The BGP routing information prefix may be introduced by **redistribute**, from a neighbor or from another VRF. In either case, once the BGP routing information prefix of an address family is introduced, the number of BGP global or specified VRF routes reaches the upper limit, the prefix will not increase and a prompt indicating route overflow in the global or specified VRF is displayed, and the BGP global or specified VRF is set to the overflow state. Run the **show bgp** { *addressfamily* | **all** } **summary** command to check routing information base status. If the address family enters the overflow state because the BGP routing information prefix reaches the upper limit, it can be adjusted by **maximum-prefix**. For IPv4 unicast routes, the routing information prefix may still be received if it is in the overflow state in the following cases: 1) The routing information of the same routing prefix already exists in the routing information base; 2) A route that covers the prefix (except the default route) already exists in the routing information base, and the next hop of the route is different from the next hop of the newly received route prefix.
Configuration Examples	The following example sets the maximum number of routes to 100. FS(config)#router bgp 100

	FS(config-router)#bgp maximum-prefix 100
Related Commands	**Command** / **Description** N/A / N/A
Platform Description	N/A

5.39 bgp mp-error-handle session-retain

	Use this command to retain BGP sessions when BGP protocol detects errors in multi-protocol route attributes. Use the **no** or **default** form of this command to restore the default setting.
	bgp mp-error-handle session-retain [**refresh-timer** *time*]
	no bgp mp-error-handle session-retain **default bgp mp-error-handle session-retain**
Parameter Description	**Parameter** / **Description** **refresh-timer** *time* / Configures the waiting time for auto route recovery. The parameter ranges from 10 to 4294967296 in the unit of seconds. The default is 120.
Defaults	By default, BGP sessions will be interrupted when multi-protocol attribute errors are detected.
Command Mode	BGP configuration mode or BGP Scope Global configuration mode
Usage Guide	By default, when UPDATA packets are received from a neighbor, BGP sessions will be interrupted if multi-protocol attribute errors are detected, which will cause oscillation of routes of all the address families of the neighbor. An address family's route error will affect the stability of routes of other address families. After this command is configured, when an error of the route attribute of an address family occurs, all the route information of the address family and neighbor will be deleted, thus preventing impact on the BGP session and other protocol address families, improving BGP protocol's stability. The option recovery-time is used t configure the waiting time for auto route recovery. To use the option, the neighbor must support the route refreshing capability. After recovery-time expires, BGP will send a route-refresh message to the neighbor's address family and re-notify the neighbor of the address family's all route information.
Configuration Examples	The following example retains BGP sessions when BGP protocol detects errors in multi-protocol route attributes. FS(config-router)# bgp mp-error-handle session-retain
Configuration Examples	**Command** / **Description** N/A / N/A

Platform Description	N/A

5.40 bgp nexthop trigger delay

	Use this command to configure the delay time for updating the routing table when the nexthop of the BGP route changes. Use the no or default form of this command to restore the default setting. **bgp nexthop trigger delay delay-time** **no bgp nexthop trigger delay** **default bgp nexthop trigger delay**	
Parameter Description	**Parameter**	**Description**
	delay-time	Delay time for updating the routing table when the nexthop changes, in the range from 0 to 100 in the unit of seconds
Defaults	The default is 5.	
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, BGP L2VPN EVPN address family configuration mode, BGP VPNv4/VPNv6 address family configuration mode or BGP Scope configuration mode.	
Usage Guide	This command is used to configure the delay time for updating the routing table when the nexthop changes, it takes effect when the bgp nexthop trigger enable switch is opened.	
Configuration Examples	The following example retains BGP sessions when BGP protocol detects errors in multi-protocol route attributes. FS(config-router)# bgp nexthop trigger delay 30	
Related Commands	**Command**	**Description**
	bgp nexthop trigger enable	Enables the nexthop trigger.
Platform Description	None	

5.41 bgp nexthop trigger enable

	Use this command to enable the nexthop trigger update function. Use the no or default form of this command to disable this function. **bgp nexthop trigger enable** **no bgp nexthop trigger enable** **default bgp nexthop trigger enable**	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	This function is enabled by default.	

Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address-family configuration mode, BGP IPv4/IPv6 VRF address-family configuration mode, BGP L2VPN EVPN address family configuration mode, BGP VPNv4/VPNv6 address-family configuration mode or BGP Scope configuration mode.	
Usage Guide	This command is used to enable the nexthop trigger update function.	
Configuration Examples	The following example enables the nexthop trigger update function. FS(config-router)# bgp nexthop trigger enable	
Related Commands	**Command**	**Description**
	Bgp nexthop trigger delay	Sets the delay time for updating the routing table when the nexthop changes.
Platform Description	None	

5.42 bgp notify unsupport-capability

	Use this command to enable the neighbor address family capability detection function. Use the **no** or **default** form of this command to restore the default setting.	
	bgp notify unsupport-capability	
	no bgp notify unsupport-capability **default bgp notify unsupport-capability**	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	This function is disabled by default.	
Command Mode	BGP configuration mode or BGP Scope Global configuration mode	
Usage Guide	When BGP neighbor address family capability negotiation is not fully consistent, neighbors can still be connected. After this command is configured, when an address family capability supported by the local device is not supported by the neighbor device, Notification packet that carries the address family that does not support the capability will be send.	
Configuration Examples	The following example enables the neighbor address family capability detection function. FS(config)# router bgp 65000 FS(config-router)# bgp notify unsupport-capability	
Configuration Examples	**Command**	**Description**
	router bgp	Enables BGP protocol.
Platform Description	N/A	

5.43 bgp redistribute-internal

	Use this command to control BGP whether to allow redistributing routes learned from IBGP, such as RIP, OSPF and ISIS, to the IGP protocol. Use the no or default form of this command to disable this function. **bgp redistribute-internal** **no bgp redistribute-internal** **default bgp redistribute-internal**
Parameter Description	**Parameter** / **Description** N/A / N/A
Defaults	IBGP routes are allowed by default to be redistributed to the IGP protocol.
Command Mode	BGP configuration mode, IPv4/IPv6 Unicast address family configuration mode, IPv4/IPv6 VRF address family configuration mode or BGP Scope configuration mode.
Usage Guide	This command is used to control whether IBGP routes are allowed to be redistributed to the IGP protocol.
Configuration Examples	The following example enables the BGP to learn the redistributing routes from IBGP. FS(config-router)# bgp redistribute-internal
Related Commands	**Command** / **Description** **redistribute** / Redistributes routes learned from other protocols.
Platform Description	None

5.44 bgp router-id

	Use this command to configure the ID-IP address of the device. Use the no or default form of this command to restore the default setting. **bgp router-id ip-address** **no bgp router-id** **default bgp router-id**
Parameter Description	**Parameter** / **Description** *ip address* / IP address
Defaults	The loop-back interface of the device is selected preferentially by default. If it does not exist, the device route-id of the device is used.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 VRF address family configuration mode or BGP Scope Global configuration mode.
Usage Guide	This command is used to configure IP address, the ID of the device when running the BGP protocol.
Configuration	The following example configures the ID-IP address of the device.

Examples	FS(config-router)# bgp router-id 10.0.0.1	
Related Commands	**Command**	**Description**
	show ip bgp dampening dampened-paths	Displays the suppressed routing information.
	bgp dampening	Enables the route dampening function and sets dampening parameters.
Platform Description	None	

5.45 bgp scan-rib disable

	Use this command to update the routing table by event triggering. Use the no or default form of this command to restore the default setting. **bgp scan-rib disable** **no bgp scan-rib disable** **default bgp scan-rib disable**	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	Timely scan and update is enabled by default.	
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address-family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, BGP VPNv4/VPNv6 address family configuration mode, BGP L2VPN EVPN address family configuration mode and BGP Scope configuration mode.	
Usage Guide	BGP provides two route update mechanisms: regular-scanning update and event-triggering update. Regular-scanning update indicates that BGP uses an internal timer to start scanning regularly and update the routing table. Event-triggering update indicates that BGP starts scanning and updates the routing table when the BGP configuration commands are changed due to user configuration or the next hop of a BGP route changes.	
Configuration Examples	The following example configures the timely scan for the BGP protocol. FS(config-router)# bgp scan-rib disable	
Related Commands	**Command**	**Description**
	bgp scan-time	Configures the interval for the BGP timely scan.
Platform Description	None	

5.46 bgp scan-time

	Use this command to configure the interval for the BGP timely scan. Use the no or default form of this command to restore the default setting. **bgp scan-time time** **no bgp scan-time** **default bgp scan-time**	
Parameter	**Parameter**	**Description**

Description	*time*	Interval of the timely scan, in the range from 5 to 60 in the unit of seconds
Defaults	The default is 60.	
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, BGP VPNv4/VPNv6 address family configuration mode, or BGP Scope configuration mode.	
Usage Guide	This command is used to configure the interval for the BGP timely scan; it takes effect when bgp scan-rib enable is configured.	
Configuration Examples	The following example configures the interval for the BGP timely scan. FS(config-router)# bgp scan-time 30	
Related Commands	**Command**	**Description**
	bgp scan-rib enable	Enables timely scan of the routing table by BGP.
Platform Description	None	

5.47 bgp tcp-source-check disable

	Use this command to configure BGP's TCP source check function. Use **no** or **default** form of this command to disable this function.	
	bgp tcp-source-check disable	
	no bgp tcp-source-check disable **default bgp tcp-source-check disable**	
Parameter Description	**Parameter**	**Description**
	-	-
Defaults	This function is enabled by default.	
Command Mode	BGP configuration mode or BGP Scope Global configuration mode	
Usage Guide	After TCP source check function is disabled, all TCP connection requests will be received. After TCP connection is established, if no neighbor peer is configured on the local device, Notification packet will be send to refuse the BGP connection.	
Configuration Examples	The following example configures BGP's TCP source check function. FS(config)# router bgp 65000 FS(config-router)# bgp tcp-source-check disable	
Configuration	**Command**	**Description**

Examples		
	router bgp	Enables BGP protocol.
Platform Description	N/A	

5.48 bgp timer accuracy-control

	Use this command to configure BGP's internal timer accuracy control. Use **no** or **default** form of this command to restore the default setting.	
	bgp timer accuracy-control	
	no bgp timer accuracy-control **default bgp timer accuracy-control**	
Parameter Description	**Parameter**	**Description**
	-	-
Defaults	This function is disabled by default.	
Command Mode	BGP configuration mode	
Usage Guide	By default, a deviation from the given time will occur on the BGP protocol's timer to prevent concurrent overtime of many timers. You can use this command to configure BGP protocol's timer to strictly implement the given time. It is recommended disabling this function unless necessary.	
Configuration Examples	The following example configures BGP's internal timer accuracy control. FS(config)# router bgp 65000 FS(config-router)# bgp timer accuracy-control	
Configuration Examples	**Command**	**Description**
	router bgp	Enables BGP protocol.
Platform Description	N/A	

5.49 bgp update-delay

	Use this command to set the maximum delay time of the BGP Speaker before sending the first updating information to neighbors. The no or default form of the command restores it to the default value. During the BGP **graceful-restart, this command is used to update the delay time.** **bgp update-delay delay-time** **no bgp update-delay**

	default bgp update-delay
Parameter Description	**Parameter** / **Description** *delay-time* / Maximum delay time of the BGP Speaker before sending its route updating information, in the range from 0 to 3600 in the unit of seconds, 120 seconds by default. For BGP graceful-restart, it is the maximum time of waiting to receive the EOR message of all neighbors, in the range from 1 to 3600 in the unit of seconds.
Defaults	The default is 120.
Command Mode	BGP configuration mode or BGP Scope Global configuration mode
Usage Guide	With the BGP starting up, it first waits some time to connect with its neighbors, and then sends the updating message to these neighbors. After connecting with neighbors, the BGP does not send the updating message to them immediately, but waits some time to receive the updating routing message from all neighbors and then performs routing optimization calculation and finally advertises the route updating message to its neighbors, which improves the convergence time and reduces the calculation consumption. If the software sends the route updating information to its neighbors immediately, it may send the information again when it receives more optimized routes from other neighbors. The **bgp update-delay** command is used to adjust the initial waiting time of the software, which is the maximum time, from establishing the connection with the first neighbor to performing the routing optimization calculation and sending the route advertisement. When the BGP graceful-restart is enabled, this command is also used to set the maximum waiting time to receive EOR messages from all neighbors. You can increase this value if there are many neighbors or the routing information of the neighbors is huge. If the number of neighbors is 100 and the average amount of routes is 5000, the update sending time that each neighbor completes all the routing is 1 second, then the update of all the routing needs 100 seconds; if the number of neighbors increases to 200, the Update Delay time can be set to 240 seconds, ensuring that all the routing can be updated with the Update Delay period. The specific time is also related to data transmission rate.
Configuration Examples	The following example sets the update-delay time to 200 seconds. FS(config)# router bgp 500 FS(config-router)# bgp graceful-restart FS(config-router)# bgp update-delay 200
Related Commands	**Command** / **Description** **bgp graceful-restart** / Enables the BGP graceful-restart.
Platform Description	None

5.50 clear bgp all

	Use this command to reset all BGP address-families. The content to be reset depends on the further parameters . clear bgp all [as number] [soft] [in | out]
Parameter Description	

Parameter	Description
none parameter	Resets peer sessions in all address-families.
as-number	Resets sessions with all members in the specified AS. In the 10.4(3) or later versions, the 4-byte AS notation is supported, namely, the new range of the new AS notation is from 1 to 4294967295, represented as 1 to 65535.65535 in dot mode.
in	Resets the received routing information.
out	Resets the redistributed routing information.
soft	Soft-resets all routing information received/sent from/to the specified peer.
soft in	Soft-resets the received routing information.
soft out	Soft-resets the distributed routing information.

Defaults	N/A
Command Mode	Privileged EXEC mode
Usage Guide	This command is used to reset sessions of all supported address-families, including the vrf session in every address-family.
Configuration Examples	N/A
Related Commands	

Command	Description
clear bgp ipv4 unicast	Resets the IPv4 unicast address-family.

Platform Description	None

5.51 clear bgp all peer-group

	Use this command to reset BGP's specific peer group. The reset content is determined by further parameters.
	clear bgp all peer-group *peer-group-name* [**soft**] [**in** | **out**]
Parameter Description	

Parameter	Description
peer-group-name	Resets a specific peer group.
in	Resets received route information.
out	Resets allocated route information.
soft	Soft-resets received and sent route information.

	soft in	Soft-resets received route information.
	soft out	Soft-resets allocated route information.
Defaults	-	
Command Mode	Privileged EXEC mode	
Usage Guide	This command will reset replies of all supported address families, including reply connection included in vrf in each address family.	
Configuration Examples	-	
Configuration Examples	**Command**	**Description**
	clear bgp ipv4 unicast	Resets BGP's IPv4 unicast address families.
Platform Description	-	

5.52 clear bgp all update-group

	Use this command to reset sessions of all members in an update-group. **clear bgp all update-group** [*update-group-index* | *peer-address*] [**soft**] [**in** | **out**]	
Parameter Description	**Parameter**	**Description**
	update-group-index	Specifies the index of an update-group, in which the sessions of members need to be reset.
	peer-address	Specifies the update-group, to which a peer whose session needs to be reset belongs.
	-	Resets BGP sessions directly if no option is carried.
	in	Resets received routing information.
	out	Resets distributed routing information.
	soft	Soft-resets sent and received routing information.
	soft in	Soft-resets received routing information.
	soft out	Soft-resets distributed routing information.
Command Mode	Privileged EXEC mode	
Default Level	14	

Usage Guide	This command is used to reset BGP sessions of all members in an update-group.
Configuration Example	The following example resets routing information received by all peers in an update group to which the peer with the IP address of 1.1.1.1 belongs. FS# clear bgp all update-group 1.1.1.1 in

5.53 clear bgp ipv4 unicast

	Use this command to reset BGP IPv4 unicast address families. The reset content is determined by further parameters.
	clear bgp ipv4 unicast [**vrf** *vrf-name*] { ***** | *as-number* | *peer-address* } [**soft**] [**in** | **out**]

Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name
	*	Resets all peer group sessions under address families.
	as-number	Resets sessions with all members in the specified AS.
	peer-address	Resets sessions with the specified peer.
	in	Resets received route information.
	out	Resets allocated route information.
	soft	Soft-resets received and sent route information.
	soft in	Soft-resets received route information.
	soft out	Soft-resets allocated route information.

Defaults	N/A
Command Mode	Privileged EXEC mode
Usage Guide	This command is the same as **clear ip bgp** in terms of the function and parameters.
Configuration Examples	N/A

Configuration Examples	**Command**	**Description**
	N/A	N/A

Platform Description	N/A

5.54 clear bgp ipv4 unicast dampening

	Use this command to clear the flap information and disable route dampening. **clear bgp ipv4 unicast [vrf vrf-name] dampening [ip-address [mask]]**
Parameter Description	

Parameter	Description
vrf-name	VRF name.
-	Clears the flap information of all routes.
address	IP address
mask	Mask

Defaults	N/A
Command Mode	Privileged EXEC mode
Usage Guide	This command is used to clear the BGP route dampening information and release suppressed routes. This command can be used to restart the BGP route dampening.
Configuration Examples	The following example clears the flap information and disables route dampening. FS# clear ip bgp dampening 192.168.0.0 255.255.0.0
Related Commands	

Command	Description
show ip bgp dampening dampened-paths	Displays the suppressed routing information.
bgp dampening	Enables the route dampening and sets the dampening parameters.

Platform Description	None

5.55 clear bgp ipv4 unicast external

	Use this command to reset all EBGP connections. **clear bgp ipv4 unicast [vrf vrf-name] external [soft] [in | out]**
Parameter Description	

Parameter	Description
vrf-name	VRF name.
in	Resets received route information.
out	Resets allocated route information.
soft	Soft-resets all routing information received/sent from/to the specified peer.
soft in	Soft-resets the received routing information.
soft out	Soft-resets the distributed routing information.

Defaults	N/A
Command Mode	Privileged EXEC mode

Usage Guide	This command is used to reset the specified external BGP connection.
Configuration Examples	The following example resets all EBGP connections. FS# clear bgp ipv4 unicast external in
Related Commands	**Command** / **Description** **clear ip bgp** / Resets the BGP session. **show ip bgp neighbors** / Displays the neighbor information.
Platform Description	None

5.56 clear bgp ipv4 unicast flap-statistics

	Use this command to clear the route flap information. clear bgp ipv4 unicast [vrf vrf-name] flap-statistics [address [mask]]
Parameter Description	**Parameter** / **Description** *vrf-name* / VRF name. - / Clears all route flap information *address* / IP address *mask* / Mask
Defaults	N/A
Command Mode	Privileged EXEC mode
Usage Guide	This command can be used only to clear the statistics of unsuppressed routes. It does not release the suppressed routes. To clear all route statistics and release the suppressed routes, run the **clear ip bgp dampening** command.
Configuration Examples	The following example clears the route flap information. FS# clear bgp ipv4 unicast flap-statistics
Related Commands	**Command** / **Description** **bgp dampening** / Enables the route dampening function and sets dampening parameters. **show ip bgp** / Displays the BGP route entry.
Platform Description	None

5.57 clear bgp ipv4 unicast peer-group

	Use this command to reset the session with all members in the peer group. clear bgp ipv4 unicast [vrf vrf-name] peer-group peer-group-name [soft] [in | out]
Parameter Description	**Parameter** / **Description** ***vrf-name*** / VRF name

	peer-group-name	Name of the peer group
	in	Resets received route information.
	out	Resets allocated route information.
	soft	Soft-resets all routing information received/sent from/to the specified peer.
	soft in	Soft-resets for the received routing information.
	soft out	Soft-resets the distributed routing information.
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	This command resets the BGP session with all members in the peer group.	
Configuration Examples	The following example resets the session with all members in the peer group. FS# clear bgp ipv4 unicast peer-group my-group in	
Related Commands	**Command**	**Description**
	clear ip bgp	Resets the BGP session.
	show ip bgp	Displays the BGP route entry.
Platform Description	None	

5.58 clear bgp ipv4 unicast table-map

	Use this command to update the table-map setting under the IPv4 unicast address family of BGP.	
	clear bgp ipv4 unicast [**vrf** *vrf-name*] **table-map**	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name
Defaults	-	
Command Mode	Privileged EXEC mode	
Usage Guide	Re-apply table-map setting and update allocated core route table information.	
Configuration Examples	-	
Parameter Description	**Command**	**Description**

	clear ip bgp	Resets BGP's IPv4 unicast address families.
Platform Description	-	

5.59 clear bgp ipv4 unicast update-group

Use this command to reset sessions of all members in an update-group in the IPv4 unicast address family.

clear bgp ipv4 unicast [**vrf** *vrf-name*] **update-group** [*update-group-index* | *peer-address*] [**soft**] [**in** | **out**]

Parameter Description

Parameter	Description
vrf-name	Specifies the name of a VRF instance. A global VRF instance is used if no VRF instance name is entered.
update-group-index	Specifies the index of an update-group, in which the sessions of members need to be reset.
peer-address	Specifies the update-group, to which a peer whose session needs to be reset belongs.
-	Resets BGP sessions directly if no option is carried.
in	Resets received routing information.
out	Resets distributed routing information.
soft	Soft-resets sent and received routing information.
soft in	Soft-resets received routing information.
soft out	Soft-resets distributed routing information.

Command Mode Privileged EXEC mode

Default Level 14

Usage Guide This command is used to reset BGP sessions of all members in an update-group in the IPv4 unicast address family.

Configuration Example The following example resets routing information received by all peers in an update group to which the peer with the IP address of 1.1.1.1 in the IPv4 unicast address family belongs.

```
FS# clear bgp ipv4 unicast update-group 1.1.1.1 in
```

5.60 clear bgp ipv6 unicast

	Use this command to reset BGP's IPv6 unicast address families.	
	clear bgp ipv6 unicast [**vrf** *vrf-name*] { * | *as-number* | *peer-address* } [**soft**] [**in** | **out**]	
Parameter Description	**Parameter**	**Description**

	vrf-name	VRF name
	*	Resets all peer group sessions under address families.
	as-number	Resets sessions with all members in the specified AS. In 10.4(3) or a later version, adds support for 4-byte AS numbers. The new AS number ranges from 1 to 4294967295, or 1 and 65535.65535 in the dotted mode.
	peer-address	Resets sessions with the specified peer.
	in	Resets received routing information.
	out	Resets distributed routing information.
	soft	Soft-resets received and sent route information.
	soft in	Soft-resets received route information.
	soft out	Soft-resets allocated route information.
Defaults	-	
Command Mode	Privileged EXEC mode	
Usage Guide	The function is similar with **clear bgp ipv4 unicast,** but applies to different address families.	
Configuration Examples	-	
Configuration Examples	**Command**	**Description**
	clear bgp ipv4 unicast	Resets BGP's IPv4 unicast address families.
Platform Description	-	

5.61 clear bgp ipv6 unicast dampening

	Use this command to clear flap information and disable route dampening.	
	clear bgp ipv6 unicast [**vrf** *vrf-name*] **dampening** [*ip-address* [*mask*]]	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name
	-	Clears all routes' flap information.
	ip-address	IP address
	mask	Mask code
Command	Privileged EXEC mode	

Mode	
Usage Guide	You can use this command to clear BGP's route flap information and disable route dampening. The command can restart BGP's route flap.
Configuration Examples	The following example clears flap information and disables route dampening.
Configuration Examples	**Command** / **Description**
	bgp dampening / Enables the route dampening function and sets dampening parameters.
Platform Description	-

5.62 clear bgp ipv6 unicast external

	Use this command to reset all EBGP connection of IPv6 unicast address families.
	clear bgp ipv6 unicast [**vrf** *vrf-name*] **external** [**soft**] [**in** | **out**]
Parameter Description	**Parameter** / **Description**
	vrf-name / VRF name
	in / Resets received routing information.
	out / Resets distributed routing information.
	soft / Soft-resets received and sent route information.
	soft in / Soft-resets received route information.
	soft out / Soft-resets allocated route information.
Defaults	-
Command Mode	Privileged EXEC mode
Usage Guide	You can use this command to reset all the specified external BGP connection.
Configuration Examples	The following example resets all EBGP connection of IPv6 unicast address families. FS# clear bgp ipv6 unicast external in
Configuration Examples	**Command** / **Description**
	clear ip bgp / Resets BGP sessions.

	show ip bgp neighbors	Displays BGP neighbors' information.
Platform Description	-	

5.63 clear bgp ipv6 unicast flap-statistics

	Use this command to clear IPv6 unicast address families' route flap statistics.	
	clear bgp ipv6 unicast [**vrf** *vrf-name*] **flap-statistics** [*address* [*mask*]]	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name
	-	Clears all route information's flap information.
	address	IP address
	mask	Mask code
Defaults	-	
Command Mode	Privileged EXEC mode	
Usage Guide	This command can only clear statistics of routes that are not damped and will not relieve damped routes. To clear statistics of all route information and relieve damped routes, use the **clear bgp ipv4 unicast dampening** command.	
Configuration Examples	The following example clears IPv6 unicast address families' route flap statistics. FS# clear bgp ipv6 unicast flap-statistics	
Configuration Examples	**Command**	**Description**
	bgp dampening	Enables the route dampening function and sets dampening parameters.
	show ip bgp	Displays BGP route entries.
Platform Description	-	

5.64 clear bgp ipv6 unicast peer-group

	Use this command to reset sessions with all members in the peer group.
	clear bgp ipv6 unicast [**vrf** *vrf-name*] **peer-group** *peer-group-name* [**soft**] [**in** | **out**]
Parameter Description	**Parameter** / **Description**
	vrf-name / VRF name
	peer-group-name / Peer group name
	in / Resets received routing information.
	out / Resets distributed routing information.
	soft / Soft-resets received and sent route information.
	soft in / Soft-resets received route information.
	soft out / Soft-resets allocated route information.
Defaults	-
Command Mode	Privileged EXEC mode
Usage Guide	Use this command to reset BGP sessions with all members in the peer group.
Configuration Examples	The following example resets sessions with all members in the peer group. FS# clear bgp ipv6 unicast peer-group my-group in
Configuration Examples	**Command** / **Description**
	clear ip bgp / Resets BGP sessions.
	show ip bgp / Displays BGP route entries.
Platform Description	-

5.65 clear bgp ipv6 unicast table-map

	Use this command to update the table-map setting under the IPv6 unicast address family of BGP.
	clear bgp ipv6 unicast [**vrf** *vrf-name*] **table-map**
Parameter Description	**Parameter** / **Description**
	vrf-name / VRF name
Defaults	-

Command Mode	Privileged EXEC mode
Usage Guide	-
Configuration Examples	-
Configuration Examples	**Command** / **Description**
	clear ip bgp / Resets BGP's IPv4 unicast address families.
Platform Description	-

5.66 clear bgp ipv6 unicast update-group

	Use this command to reset sessions of all members in an update-group in the IPv6 unicast address family. **clear bgp ipv6 unicast** [**vrf** *vrf-name*] **update-group** [*update-group-index* | *neighbor-address*] [**soft**] [**in** | **out**]
Parameter Description	**Parameter** / **Description**
	vrf-name / Specifies the name of a VRF instance. A global VRF instance is used if no VRF instance name is entered.
	update-group-index / Specifies the index of an update-group, in which the sessions of members need to be reset.
	neighbor-address / Specifies the update-group, to which a peer whose session needs to be reset belongs.
	- / Resets BGP sessions directly if no option is carried.
	in / Resets received routing information.
	out / Resets distributed routing information.
	soft / Soft-resets sent and received routing information.
	soft in / Soft-resets received routing information.
	soft out / Soft-resets distributed routing information.
Command Mode	Privileged EXEC mode
Default Level	14
Usage Guide	This command is used to reset BGP sessions of all members in an update-group in the IPv6 unicast address family.

Configuration Example	The following example resets routing information received by all peers in an update group to which the peer with the IP address of 1111::1111 in the IPv6 unicast address family belongs. FS# clear bgp ipv6 unicast update-group 1111::1111 in

5.67 clear bgp l2vpn evpn

	Use this command to reset BGP EVPN address families.	
	clear bgp l2vpn evpn { ***** | *as-number* | *neighbor-address* } [**soft**] [**in** | **out**]	
Parameter Description	**Parameter**	**Description**
	*	Resets all peer group sessions under address families.
	as-number	Resets sessions with all members in the specified AS. In 10.4(3) or a later version, adds support for 4-byte AS numbers. The new AS number ranges from 1 to 4294967295, or 1 and 65535.65535 in the dotted mode.
	neighbor-address	Resets sessions with the specified peer.
	in	Resets received route information.
	out	Resets allocated route information.
	soft	Soft-resets received and sent route information.
	soft in	Soft-resets received route information.
	soft out	Soft-resets allocated route information.
Defaults	-	
Command Mode	Privileged EXEC mode	
Usage Guide	The function is similar with **clear bgp ipv4 unicast,** but applies to different address families.	
Configuration Examples	-	
Configuration Examples	**Command**	**Description**
	clear bgp ipv4 unicast	Resets BGP's IPv4 unicast address families.
Platform Description	-	

5.68 clear bgp l2vpn evpn dampening

	Use this command to clear flap information and disable route dampening.	
	clear bgp l2vpn evpn dampening	
Parameter Description	**Parameter**	**Description**
	N/A	
Defaults	-	
Command Mode	Privileged EXEC mode	
Usage Guide	You can use this command to clear BGP's route flap information and relieve damped routes. The command can restart BGP's route flap.	
Configuration Examples	The following example clears flap information and disables route dampening. FS# clear bgp l2vpn evpn dampening	

Platform Description N/A

5.69 clear bgp l2vpn evpn external

	Use this command to reset all EBGP connection of BGP EVPN address families.	
	clear bgp l2vpn evpn external [**soft**] [**in** | **out**]	
Parameter Description	**Parameter**	**Description**
	in	Resets received route information.
	out	Resets allocated route information.
	soft	Soft-resets received and sent route information.
	soft in	Soft-resets received route information.
	soft out	Soft-resets allocated route information.
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	You can use this command to reset all the specified external BGP connection.	
Configuration Examples	The following example resets all EBGP connection of L2VPN EVPN address families. FS# clear bgp l2vpn evpn external in	

Platform Description	N/A

5.70 clear bgp l2vpn evpn flap-statistics

	Use this command to clear BGP EVPN address families' route flap statistics.	
	clear bgp l2vpn evpn flap-statistics	
Parameter Description	**Parameter**	**Description**
	N/A	
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	This command can only clear statistics of routes that are not damped and will not relieve damped routes. To clear statistics of all route information and relieve damped routes, use the **clear bgp l2vpn evpn dampening** command.	
Configuration Examples	The following example clears L2VPN EVPN address families' route flap statistics. FS# clear bgp l2vpn evpn flap-statistics	
Platform Description	N/A	

5.71 clear bgp l2vpn evpn peer-group

	Use this command to reset sessions of all members in the peer group.	
	clear bgp l2vpn evpn peer-group *peer-group-name* [**soft**] [**in** | **out**]	
Parameter Description	**Parameter**	**Description**
	peer-group-name	Peer group name
	in	Resets received route information.
	out	Resets allocated route information.
	soft	Soft-resets received and sent route information.
	soft in	Soft-resets received route information.
	soft out	Soft-resets allocated route information.
Defaults	N/A	
Command	Privileged EXEC mode	

Mode	
Usage Guide	Use this command to reset BGP sessions of all members in the peer group.
Configuration Examples	The following example displays that the L2VPN EVPN address family soft-resets received route information of all members in the peer group my-group. FS# clear bgp l2vpn evpn peer-group my-group in
Platform Description	N/A

5.72 clear bgp l2vpn evpn update-group

	Use this command to reset sessions of all members in an update-group of L2VPN EVPN address family. **clear bgp l2vpn evpn update-group** [*update-group-index* | peer-*address*] [**soft**] [**in** | **out**]

Parameter Description	**Parameter**	**Description**
	update-group-index	Specifies the index of an update-group, in which the sessions of members need to be reset.
	peer-address	Specifies the update-group, to which a peer whose session needs to be reset belongs.
	-	Resets BGP sessions directly if no option is carried.
	in	Resets received routing information.
	out	Resets distributed routing information.
	soft	Soft-resets sent and received routing information.
	soft in	Soft-resets received routing information.
	soft out	Soft-resets distributed routing information.

Command Mode	Privileged EXEC mode
Default Level	14
Usage Guide	This command is used to reset BGP sessions of all members in an update-group of L2VPN EVPN address family.
Configuration Example	The following example resets routing information received by all peers in an update group of L2VPN EVPN address family to which the peer with the IP address of 1.1.1.1 belongs. FS# clear bgp l2vpn evpn update-group 1.1.1.1 in

5.73 clear evpn conflict mac

	Use this command to clear MAC information and other statistics of conflicts occurring in EVPN. **clear evpn conflict mac** [*vni-id*]	
Parameter Description	**Parameter**	**Description**
	vni-id	Clears MAC information and other statistics of conflicts occurring on a specified L2VNI.
Command Mode	Privileged EXEC mode	
Default Level	14	
Usage Guide	This command is used to clear conflict MAC information and re-advertise the EVPN routes corresponding to the conflict MAC.	
Configuration Example	The following example clears all conflict MAC information. FS# clear evpn conflict mac	

5.74 clear ip bgp

	Use this command to reset the BGP session. clear ip bgp [vrf vrf-name] { * | as-number | peer-address } [soft] [in | out]	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name.
	*	Resets all the current BGP sessions and the OVERFLOW status of BGP ipv4 unicast address family.
	address	Resets the BGP session with the specified peer.
	as number	Resets sessions with all members in the specified AS. In the 10.4(3) or later versions, the 4-byte AS notation is supported, namely, the new range of the new AS notation is from 1 to 4294967295, represented as 1 to 65535.65535 in dot mode.
	in	Reset the received routing information.
	out	Reset the distributed routing information.
	soft	Soft-reset all routing information received/sent from/to the specified peer
	soft in	Soft-reset the received routing information.
	soft out	Soft-reset the distributed routing information.
Defaults	N/A	
Command Mode	Privileged EXEC mode	

Usage Guide	At any time, once the routing policy or BGP configuration changes, an effective way must be available to implement the new routing policy or configuration. Traditional measure is to close the BGP connection and establish a new one. This product supports implementing a new routing strategy without closing the BGP session connection by soft-resetting BGP. For the peer that does not support the route refresh function, you may run the **neighbor soft-reconfiguration inbound** command to keep a copy of original routing information of every specified BGP peer on the local BGP speaker. This will consume some resources. You can use the **show ip bgp neighbors** command to see whether the BGP peer supports the route refresh function. If it is supported, you need not to execute the **neighbor soft-reconfiguration inbound** command when the inbound routing strategy changes. All connected BGP routers must support the route refresh function to execute this command. This product supports the route refresh function.
Configuration Examples	The following example resets the BGP session. FS# clear bgp ipv4 unicast *
Related Commands	**Command** / **Description** **neighbor soft-reconfiguration inbound** — (Optional) Restarts the BGP session and reserves the unchanged route information sent by the BGP peer (group). **show ip bgp** — Displays the BGP route entry.
Platform Description	None

5.75 clear ip bgp dampening

	Use this command to clear the dampening information and disable route dampening. clear ip bgp [vrf vrf-name] dampening [ip-address [mask]]
Parameter Description	**Parameter** / **Description** *vrf-name* — VRF name *address* — IP address *mask* — Mask
Defaults	N/A
Command Mode	Privileged EXEC mode
Usage Guide	This command is used to clear the BGP route flap information and disable route dampening. This command can be used to restart BGP route dampening.
Configuration Examples	The following example clears the dampening information and disables route dampening. FS# clear ip bgp dampening 192.168.0.0 255.255.0.0

	Command	Description
Related Commands	**show ip bgp dampening dampened-paths**	Displays the suppressed routing information.
	bgp dampening	Enables the route dampening function and sets dampening parameters.
Platform Description	None	

5.76 clear ip bgp external

	Use this command to reset all EBGP connections. clear ip bgp [vrf vrf-name] external [soft] [in | out]	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name.
	in	Reset the received routing information.
	out	Reset the distributed routing information.
	soft in	Soft-resets the received routing information.
	soft out	Soft-resets the distributed routing information.
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	This command is used to reset the specified external BGP connection.	
Configuration Examples	The following example resets all EBGP connections. FS# clear ip bgp external in	
Related Commands	**Command**	**Description**
	clear ip bgp	Resets the BGP session.
	show ip bgp neighbors	Displays the neighbor information.
Platform Description	None	

5.77 clear ip bgp flap-statistics

	Use this command to clear the routes vibration statistics of the IPv4 unicast address family. clear ip bgp [vrf vrf-name] flap-statistics [ip-address [mask]]	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name.
	address	IP address
	Mask	Mask
Defaults	N/A	

Command Mode	Privileged EXEC mode
Usage Guide	This command can be used only to clear statistics of unsuppressed routes. It does not release the suppressed routes. To clear all route statistics and release the suppressed routes, run the **clear ip bgp dampening** command.
Configuration Examples	The following example clears the routes vibration statistics of the IPv4 unicast address family. FS# clear ip bgp flap-statistics
Related Commands	**Command** / **Description** **bgp dampening** — Enables the route dampening function and sets dampening parameters. **show ip bgp** — Displays the BGP route entry.
Platform Description	None

5.78 clear ip bgp peer-group

	Use this command to reset the session with all members in the peer group. clear ip bgp [vrf vrf-name] peer-group peer-group-name [soft] [in | out]
Parameter Description	**Parameter** / **Description** ***vrf-name*** — VRF name. ***peer-group-name*** — Name of the peer group **in** — Reset the received routing information. **out** — Reset the distributed routing information. **soft** — Soft-resets all routing information received/sent from/to the specified peer **soft in** — Soft-resets the received routing information. **soft out** — Soft-resets the distributed routing information.
Defaults	N/A
Command Mode	Privileged EXEC mode
Usage Guide	This command resets the BGP session with all members in the peer group.
Configuration Examples	The following example resets the session with all members in the peer group. FS# clear ip bgp peer-group my-group in
Related Commands	**Command** / **Description** **clear ip bgp** — Resets the BGP session. **show ip bgp** — Displays the BGP route entry.
Platform Description	None

5.79 clear ip bgp table-map

	Use this command to update the table-map's route information applied by IPv4 unicast address family. clear ip bgp [vrf vrf-name] table-map	
Parameter Description	**Parameter**	**Description**
	vrf-name	vrf name
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	This command is used to update the route information of the applied table-map.	
Configuration Examples	The following example updates the table-map's route information applied by IPv4 unicast address family. FS# clear ip bgp table-map	
Related Commands	**Command**	**Description**
	clear ip bgp	Resets the BGP session.
	show ip bgp	Displays the BGP route entry.
Platform Description	None	

5.80 clear ip bgp update-group

	Use this command to reset sessions of all members in an update-group in the IPv4 unicast address family. **clear ip bgp** [**vrf** *vrf-name*] **update-group** [*update-group-index* | *neighbor-address*] [**soft**] [**in** | **out**]	
Parameter Description	**Parameter**	**Description**
	vrf-name	Specifies the name of a VRF instance. A global VRF instance is used if no VRF instance name is entered.
	update-group-index	Specifies the index of an update-group, in which the sessions of members need to be reset.
	neighbor-address	Specifies the update-group, to which a peer whose session needs to be reset belongs.
	-	Resets BGP sessions directly if no option is carried.
	in	Resets received routing information.
	out	Resets distributed routing information.
	soft	Soft-resets sent and received routing information.
	soft in	Soft-resets received routing information.
	soft out	Soft-resets distributed routing information.
Command Mode	Privileged EXEC mode	

Default Level	14
Usage Guide	This command is used to reset BGP sessions of all members in an update-group in the IPv4 unicast address family.
Configuration Example	The following example resets routing information received by all peers in an update group to which the peer with the IP address of 1.1.1.1 in the IPv4 unicast address family belongs. FS# clear ip bgp update-group 1.1.1.1 in

5.81 default-information originate

	Use this command to enable BGP to distribute the default route. Use the no form of this command to restore the default setting. default-information originate [no] default-information originate default default-information originate	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	This function is disabled by default.	
Command Mode	BGP configuration mode, BGP IPv4/IPv6 address family configuration mode, BGP IPv4 VRF configuration mode, BGP IPv6 VRF configuration mode	
Usage Guide	This command is used to control whether the redistributed default route is effective, and this command needs to be configured together with the **redistribute** command. It takes effect only when a default route exists in the redistributed route. This command is similar to the **network** command. The difference is that in the process of configuring the former, the **redistribute** command must be configured explicitly to redistribute the default route, only in this case, the redistributed default route is effective. For the later command, the IGP must have the default route.	
Configuration Examples	The following example enables BGP to distribute the default route. FS(config-router)# default-information originate	
Related Commands	**Command**	**Description**
	network	Configures routes to be advertised.
	redistribute	Redistributes routes of other protocol.
Platform Description	None	

5.82 default-metric

	Use this command to set the metric for route redistribution. Use the no or default form of this command to restore the default setting. default-metric number no default-metric default default-metric
Parameter Description	**Parameter** / **Description** *number* / Metric number, in the range from 1 to 4294967295
Defaults	No metric is set by default.
Command Mode	BGP configuration mode, BGP IPv4/ IPv6 Unicast address family configuration mode, BGP IPv4/ IPv6 VRF address family configuration mode or BGP Scope configuration mode.
Usage Guide	This command sets the metric of routes to be redistributed for integrity. The metric set by the command cannot cover that set by the r**edistribute metric** command. The value is 0 when the default metric applies to redistributed connected routes.
Configuration Examples	The following example sets the metric for route redistribution. FS(config-router)# default-metric 45
Related Commands	**Command** / **Description** **redistribute** / Redistributes routes of other protocol.
Platform Description	None

5.83 distance bgp

	Use this command to set different management distances for different types of BGP routes. Use the no or default form of this command to restore the default setting. distance bgp external-distance internal-distance local-distance no distance bgp default distance bgp
Parameter Description	**Parameter** / **Description** *external-distance* / Route management distance learned from EBGP peers, in the range from 1 to 255 *internal-distance* / Route management distance learned from IBGP peers, in the range from 1 to 255 *local-distance* / Specifies the management distance of route learned from peers. However, the optimal one can be learned from the IGP. In general, these routes are indicated by the Network Backdoor command. The value is in the range from 1 to 255
Defaults	The parameter defaults are as follows: *external-distance - 20*

	internal-distance - 200 *local-distance - 200*
Command Mode	BGP configuration mode or BGP Scope configuration mode.
Usage Guide	It is not recommended to change the management distance of the BGP route. If it is necessary, observe the following points: ● The management distance of "external-distance" must be shorter than those of other IGP routing protocols (such as OSPF and RIP); ● The internal-distance and local-distance should have longer management distances than other IGP routing protocols.
Configuration Examples	The following example sets different management distances for different types of BGP routes. FS(config-router)# distance bgp 20 20 200
Related Commands	**Command** / **Description** **neighbor soft-reconfiguration inbound** / Restarts the BGP session and reserves the unchanged route information sent by the BGP peer (group). **show ip bgp** / Displays the BGP route entry.
Platform Description	None

5.84 evpn

	Use this command to enter EVPN configuration mode. Use the no or restore form of this command to restore the default settings. evpn no evpn default evpn
Parameter Description	**Parameter** / **Description** N/A / N/A
Defaults	By default, the EVPN configuration mode is disabled.
Command Mode	Global configuration mode
Usage Guide	Use this command to enter EVPN configuration mode. Use the **exit** command to exit the EVPN configuration mode
Configuration Examples	The following example enters EVPN configuration mode. FS(config)# evpn
Platform Description	N/A

5.85 exit-address-family

	Use this command to exit BGP address-family configuration mode. exit-address-family	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	N/A	
Command Mode	BGP address-family configuration mode	
Usage Guide	This command can be used to exit from various address-family modes of BGP to BGP configuration mode.	
Configuration Examples	The following example exits the BGP address-family configuration mode. FS(config-router-af)#exit-address-family	
Related Commands	**Command**	**Description**
	address-family ipv4	Enters IPv4 address family configuration mode.
Platform Description	None	

5.86 export map(EVPN VNI)

	Use this command to configure the route map for exporting the extended community attribute of EVPN routes from the local device to the remote device. Use the **no** form of this command to delete the route map for exporting the extended community attribute of EVPN routes from the local device to the remote device. Use the **default** form of this command to restore the default settings. **export map** *routemap-name*	
	no export map	
	default export map	
Parameter Description	**Parameter**	**Description**
	routemap-name	Name of the route map
Defaults	No route map is configured for exporting the extended community attribute by default.	
Command Mode	EVPN VNI configuration mode.	
Default Level	14	
Usage Guide	This command is used to modify the extended community attribute advertised by a type 5 route converted from a local EVPN route or IP route. This command supports only one route map, and the old configuration is overwritten by the new configuration.	

Configuration Examples	The following example configures a route map for exporting the extended community attribute associated with map1 on VNI 1. FS(config)# evpn FS(config-evpn)# vni 1 FS(config-evpn-vni)# export map map1
Verification	Run the **show running-config** command to display the configurations.

5.87 import map(EVPN VNI)

	Use this command to configure the route map for importing the remote EVPN routes to the local VNI instance. Use the **no** form of this command to delete the route map for importing the remote EVPN routes to the local VNI instance. Use the **default** form of this command to restore the default settings. **import map** *routemap-name*	
	no import map	
	default import map	
Parameter Description	**Parameter**	**Description**
	routemap-name	Name of the route map
Defaults	No route map is configured for importing the remote EVPN routes to the local VNI instance by default.	
Command Mode	EVPN VNI configuration mode.	
Default Level	14	
Usage Guide	This command is used to filter the remote EVPN routes to be imported to the local VNI instance, or modify the attribute of the remote EVPN routes imported to the local VNI instance. This command supports only one route map, and the old configuration is overwritten by the new configuration.	
Configuration Examples	The following example configures the route map map1 for importing the remote EVPN routes to the local VNI instance vni 1. FS(config)# evpn FS(config-evpn)# vni 1 FS(config-evpn-vni)# import map map1	
Verification	Run the **show running-config** command to display the configurations.	

5.88 maximum-paths

	Use this command to configure the number of equivalent paths of the EBGP/IBGP multipath load balancing function. Use the no form of this command to disable the EBGP/IBGP multipath load balancing function. Use the default form of this command to restore the default settings.
	maximum-paths { **ebgp** | **ibgp** } *number*

	no maximum-paths { **ebgp** | **ibgp** } **default maximum-paths** { **ebgp** | **ibgp** }
Parameter Description	**Parameter** / **Description**
	ebgp — Specifies the number of equivalent paths of the EBGP multipath load balancing function.
	ibgp — Specifies the number of equivalent paths of the IBGP multipath load balancing function.
	number — Indicates the maximum number of equivalent paths. The minimum value is 1, and the maximum value depends on the device capability. If the value is 1, the EBGP multipath load balancing function is disabled.
Defaults	Equivalence of multiple BGP paths is not supported by default.
Command Mode	BGP configuration mode, BGP IPv4 Unicast address family configuration mode, BGP IPv6 Unicast address family configuration mode, and BGP Scope Global configuration mode
Default Level	14
Usage Guide	The maximum-paths ebgp command is also used to configure equivalence of confederation EBGP multiple paths and local inter-VRF import routes. IBGP and EBGP routes cannot form equivalent routes.
Configuration Examples	The following example configures EBGP load balancing and sets the maximum number of equivalent routes to 2. FS(config)# router bgp 65530 FS(config-router)# maximum-paths ebgp 2
Verification	Run the show running-config command to display the BGP configurations.

5.89 maximum-prefix

	Use this command to limit the maximum number of prefixes in the routing database in the address family. Use the no or default form of this command to restore the default setting. maximum-prefix maximum no maximum-prefix default maximum-prefix
Parameter Description	**Parameter** / **Description**
	maximum — The maximum number of prefixes in the routing database in the address family, in the range from 1 to 4294967295
Defaults	The maximum number is not limited by default.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF configuration mode, BGP L2VPN EVPN address family configuration mode or BGP Scope configuration mode.

Usage Guide	In a BGP address family, routing prefixes may be introduced through redistribution or learnt from neighbors, or other VRFs. Once routing prefixes in the BGP address family reaches the maximum number, this address family will enter to the overflow state. Use the **show bgp** { *addressfamily* | **all** } **summary** command to display the state of routing database. It is necessary to reconfigure BGP for state clearing, or use the **clear bgp** { *addressfamily* | **all** } * command to reset the address family. When the address family is overflow as the number of prefixes reaches the maximum number, you can adjust maximum-prefix. Maximum-prefix will not filter the routing information generated by the network and aggregate commands. IPv4 unicast routes can receive the routing prefix in the following conditions even in the Overflow state: The route information of the same routing prefix exists in the address database. One route that overwrites this prefix (except for the default route) exists in the address database and the next-hop of this route is different from that of the newly received routing prefix.
Configuration Examples	The following example sets the maximum number of prefixes in the BGP routing database in the ipv4 multicast address family. FS(config)# router bgp 65000 FS(config-router)# address-family ipv4 multicast FS(config-router-af)# maximum-prefix 65535
Related Commands	**Command** / **Description**
	clear bgp all / Resets BGP's all address families.
	clear bgp ipv4 mdt / Resets BGP's ipv4 mdt address families.
	clear bgp ipv4 unicast / Resets BGP's ipv4 unicast address families.
	clear bgp ipv6 unicast / Resets BGP's ipv6 unicast address families.
	clear bgp vpnv4 unicast / Resets BGP's vpnv4 unicast address families.
	show bgp all summary / Displays summary of BGP's all address families.
	show bgp ipv4 mdt summary / Displays summary of BGP's ipv4 mdt address families.
	show bgp ipv4 unicast summary / Displays summary of BGP's ipv4 unicast address families.
	show bgp ipv6 unicast summary / Displays summary of BGP's ipv6 unicast address families.
	show bgp vpnv4 summary / Displays summary of BGP's vpnv4 unicast address families.
Platform Description	N/A

5.90 neighbor activate

	Use this command to activate the neighbor or peer group in the current address mode. Use the no or default form of this command to disable this function. neighbor {peer-address | peer-group-name} activate no neighbor {peer-address | peer-group-name} activate default neighbor { peer-address | peer-group-name } activate

Parameter Description	**Parameter**	**Description**
	peer-address	IP address of the peer, IPv4 address or IPv6 address
	peer-group-name	Name of the peer group of up to 32 characters
Defaults	This function is enabled in IPv4 address family mode by default.	
Command Mode	BGP configuration mode, BGP IPv4/ IPv6 Unicast address family configuration mode, BGP IPv4/ IPv6 VRF address family configuration mode, BGP L2VPN EVPN address family configuration mode, or BGP Scope configuration mode.	
Usage Guide	The function is enabled by default for IPv4 address families. You need to set this command in other address-family configuration modes for exchanging routes.	
Configuration Examples	The following example activates the neighbor or peer group in the current address mode. FS(config)# router bgp 60 FS(config-router)# neighbor 10.0.0.1 remote-as 100 FS(config-router)# address-family vpnv4 FS(config-router-af)# neighbor 10.0.0.1 activate	
Related Commands	**Command**	**Description**
	router bgp	Enables the BGP protocol.
	neighbor remote-as	Configures the BGP peer.
Platform Description	None	

5.91 neighbor advertisement-interval

	Use this command to set the time interval to send the BGP route update message. Use the no or default form of this command to restore the default setting. neighbor { peer-address | peer-group-name } advertisement-interval seconds no neighbor { peer-address | peer-group-name } advertisement-interval default neighbor { peer-address | peer-group-name } advertisement-interval	
Parameter Description	**Parameter**	**Description**
	peer address	IP address of the peer
	peer-group-name	Name of the peer group of up to 32 characters
	seconds	Time interval to send the route update message in the range from 0 to 600 seconds
Defaults	IBGP connection: 15 seconds EBGP connection: 30 seconds	
Command Mode	BGP configuration mode, BGP IPv4/ IPv6 VRF address family configuration mode or BGP Scope configuration mode.	
Usage Guide	If you have specified the BGP peer group, all members of the peer group will adopt the settings of the command.	
Configuration	The following example sets the time interval to send the BGP route update message.	

Examples	FS(config)# router bgp 60 FS(config-router)# neighbor 10.0.0.1 remote-as 100 FS(config-router)# neighbor 10.0.0.1 advertisement-interval 10
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer.
Platform Description	None

5.92 neighbor allowas-in

	Use this command to allow the PE to receive messages with the same AS number as itself. Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} allowas-in number no neighbor {peer-address | peer-group-name} allowas-in default neighbor {peer-address | peer-group-name} allowas-in
Parameter Description	**Parameter** / **Description** *peer address* / IP address of the peer *peer-group-name* / Name of the peer group of up to 32 characters *number* / Number of the AS number duplication in the range from 1 to 10, 3 by default
Defaults	This function is disabled by default.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, BGP L2VPN EVPN address family configuration mode or BGP Scope configuration mode.
Usage Guide	A typical application is spoke_hub mode. Execute this command on the PE to enable it to receive and then send the advertised address prefix. Configure two VRFs on the PE. One VRF receives the routes of all PEs and advertises them to the CE; the other VRF receives the routes advertised by the CE and advertises them to all PEs. This command applies to IBGP or EBGP peers.
Configuration Examples	The following example allows the PE to receive messages with the same AS number as itself. FS(config)# router bgp 60 FS(config-router)# neighbor 10.1.1.1 remote-as 100 FS(config-router)# address-family ipv4 vrf vpn1 FS(config-router-af)# neighbor 10.1.1.1 allowas-in
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer.
Platform Description	None

5.93 neighbor as-originate-interval

	Use this command to configure the interval that the device advertises local original BGP routes to the peer (group). Use the no or default form of this command to restore the default setting. neighbor { peer-address | peer-group-name } as-origination-interval seconds no neighbor { peer-address | peer-group-name } as-origination-interval default neighbor { peer-address | peer-group-name } as-origination-interval
Parameter Description	**Parameter** / **Description** *peer address* / IP address of the peer. *peer-group-name* / Name of the peer group, containing up to 32 characters. *seconds* / The interval at which the device advertises local original BGP routes to the peer (group), in the range from 1 to 65535 in the unit of seconds.
Defaults	The default interval is 1.
Command Mode	BGP configuration mode/ BGP IPv4 VRF address family configuration mode/ BGP IPv6 VRF address family configuration mode/ BGP scope global configuration mode.
Usage Guide	If you specify a peer group name in this command, the configuration takes effect on all members of the peer group.
Configuration Examples	The following example configures the interval at which the device advertises local original BGP routes to the peer in the BGP IPv4 VRF address family configuration mode. FS(config)# router bgp 60 FS(config-router)# address-family ipv4 vrf vpn1 FS(config-router-af)# neighbor 10.0.0.1 remote-as 100 FS(config-router-af)# neighbor 10.0.0.1 as-origination-interval 10
Related Commands	**Command** / **Description** N/A / N/A
Platform Description	N/A

5.94 neighbor default-originate

	Use this command to allow the BGP speaker to advertise the default route to the peer (group). Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} default-originate [route-map map-tag] no neighbor {peer-address | peer-group-name} default-originate [route-map map-tag] default neighbor { peer-address | peer-group-name } default-originate [route-map map-tag]
Parameter Description	**Parameter** / **Description** *peer address* / IP address of the peer *peer-group-name* / Name of the peer group of up to 32 characters *map-tag* / Name of the route-map of up to 32 characters

Defaults	This function is disabled by default.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, or BGP Scope configuration mode
Usage Guide	This command does not requires the default route but sends a default route whose next-hop address is the local address to neighbors. If you have specified the BGP peer group, all members of the peer group will adopt the settings of the command. If you set the command for a member in the peer, this command will overwrite the settings on the peer group.
Configuration Examples	The following example allows the BGP speaker to advertise the default route to the peer (group). FS(config)# router bgp 60 FS(config-router)# neighbor 10.1.1.1 remote-as 80 FS(config-router)# neighbor 10.1.1.1 default-originate
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer.
Platform Description	None

5.95 neighbor description

	Use this command to set a descriptive sentence for the specified peer (group). Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} description text no neighbor {peer-address | peer-group-name} description default neighbor { peer-address | peer-group-name } description
Parameter Description	**Parameter** / **Description** *peer address* / IP address of the peer *peer-group-name* / Name of the peer group of up to 32 characters *text* / Descriptive text of the peer (group) of up to 80 characters
Defaults	This function is disabled by default.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode and BGP IPv4/IPv6 VRF address family configuration mode or BGP Scope configuration mode.
Usage Guide	This command is used to add descriptive characters for the peer (group). This may help remember features and characteristics of the peer (group).
Configuration Examples	The following example sets a descriptive sentence for the specified peer (group). FS(config)# router bgp 60 FS(config-router)# neighbor 10.1.1.1 remote-as 80 FS(config-router)# neighbor 10.1.1.1 description xyz.com

Related Commands	**Command**	**Description**
	router bgp	Enables the BGP protocol.
	neighbor remote-as	Configures the BGP peer.
Platform Description	None	

5.96 neighbor distribute-list

	Use this command to implement the routing policy based on the ACL when receiving/sending route information from/to the specified BGP peer. Use the no or default form of this command to restore the default setting. neighbor { peer-address | peer-group-name } distribute-list { access-list-number } { in | out } no neighbor { peer-address | peer-group-name } distribute-list { access-list-number } { in | out } default neighbor { peer-address | peer-group-name } distribute-list { access-list-number | access-list-name } { in | out }	
Parameter Description	**Parameter**	**Description**
	peer address	IP address of the peer
	peer-group-name	Name of the peer group of up to 32 characters
	access-list-number	ACL number
	in	Specifies the ACL for filtering the incoming routes.
	out	Specifies the ACL for filtering the outgoing routes.
Defaults	This function is disabled by default.	
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, BGP VPNv4/VPNv6 address family configuration mode or BGP Scope configuration mode.	
Usage Guide	For in rule or out rule, this command cannot be used together with the **neighbor prefix-list** command. Only one of them can take effect. If you have specified the BGP peer group, all members of the peer group will adopt the settings. If you set the **neighbor distribute-list** command for a member in the peer, this command will overwrite the settings on the peer group. You can set different filtering policies in different address-family configuration modes to control routes.	
Configuration Examples	The following example implements the routing policy based on the ACL when receiving/sending route information from/to the specified BGP peer. FS(config)# router bgp 60 FS(config-router)# neighbor 10.1.1.1 remote-as 80 FS(config-router)# neighbor 10.1.1.1 distribute-list bgp-filter in	
Related Commands	**Command**	**Description**
	router bgp	Enables the BGP protocol.
	neighbor remote-as	Configures the BGP peer.
	ip access-list	Creates a standard IP ACL or extended IP ACL.
Platform Description	None	

5.97 neighbor ebgp-multihop

	Use this command to allow establishing BGP connection between EBGP peers that are not directly connected. Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} ebgp-multihop [ttl] no neighbor {peer-address | peer-group-name} ebgp-multihop [ttl] default neighbor { peer-address | peer-group-name } ebgp-multihop [ttl]
Parameter Description	**Parameter** / **Description** *peer address* / IP address of the peer *peer-group-name* / Name of the peer group of up to 32 characters *ttl* / Maximum hops in the range 1 to 255
Defaults	The BGP connection is allowed between EBGP peers connected with each other directly by default. If "ebgp-multihop" is followed by no parameter, the ttl is 255.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 VRF address family configuration mode or BGP Scope configuration mode.
Usage Guide	To prevent routing loop and dampening, non-default routes that can reach the peer must exist between EBGP peers between which the BGP connection can only be established via multiple hops. If the BGP peer group is specified, all members of the peer group adopt the settings. If this command is set for a member of the peer, the setting will overwrite the setting for the group.
Configuration Examples	The following example allows establishing BGP connection between EBGP peers that are not directly connected. FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 remote-as 65100 FS(config-router)# neighbor 10.0.0.1 ebgp-multihop
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer.
Platform Description	None

5.98 neighbor fall-over bfd

	Use this command to enable BFD correlation with BGP. Use the no form or default form of this command to disable BFD correlation with BGP. neighbor { peer-address | peer-group-name } fall-over bfd no neighbor { peer-address | peer-group-name } fall-over bfd default neighbor { peer-address | peer-group-name } fall-over bfd
Parameter Description	**Parameter** / **Description** *peer address* / IPv4 or IPv6 address of the peer. *peer-group-name* / Name of the peer group, containing up to 32 characters.
Defaults	BFD correlation is disabled by default.
Command	BGP configuration mode / IPv4 VRF address family configuration mode/ IPv6 VRF address family configuration

Mode	mode/ Scope configuration mode
Usage Guide	Before configuring BFD correlation, the BFD session parameters of the neighbor interface must be configured.
Configuration Examples	The following example enables BFD correlation to detect the forwarding path between local and the neighbor 172.16.0.2. FS(config)# router bgp 45000 FS(config-router)# neighbor 172.16.0.2 remote-as 45001 FS(config-router)# neighbor 172.16.0.2 fall-over bfd
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer.
Platform Description	None

5.99 neighbor filter-list

	Use this command to enable route filtering when sending/receiving routing information to/from BGP peers. Use the no or default form of this command to restore the default setting. neighbor { peer-address | peer-group-name } filter-list access-list-number { in | out } no neighbor { peer-address | peer-group-name } filter-list access-list-number { in | out } default neighbor { peer-address | peer-group-name } filter-list access-list-number { in | out }
Parameter Description	**Parameter** / **Description** ***peer address*** / IP address of the peer, IPv4 address or IPv6 address ***peer-group-name*** / Name of the peer group of up to 32 characters ***access-list-number*** / ACL number **in** / Applies as-path list on the received routing information. **out** / Applies as-path list on the distributed routing information.
Defaults	The function is disabled by default.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, BGP VPNv4/VPNv6 address family configuration mode or BGP Scope configuration mode.
Usage Guide	If the BGP peer group is specified, all members of the peer group adopt the settings of this command. If the **neighbor filter-list** command is set for a member of the peer, the setting will overwrite the setting for the group. You can set different filter policies in different address-family configuration modes to control routes.
Configuration Examples	The following example enables route filtering when sending/receiving routing information to/from BGP peers. FS(config)# ip as-path access-list 1 deny _123_ FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 remote-as 65100 FS(config-router)# neighbor 10.0.0.1 filter-list 1 out
Related	**Command** / **Description**

Commands	**router bgp**	Enables the BGP protocol.
	neighbor remote-as	Configures the BGP peer.
	ip as-path access-list	Creates an AS_PATH list.
	match as-path	Matches the AS_PATH list.
Platform Description	None	

5.100 neighbor local-as

	Use this command to configure the local AS number for the BGP peer, which could be used as its Remote AS to connect with local router. Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} local-as as-number [no-prepend [replace-as [dual-as]]] no neighbor {peer-address | peer-group-name} local-as default neighbor { peer-address | peer-group-name } local-as	
Parameter Description	**Parameter**	**Description**
	peer address	IP address of the peer, IPv4 address or IPv6 address
	peer-group-name	Name of the peer group of up to 32 characters
	as-number	Local AS number, in the range from 1 to 65535. In the 10.4(3) or later versions, the 4-byte AS notation is supported, namely, the new AS notation range is from 1 to 4294967295, represented as from 1 to 65535.65535 in dot mode.
	no-prepend	The AS-PATH of the routing information received from the peer does not depend on the Local AS. This option is disabled by default.
	replace-as	The AS-PATH of the routing information sent to the peer replaces the BGP AS with the Local AS. This option is disabled by default.
	dual-as	Uses BGP AS or Local AS to establish BGP connection with the device. This option is disabled by default.
Defaults	No Local AS is configured for the peer. If Local AS is configured, no option is configured by default. The peer could only use Local AS to establish BGP connection with local device, and adds Local AS into the AS-PATH of the received routing information, inserts Local AS to the corresponding AS-PATH before sending the routing information to the peer.	
Command Mode	BGP configuration mode, BGP IPv4/IPv6 VRF configuration mode or BGP Scope configuration mode.	
Usage Guide	Local AS could be configured on the EBGP peer only, and if the attributes of the peer change, such as EBGP converts to IBGP or union EBGP, Local AS and corresponding options will be deleted. Local AS must be different from BGP AS and this peer's Remote AS and the union ID (if federation is configured). If you have specified the BGP peer group, all members of this peer group will adopt the settings of this command. You cannot set Local AS for the specified member of the peer group separately.	
Configuration Examples	The following example configures the local AS number for the BGP peer. FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 remote-as 65100 FS(config-router)# neighbor 10.0.0.1 local-as 23	

Related Commands	**Command**	**Description**
	router bgp	Enables the BGP protocol.
	neighbor remote-as	Configures the BGP peer.
Platform Description	N/A	

5.101 neighbor maximum-prefix

	Use this command to limit the number of prefixes received from the specified BGP peer. Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} maximum-prefix maximum [threshold] [warning-only] no neighbor {peer-address | peer-group-name} maximum-prefix maximum default neighbor { peer-address | peer-group-name } maximum-prefix maximum	
Parameter Description	**Parameter**	**Description**
	peer-address	IP address of the peer, IPv4 or IPv6 address
	peer-group-name	Name of the peer group of up to 32 characters
	maximum	Upper limit of the number of the received route entries
	threshold	Percentage of the maximum when alarming.
	warning-only	Does not terminate the BGP connection when the route entries reach the upper limit but produce a log entry.
Defaults	This function is disabled by default.	
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, BGP L2VPN EVPN address family configuration mode or BGP Scope configuration mode.	
Usage Guide	The BGP connection will be torn down when the received routes exceeds the upper limit by default. To prevent tearing down the connection, set the "warning-only" to control that. If the BGP peer group is specified, all members of the peer group adopt the settings of this command. If this command is set for a member of the peer, the setting will overwrite the setting for the group.	
Configuration Examples	The following example limits the number of prefixes received from the specified BGP peer. FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 maximum-prefix 1000	
Related Commands	**Command**	**Description**
	router bgp	Enables the BGP protocol.
	neighbor remote-as	Configures the BGP peer.
Platform Description	None	

5.102 neighbor next-hop-self

	Use this command to set the next-hop of the route to the local BGP speaker while specifying the routes that the BGP peer redistributes. Use the no or default form of this command to restore the default setting.

	neighbor {peer-address | peer-group-name} next-hop-self no neighbor {peer-address | peer-group-name} next-hop-self default neighbor { peer-address | peer-group-name } next-hop-self
Parameter Description	**Parameter** / **Description** *peer-address* / IP address of the peer, IPv4 or IPv6 address *peer-group-name* / Name of the peer group of up to 32 characters
Defaults	This function is disabled by default.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, BGP VPNv4/VPNv6 address family configuration mode or BGP Scope configuration mode.
Usage Guide	This command is mostly used in the non-full-mesh-type network, such as the Frame Relay and X.25, where the BGP speakers within the same subnet cannot completely be accessed mutually. If you have specified the BGP peer group, all members of the peer group will adopt the settings of the command.
Configuration Examples	The following example sets the next-hop of the route to the local BGP speaker. FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 next-hop-self
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer.
Platform Description	None

5.103 neighbor next-hop-unchanged

	Use this command to maintain the next-hop when sending routes to the peer(group). Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} next-hop-unchanged no neighbor {peer-address | peer-group-name} next-hop-unchanged default neighbor { peer-address | peer-group-name } next-hop-unchanged
Parameter Description	**Parameter** / **Description** *peer-address* / IP address of the peer, IPv4 or IPv6 address *peer-group-name* / Name of the peer group of up to 32 characters **next-hop-unchanged** / Maintains the next-hop while sending the routes to the peer(group).
Defaults	The next-hop will be changed by default when routes are sent to the EBGP peer.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP L2VPN EVPN address family configuration mode or BGP Scope Global configuration mode.
Usage Guide	This command is used to control to maintain the next-hop route transmitting between multi-hop EBGP peer sessions. This command cannot be configured on the route reflector. And for the client of the route reflector, if

	this function is enabled, the **neighbor next-hop-self** command cannot be used to change the next-hop of routes. This function is mainly applied to the cross-domain VPN. In the implementation with the Option C adopted, to reduce the complete connectivity between the PEs of the cross-domain CPN, a route reflector can be set in every autonomous domain to establish the Multihop MP-EBGP connection to implement the VPN route interaction. As the next-hop route is changed as itself while sending routes to the EBGP peer by default, PE stations of other autonomous domains will consider the final next-hop of the VPN route as the route reflector when receiving the VPN route at last, which will result in all cross-domains VPN flow going through the reflector. However, usually this is not the optimal forwarding path, and the requirement for the forwarding performance of the RR is higher. To avoid this condition, use the **neighbor next-hop-unchanged** command in the address-family VPNv4 configuration mode to maintain the next-hop of the VPNv4 route sent to the BGP peer when establishing the cross-domain Multihop MP-EBGP connection on the router reflector.
Configuration Examples	The following example maintains the next-hop when sending routes to the peer (group). FS(config)# router bgp 60 FS(config-router)# address-family vpnv4 FS(config-router-af)# neighbor 10.1.1.1 next-hop-unchanged
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer.
Platform Description	None

5.104 neighbor password

	When the BGP connection with the BGP peer is established, use this command to enable TCP MD5 authentication and set the password. Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} password [0 | 7]string no neighbor {peer-address | peer-group-name} password default neighbor { peer-address | peer-group-name } password
Parameter Description	**Parameter** / **Description** *peer-address* / IP address of the peer, IPv4 or IPv6 address *peer-group-name* / Name of the peer group of up to 32 characters **0** / Displays the password with encryption. **7** / Displays the password without encryption. *string* / Password for MD5 authentication in the range from up to 80 characters
Defaults	The function is disabled by default
Command Mode	BGP configuration mode, BGP IPv4/IPv6 VRF address family configuration mode or BGP Scope configuration mode.
Usage Guide	This command will enable MD5 authentication of the TCP. BGP peers must have the same password configured; otherwise, the neighbor relationship cannot be established. When this command is set, the local BGP speaker will re-establish the BGP connection with the BGP peer. If the BGP peer group is specified, all members of the peer group adopt the settings of this command. If this

	command is set for a member of the peer, the setting will overwrite the setting for the group. No matter in which mode, a neighbor has only one password, not one for every address family, .
Configuration Examples	The following example enables TCP MD5 authentication and sets the password. FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 password Red-Giant
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol **neighbor remote-as** / Configures the BGP peer.
Platform Description	None

5.105 neighbor peer-group (creating)

	Use this command to create a BGP peer group. Use the no or default form of this command to restore the default setting. neighbor peer-group-name peer-group no neighbor peer-group-name peer-group default neighbor peer-group-name peer-group
Parameter Description	**Parameter** / **Description** *peer-group-name* / Name of the peer group of up to 32 characters
Defaults	No BGP peer group is created.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 VRF configuration mode or BGP Scope configuration mode.
Usage Guide	If multiple BGP peers use the same update policy, the peers can be configured in the same peer group, so as to simplify the configuration and boost operation efficiency.
Configuration Examples	The following example creates a BGP peer group. FS(config)# router bgp 65000 FS(config-router)# neighbor Red-Giant peer-group
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer. **neighbor peer-group (assigning members)** / Configures the specified peer as the member of the BGP peer group. **show ip bgp peer-group** / Displays the information of the BGP peer.
Platform Description	None

5.106 neighbor peer-group (assigning members)

	Use this command to configure the specified peer as a member of the BGP peer group. Use the no or default

	form of this command to restore the default setting. neighbor peer-address peer-group peer-group-name no neighbor peer-address peer-group peer-group-name default neighbor peer-address peer-group peer-group-name
Parameter Description	**Parameter** / **Description** *peer-address* / IP address of the peer, IPv4 or IPv6 address *peer-group-name* / Name of the peer group of up to 32 characters
Defaults	No peer exists in the peer group.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, BGP L2VPN EVPN address family configuration mode or BGP Scope configuration mode.
Usage Guide	Members of the peer group can adopt all configurations of the peer. It is allowed to configure an individual member of the peer group to replace the universal configuration for the peer group, but such separate configuration does not contain the configuration information that may affect the output update. In other words, every member in the peer group will always adopt the following configurations of the peer group: remote-as, update-source, local-as, reconnect-interval, times, advertisement-interval, default-originate, next-hop-self, remove-private-as, send-community, distribute-list out, filter-list out, prefix-list out, route-map out, unsuppress-map, route-reflector-client. Do not place neighbors of different address families in the same peer group, or place IBGP and EBGP neighbors in the same peer group.
Configuration Examples	The following example configures the specified peer as a member of the BGP peer group. FS(config)# router bgp 65000 FS(config-router)# neighbor Red-Giant peer-group FS(config-router)# neighbor 10.0.0.1 peer-group Red-Giant
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer. **neighbor peer-group (creating)** / Creates the BGP peer group. **show ip bgp peer-group** / Displays the information of the BGP peer.
Platform Description	None

5.107 neighbor prefix-list

	Use this command to implement the routing policy based on the prefix list to receive/transmit routes from/to the BGP peer. Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} prefix-list prefix-list-name { in | out } no neighbor {peer-address | peer-group-name} prefix-list prefix-list-name { in | out }

	default neighbor { peer-address | peer-group-name } prefix-list prefix-list-name { in | out }
Parameter Description	

Parameter	Description
peer address	IP address of the peer, IPv4 or IPv6 address
peer-group-name	Name of the peer group of up to 32 characters
prefix-lis-name	Name of the prefix-list of up to 32 characters
in	Applies the prefix list to the received routes.
out	Applies the prefix list to the redistributed routes.

Defaults	This function is disabled by default.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, BGP VPNv4/VPNv6 address family configuration mode or BGP Scope configuration mode.
Usage Guide	For the "in" rule or "out" rule, this command cannot be used together with the **neighbor distribute-list** command. That is, only one of them takes effect. If the BGP peer group is specified, all members of the peer group adopt the settings of this command. If the **neighbor prefix-list in** command is set for a member of the peer, the setting will overwrite the setting for the group. You can set different filter policies in different address-family configuration modes to control routes.
Configuration Examples	The following example implements the routing policy based on the prefix list to receive/transmit routes from/to the BGP peer. FS(config)# ip prefix-list bgp-filter deny 10.0.0.1/16 FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 prefix-list bgp-filter in

Related Commands	Command	Description
	router bgp	Enables the BGP protocol.
	neighbor remote-as	Configures the BGP peer.
	ip prefix-list	Creates the prefix lists.

Platform Description	None

5.108 neighbor remote-as

	Use this command to configure the BGP peer (group). Use the no or default form of this command to restore the default setting. neighbor { peer-address | peer-group-name } remote-as as-number no neighbor { peer-address | peer-group-name } remote-as default neighbor { peer-address | peer-group-name } remote-as
Parameter Description	

Parameter	Description
peer-address	IP address of the peer, IPv4 or IPv6 address
peer-group-name	Name of the peer group of up to 32 characters

	as-number	BGP peer (group) autonomous system number in the range from 1 to 65535 In the 10.4(3) or later versions, the 4-byte AS notation is supported, namely, the new AS notation range is from 1 to 4294967295, represented as from 1 to 65535.65535 in dot mode.
Defaults	No BGP peer is configured.	
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, BGP L2VPN EVPN address family configuration mode or BGP Scope configuration mode.	
Usage Guide	If you have specified the BGP peer group, all members of the peer group will inherit the settings of the command.	
Configuration Examples	The following example configures the BGP peer (group). FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 remote-as 80	
Related Commands	**Command**	**Description**
	router bgp	Enables the BGP protocol.
Platform Description	None	

5.109 neighbor remove-private-as

	Use this command to delete the private AS number recorded in the AS path attribute in the route sent to the specified EBGP peer. Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} remove-private-as no neighbor {peer-address | peer-group-name} remove-private-as default neighbor { peer-address | peer-group-name } remove-private-as	
Parameter Description	**Parameter**	**Description**
	peer-address	IP address of the peer, IPv4 or IPv6 address
	peer-group-name	Name of the peer group of up to 32 characters
Defaults	This function is disabled by default.	
Command Mode	BGP configuration mode, BGP IPv4/IPv6 address family configuration mode, or BGP IPv4 VRF configuration mode.	
Usage Guide	This command takes effect only on EBGP peers. If the AS path contains the private AS number that is the AS number of the EBGP peer to be sent, the AS number is not deleted. Private AS number range: 64512 - 65535	
Configuration Examples	The following example deletes the private AS number recorded in the AS path attribute in the route sent to the specified EBGP peer FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 remove-private-as	
Related	**Command**	**Description**

Commands	**router bgp**	Enables the BGP protocol.
	neighbor remote-as	Configures the BGP peer.
Platform Description	None	

5.110 neighbor route-map

	Use this command to enable route match for the received/sent routes. Use the no or default form of this command to disable this function. neighbor { peer-address | peer-group-name } route-map map-tag {in | out} no neighbor { peer-address | peer-group-name } route-map map-tag {in | out} default neighbor { peer-address | peer-group-name } route-map map-tag { in | out }
Parameter Description	**Parameter** / **Description** *peer-address* / IP address of the peer, IPv4 or IPv6 address *peer-group-name* / Name of the peer group of up to 32 characters *map-tag* / Name of the match rule **in** / Applies the rule to the incoming routes. **out** / Applies the rule to the outgoing routes.
Defaults	N/A
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, BGP L2VPN EVPN address family configuration mode or BGP Scope configuration mode.
Usage Guide	This command can be used to filter the incoming and outgoing routes for different neighbors by using different incoming/outgoing rules, purifying and controlling routes. You can set different filter policies in different address-family configuration modes to control routes.
Configuration Examples	The following example enables route match for the received/sent routes. FS(config-router)# neighbor 10.0.0.1 route-map map-tag in
Related Commands	**Command** / **Description** **neighbor soft-reconfiguration inbound** / Stores the routing information sent from the BGP peer. **show ip bgp** / Displays the BGP route entry.
Platform Description	None

5.111 neighbor route-reflector-client

	Use this command to configure the local device as the route reflector and specifies its client. Use the no or default form of this command to restore the default setting. neighbor peer-address route-reflector-client no neighbor peer-address route-reflector-client default neighbor { peer-address | peer-group-name } route-reflector-client	
Parameter Description	**Parameter**	**Description**
	peer-address	IP address of the peer, IPv4 or IPv6 address
	peer-group-name	Name of the peer. The name cannot exceed 32 characters.
Defaults	This function is disabled by default.	
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode, BGP L2VPN EVPN address family configuration mode or BGP Scope configuration mode.	
Usage Guide	By default, all IBGP speakers in the autonomous system must establish neighbor relationship with each other. The BGP speaker does not forward the routes learned from an IBGP peer to other IBGP peers to avoid route loop. This command can be used to set route reflector, so that there is no need for all IBGP speakers to establish full neighboring relationship between each other. This will allow the route reflector to forward learned IBGP routes to other IBGP peers.	
Configuration Examples	The following example configures the local device as the route reflector and specifies its client. FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 route-reflector-client	
Related Commands	**Command**	**Description**
	router bgp	Enables the BGP protocol.
	neighbor remote-as	Configures the BGP peer.
	bgp cluster-id	Configures the cluster ID of the route reflectors.
	bgp client-to-client reflection	Enables the route reflection between clients
Platform Description	None	

5.112 neighbor send-community

	Use this command to transmit community attributes to the specified BGP neighbor. Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} send-community [both | standard | extended] no neighbor {peer-address | peer-group-name} send-community [both | standard | extended] default neighbor { peer-address | peer-group-name } send-community [both | standard | extended]

Parameter Description	**Parameter**	**Description**
	peer-address	IP address of the peer, IPv4 or IPv6 address
	peer-group-name	Name of the peer group of up to 32 characters
	both	Transmits both standard and extended communities.
	standard	Transmits the standard community only.
	extended	Transmits the extended community only.
Defaults	This function is disabled by default.	
Command Mode	BGP configuration mode, BGP IPv4 Unicast VRF address family configuration mode, BGP IPv6 Unicast/VRF address family configuration mode, BGP L2VPN EVPN address family configuration mode, BGP scope configuration mode	
Usage Guide	This command transmits the community to the neighbor or neighbor group.	
Configuration Examples	The following example transmits community attributes to the specified BGP neighbor. FS(config-router)# neighbor 10.1.1.1 send-community both	
Related Commands	**Command**	**Description**
	router bgp	Enables the BGP protocol.
	neighbor remote-as	Configures the BGP peer.
	ip community-list	Creates the community list.
Platform Description	None	

5.113 neighbor shutdown

	Use this command to disconnect the BGP connection established with the specified BGP peer. Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} shutdown no neighbor {peer-address | peer-group-name} shutdown default neighbor { peer-address | peer-group-name } shutdown	
Parameter Description	**Parameter**	**Description**
	peer-address	IP address of the peer, IPv4 or IPv6 address
	peer-group-name	Name of the peer group of up to 32 characters
Defaults	This function is disabled by default.	
Command Mode	BGP configuration mode, BGP IPv4/IPv6 VRF address family configuration mode or BGP Scope configuration mode.	
Usage Guide	This command is used to disconnect valid connection established with the specified peer (group), and delete all associated routing information. However, this command still keeps the configuration information of that specified peer (group). If the BGP peer group is specified, all members of the peer group adopt the settings of this command. If this command is set for a member of the peer, the setting will overwrite the setting for the group.	
Configuration Examples	The following example disconnects the BGP connection established with the specified BGP peer. FS(config)# router bgp 60	

	FS(config-router)# neighbor 10.0.0.1 shutdown
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer. **show ip bgp summary** / Displays the BGP connection status.
Platform Description	None

5.114 neighbor soft-reconfiguration inbound

	Use this command to store the routing information sent from the BGP peer. Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} soft-reconfiguration inbound no neighbor {peer-address | peer-group-name} soft-reconfiguration inbound default neighbor { peer-address | peer-group-name } soft-reconfiguration inbound
Parameter Description	**Parameter** / **Description** *peer-address* / IP address of the peer, IPv4 or IPv6 address *peer-group-name* / Name of the peer group of up to 32 characters
Defaults	This function is disabled by default.
Command Mode	BGP configuration mode, BGP IPv4 Unicast VRF address family configuration mode, BGP IPv6 Unicast/VRF address family configuration mode, BGP VPNv4/VPNv6 address family configuration mode, BGP scope configuration mode
Usage Guide	This command restarts the BGP session, and keeps the unchanged routing information sent from the BGP peer (group). Executing this command will consume more memories. If both parties support the route refresh function, this command becomes unnecessary. You may run the **show ip bgp neighbors** command to judge whether the peer can support the route refresh function. If the BGP peer group is specified, all members of the peer group adopt the settings of this command. If this command is set for a member of the peer, the setting will overwrite the setting for the group.
Configuration Examples	The following example stores the routing information sent from the BGP peer. FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 soft-reconfiguration inbound
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer. **show ip bgp neighbors** / Displays the information of the BGP peer. **clear ip bgp** / Resets the BGP peer session.
Platform Description	None

5.115 neighbor timers

	In specifying BGP peer to establish the BGP connection, use this command to set the keepalive and holdtime time values used for establishing the BGP connection. Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} timers keepalive holdtime [minimum-holdtime] | connect connect-retry } no neighbor [peer-address | peer-group-name] timers [connect] default neighbor { peer-address | peer-group-name } timers [connect]
Parameter Description	

Parameter	Description
peer-address	IP address of the peer, IPv4 or IPv6 address
peer-group-name	Name of the peer group of up to 32 characters
keepalive	Time interval to send the KEEPALIVE message to the BGP peer. Range: 0-65535 seconds
holdtime	Time interval to consider the BGP peer alive Range: 0-65535 seconds
minimum-holdtime	Allows a minimum holdtime value of neighbor advertisement. It is unrestricted when the value is 0. The range is 0 to 65535 seconds.
connect-retry	The value of the connect-retry timer is 15s.

Defaults	*keepalive*: 60 seconds *holdtime*: 180 seconds *minimum-holdtime*: 0 seconds connect-retry: 15 seconds
Command Mode	BGP configuration mode, BGP IPv4 VRF address family configuration mode, BGP IPv6 VRF address family configuration mode or BGP Scope configuration mode.
Usage Guide	A proper keepalive value must not exceed one-third of the holdtime value. If the time is configured for an individual peer or a peer group, that peer or peer-group will use its time to replace the global time configuration and connect the peer. If the BGP peer group is specified, all members of the peer group adopt the settings of this command. If this command is set for a member of the peer, the setting will overwrite the setting for the group.
Configuration Examples	The following example sets the keepalive and holdtime time values used for establishing the BGP connection. FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 80 240
	The following example sets the connect-retry time values used for establishing the BGP connection.
	FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 timers connect 100
Related Commands	

Command	Description
router bgp	Enables the BGP protocol.
timers bgp	Sets the keepalive and holdtime values globally.

Platform Description	None

5.116 neighbor unsuppress-map

	Use this command to selectively advertise routing information suppressed by aggregate-address command. Use the no or default form of this command to restore the default setting. neighbor {peer-address | peer-group-name} unsuppress-map map-tag no neighbor {peer-address | peer-group-name} unsuppress-map map-tag default neighbor { peer-address | peer-group-name } unsuppress-map map-tag
Parameter Description	**Parameter** / **Description** *peer-address* / IP address of the peer *peer-group-name* / Name of the peer group of up to 32 characters *map-tag* / Name of the route-map of up to 32 characters
Defaults	This function is disabled by default.
Command Mode	BGP configuration mode, BGP IPv4 Unicast/VRF address family configuration mode, BGP IPv6 Unicast/VRF address family configuration mode, BGP L2VPN EVPN address family configuration mode BGP VPNv4/VPNv6 address family configuration mode, BGP scope configuration mode
Usage Guide	This command advertises the specified suppressed routes. If the BGP peer group is specified, all members of the peer group adopt the settings of this command. If this command is set for a member of the peer, the setting will overwrite the setting for the group.
Configuration Examples	The following example selectively advertises routing information suppressed by aggregate-address command. FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 unsuppress-map unspress-route
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer. **aggregate-address** / Configures the aggregate address. **route-map** / Configures the route-map
Platform Description	None

5.117 neighbor update-delay

	Use this command to configure the time of BGP delayed advertisement for first routes. Use the no or restore form of the command to restore the default setting. neighbor { peer-address | peer-group-name } update-delay time no neighbor { peer-address | peer-group-name } update-delay default neighbor { peer-address | peer-group-name } update-delay
Parameter Description	**Parameter** / **Description** *peer-address* / IP address of the peer, IPv4 or IPv6 address

	peer-group-name	Name of the peer group of up to 32 characters
	time	Time of BGP delayed advertisement for first routes.
Defaults	The function is disabled by default.	
Command Mode	BGP configuration mode/ BGP IPv4 VRF address family configuration mode/ BGP IPv6 VRF address family configuration mode/ BGP scope configuration mode	
Usage Guide	After BGP starts, BGP peers negotiate to establish the neighborship before sending route information (update packets). In addition, after **update-delay** is configured on the local end, a specific neighbor sends route information to the local end, the local end will sends out the route information after the delay time. If the BGP peer group is specified, all members of the peer group adopt the settings of this command.	
Configuration Examples	The following example sets the delayed time to 60s. FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 update-delay 60	
Platform Description	N/A	

5.118 neighbor update-source

	Use this command to configure the interface for BGP connection of the IBGP peer.. neighbor { peer-address | peer-group-name } update-source {interface-type interface-number | address } Use the no form of the command to remove the source address configuration for the BGP peer. no neighbor {peer-address | peer-group-name} update-source Use the default form of the command to restore the default settings. default neighbor { peer-address | peer-group-name } update-source	
Parameter Description	**Parameter**	**Description**
	peer-address	IP address of the peer, IPv4 or IPv6 address
	peer-group-name	Name of the peer group of up to 32 characters
	interface-type interface-number	Interface name
	address	The interface address which is used for BGP connection. The address type (IPv4 or IPv6) must be same as that of the peer address.
Defaults	The local interface is used as the egress interface by default.	
Command Mode	BGP configuration mode/ IPv4 VRF address family configuration mode/ IPv6 VRF address family configuration mode/ Scope configuration mode	
Usage Guide	You can use this command to enable the loopback interface to establish a BGP connection with the peer. The interface address specified for BGP connection must be valid in local, otherwise the BGP connection may be faulty. All members in a BGP peer group inherit the settings of this command. Particularly, if the interface address is used, only the member whose address type is same as the interface address's can inherit the settings of this command. If the IPv6 address of the loopback interface is used for neighbor connection, both peers need to be configured with the loopback interface. The BGP connection can be established only when the address of the egress interface	

	on the peer is same as that of the neighbor in local. A loopback interface address can be configured on different interfaces. You need to specify only the interface name, The peer configured with the IPv6 address of loopback interface support only one-hop BGP neighbor connection.
Configuration Examples	The following example establishes the BGP connection. FS(config)# router bgp 65000 FS(config-router)# neighbor 10.0.0.1 update-source lookback 1
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer.
Platform Description	None

5.119 neighbor version

	Use this command to display the number of the BGP protocol version used by the specific BGP neighbor. Use the no or default form of this command to restore the default setting. neighbor { peer-address | peer-group-name } version 4 no neighbor { peer-address | peer-group-name } version default neighbor { peer-address | peer-group-name } version
Parameter Description	**Parameter** / **Description** *peer-address* / IP address of the peer *peer-group-name* / Name of the peer group of up to 32 characters *4* / Version number
Defaults	The default version number is 4.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 VRF address family configuration mode or BGP Scope configuration mode
Usage Guide	When the command is used, BGP will lose the version negotiation function.
Configuration Examples	The following example displays the number of the BGP protocol version used by the specific BGP neighbor. FS(config-router)# neighbor 10.1.1.1 version 4
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer.
Platform Description	None

5.120 neighbor weight

	Use this command to set the weight for the specific neighbor. Use the no or default form of this command to restore the default setting. neighbor { peer-address | peer-group-name } weight number no neighbor { peer-address | peer-group-name } weight default neighbor { peer-address | peer-group-name } weight
Parameter Description	**Parameter** / **Description** *peer-address* / IP address of the peer *peer-group-name* / Name of the peer group of up to 32 characters *number* / Weight, in the range from 0 to 65535.
Defaults	No weight is configured for the specific neighbor by default. In this case, the learned route weight is 0 and the locally generated route's weight is 32768 initially.
Command Mode	BGP configuration mode, BGP IPv4 Unicast/VRF address family configuration mode, BGP IPv6 Unicast/VRF address family configuration mode, BGP scope configuration mode and BGP L2VPN EVPN family address configuration mode
Usage Guide	When the command is used, routes learnt from the neighbor use this value as the initial weight value. The higher the weight, the higher the priority is. Executing the **set weight** command in the route map of the neighbor will overwrite this value.
Configuration Examples	The following example sets the weight for the specific neighbor. FS(config-router)# neighbor 10.1.1.1 weight 73
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **neighbor remote-as** / Configures the BGP peer.
Platform Description	None

5.121 network

	Use this command to configure the network information to be advertised by the local BGP speaker. Use the no or default form of this command to restore the default setting. network network-number [mask mask] [route-map map-tag] [backdoor] no network network-number [mask mask] [route-map map-tag] [backdoor] default network network-number [mask mask] [route-map map-tag] [backdoor]
Parameter Description	**Parameter** / **Description** ***network-number*** / Network number ***mask*** / Subnet mask ***map-tag*** / Name of the route-map of up to 32 characters **backdoor** / The route is a backdoor route.
Defaults	No network information is specified by default.

Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode or BGP Scope configuration mode.
Usage Guide	This command allows injecting the IGP route into the BGP routing table. The network information advertised can be direct route, static route and dynamic route. The "route-map" can be used to modify the network information.
Configuration Examples	The following example configures the network information to be advertised by the local BGP speaker. FS(config)# router bgp 65000 FS(config-router)# network 10.0.0.1 mask 255.255.0.0
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **redistribute** / Configures the route redistribution. **Network synchronization** / Enables network synchronization.
Platform Description	None

5.122 network synchronization

	Use this command to advertise the network information after the local BGP speaker is synchronized with the local device. Use the no or default form of this command to directly advertise the network information. network synchronization no network synchronization default network synchronization
Parameter Description	**Parameter** / **Description** N/A / N/A
Defaults	This function is enabled by default.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode or BGP Scope configuration mode.
Usage Guide	This command is used to modify the status of the network during the process of advertisement. It is not recommended to turn off this switch lest route black hole is caused.
Configuration Examples	The following example advertises the network information after the local BGP speaker is synchronized with the local device. FS(config)# router bgp 65000 FS(config-router)# network synchronization
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol. **redistribute** / Configures the route redistribution. **network(BGP)** / Configures the route to be distributed.
Platform Description	None

5.123 overflow memory-lack

	Use this command to allow BGP to enter the OVERFLOW state when the memory is insufficient. Use the no or default form of this command to disable this function. overflow memory-lack no overflow memory-lack default overflow memory-lack
Parameter Description	**Parameter** / **Description** N/A / N/A
Defaults	Allow the BGP to enter the OVERFLOW state when the memory is insufficient.
Command Mode	BGP configuration mode or BGP Scope Global configuration mode
Usage Guide	In the BGP OVERFLOW state, the newly-learned routes are discarded, which prevents the memory from increasing. When this function is enabled, if the BGP address family is in the OVERFLOW state, the newly-learned routes will be discarded, which may result in network loop. To prevent this, BGP generates a default route directing to the NULL interface, and the default route will always exist in the OVERFLOW state. Use the **clear bgp** {*addressfamily*|**all**} * command to reset the BGP and clear the OVERFLOW state in the BGP address family. Use the no option to disallow the BGP to enter the OVERFLOW state when the memory is insufficient, which may lead to the continuous exhaustion of the memory resources. When the memory has been exhausted to a certain degree, BGP will break down all neighbors and delete all learned routes.
Configuration Examples	The following example sets BGP not to enter the OVERFLOW configuration status when the memory is insufficient. FS(config)# router bgp 65000 FS(config-router)# no overflow memory-lack
Related Commands	**Command** / **Description** **clear bgp** { *addressfamily*|**all** } * / Resets the BGP address family. **show bgp** { *addressfamily*|**all** } **summary** / Displays the summary of the BGP address family.
Platform Description	None

5.124 rd

	Use this command to configure a RD value for the EVI instance. Use the no or restore form of this command to restore the default settings. rd { auto | rd_value } no rd { auto | rd_value } default rd
Parameter Description	**Parameter** / **Description** **auto** / Generates the RD value automatically.

	rd_value	Indicates value of the RD. There are 3 forms of rd_value: 1. rd_value = as_num:nn The as_num indicates the public AS number (2 bytes) and nn is customized. The range is from 0 to 4,294,967,295. 2. rd_value = ip_addr:nn The ip_add refers to the global IP address and nn is customized. The range is from 0 to 65,535. 3. rd_value = as4_num:nn The as4_num indicates the public AS number (2 bytes) and nn is customized. The range is from 0 to 65,535. The 4-byte AS notation range is from 1 to 4,294,967,295, represented as from 1 to 65535.65535 in dot mode.
Defaults	The RD value is not configured by default.	
Command Mode	evpn-vni configuration mode	
Usage Guide	If an EVI is configured with a RD value, the RD value cannot be revised. If you want to revise it, you can only delete the EVI first and then configure a new RD value for it. One EVI can be configured with one RD value only. The RD format in 4-byte AS is **AS4:NN**. The **AS4** supports demical and dot mode. The range of **AS4** is from 1 to 4,294,967,295, represented as from 1 to 65535.65535 in dot mode. The range of **NN** is from 1 to 65,535. For AS number in the range of 1 to 65,535, it will be saved in the format of 2-byte AS, because under this condition, the demical and dot mode AS are the same.	
Configuration Examples	The following example sets RD for EVI 100. The value is 100 : 1. FS(config)# evpn FS(config-evpn)# vni 100 FS(config-evpn-vni)# rd 100:1 The following example sets RD for EVI 200. The value is auto. FS(config)# evpn FS(config-evpn)# vni 200 FS(config-evpn-vni)# rd auto	
Platform Description	N/A	

5.125 redistribute

	Use this to redistribute routes between the other routing protocol and the BGP. Use the no or default form of this command to restore the default setting. redistribute protocol-type [route-map map-tag] [metric metric-value] no redistribute protocol-type [route-map map-tag] [metric] default redistribute protocol-type [route-map map-tag] [metric]

Parameter Description	**Parameter**	**Description**
	protocol-type	The source protocol types for redistributing routes, including connected, static, RIP
	route-map *map-tag*	Specifies the route map. No route map is associated with by default.
	metric *metric-value*	Sets the default metric of the routes to be redistributed, null by default.
Defaults	This function is disabled by default.	
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode or BGP Scope configuration mode.	
Usage Guide	When a switch supports multiple routing protocols, the coordination between these protocols becomes an important task. The switch may run multiple routing protocols at the same time, so it should redistribute a protocol's information to another protocol. This is applicable to all IP routing protocols. When you configure the **no** form of this command with parameters, the corresponding parameter configuration will be removed. The no form removes redistribution without any parameters configured. The route metric generated by the route-map command takes precedence over the one generated by the metric option of this command. If both are unavailable, the redistributed one is used.	
Configuration Examples	The following example redistributes routes between the other routing protocol and the BGP. FS(config-router)# redistribute static route-map static-rmap	
Related Commands	**Command**	**Description**
	show ip protocol	Displays the protocol configuration.
Platform Description	None	

5.126 redistribute ospf

	Use this command to redistribute routes between OSPF and BGP. Use the no or default form of this command to restore the default setting. redistribute ospf process-id [route-map map-tag] [metric metric-value] [match internal external [1|2] nssa-external [1|2]] no redistribute ospf process-id [route-map map-tag] [metric metric-value] [match internal external [1|2] nssa-external [1|2]}] default redistribute ospf process-id [route-map map-tag] [metric] [match { internal | external [1 | 2] | nssa-external [1 | 2] }]	
Parameter Description	**Parameter**	**Description**
	process-id	OSPF process ID to be redistributed
	route-map ***map-tag***	Specifies the route map. No route map is associated by default.
	metric ***metric-value***	Sets the default metric of the routes to be redistributed, null by default.
	match	Matches the sub type of OSPF routes.
	internal	Matches the internal OSPF routes, the default configuration.

	external [1 | 2]	Matches the external OSPF routes. You can specify the concrete type (v1 or v2) or v1 and v2 without indication.
	nssa- external [1 | 2]	Matches the NSSA-external type of OSPF routes. You can specify the concrete type (v1 or v2) or v1 and v2 without indication.
Defaults	This function is disabled by default.	
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode or BGP Scope configuration mode.	
Usage Guide	When a switch supports multiple routing protocols, the coordination between these protocols becomes an important task. The switch may run multiple routing protocols at the same time, so it should redistribute a protocol's information to another protocol. When you configure the **no** form of this command with parameters, the corresponding parameter configuration will be removed. The **no** form removes redistribution without any parameters configured. The filtering rule of OSPF routing: filtering the OSPF routing type according to the configured match option before filtering the route-map rule. The route metric generated by the **route-map** command takes precedence over the one generated by the metric option of this command. If both are not available, the redistributed one is used.	
Configuration Examples	The following example redistributes routes between OSPF and BGP. FS(config-router)# redistribute ospf 2 route-map static-rmap	
Related Commands	**Command**	**Description**
	show ip protocol	Displays the protocol configuration.
Platform Description	None	

5.127 redistribute isis

	Use this command to redistribute routes between ISIS and BGP. Use the no or default form of this command to restore the default settings. redistribute isis [isis-tag] [route-map map-tag] [metric metric-value] [level-1 | level-1-2 | level-2] no redistribute isis [isis-tag] [route-map map-tag] [metric] [level-1 | level-1-2 | level-2] default redistribute isis [isis-tag] [route-map map-tag] [metric] [level-1 | level-1-2 | level-2]	
Parameter Description	**Parameter**	**Description**
	isis-tag	(Optional)ISIS process ID to be redistributed
	route-map *map-tag*	Specifies the route map. No route map is associated by default.
	metric *metric-value*	Sets the default metric of the routes to be redistributed, null by default.
	level-1	Redistributes level-1 ISIS routes.
	level-1-2	Redistributes level-1 and level-2 ISIS routes.
	level-2	Redistributes level-2 ISIS routes.
Defaults	This function is disabled by default.	

Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode or BGP Scope configuration mode.	
Usage Guide	When a switch supports multiple routing protocols, the coordination between these protocols becomes an important task. The switch may run multiple routing protocols at the same time, so it should redistribute a protocol's information to another protocol. This is applicable to all IP routing protocols. When you configure the **no** form of this command with parameters, the corresponding parameter configuration will be removed. The **no** form removes redistribution without any parameters configured. The filtering rule of ISIS routing is: filtering the ISIS routing type according to the configured level option before filtering the route-map rule. The route metric generated by the route-map command takes precedence over the one generated by the metric option of this command. If both are unavailable, the redistributed one is used.	
Configuration Examples	The following example redistributes routes between ISIS and BGP. FS(config-router)# redistribute isis route-map static-rmap	
Related Commands	**Command**	**Description**
	show ip protocol	Displays the protocol configuration.
Platform Description	None	

5.128 route-target

	Use this command to configure a RT (Route Target) for EVI. Use the no or restore form of this command to restore the default settings. route-target { import | export | both } { auto | rt_value} no route-target { import | export | both } { auto | rt_value } default route-target { import | export | both } { auto | rt_value }	
Parameter Description	**Parameter**	**Description**
	auto	Generates the RD value automatically.
	import	Sets the import RT value.
	export	Sets the export RT value.
	both	Sets the import and export RT value.
	rt_value	Indicates value of the RT. There are 3 forms of rt_value: 1. rt_value = as_num:nn The as_num indicates the public AS number (2 bytes) and nn is customized. The range is from 0 to 4,294,967,295. 2. rt_value = ip_addr:nn The ip_add refers to the global IP address and nn is customized. The range is from 0 to 65,535. 3. rt_value = as4_num:nn The as4_num indicates the public AS number (2 bytes) and nn is customized. The range is from 0 to 65,535. The 4-byte AS notation range is from 1 to 4,294,967,295, represented as from 1 to 65535.65535 in dot mode.
Defaults	The RT value is not configured by default.	

Command Mode	evpn-vni configuration mode
Usage Guide	One EVI can be configured with multiple import and export RT values. The format of auto RT is **AS2:NN**. The **AS2** is the AS number of 2B. If an AS number of 4B is configured, it will be split into two 2B AS number and then be put in the RT. The **nn** indicates value of **vni-id** and has a space of 4B. If the AS number of BGP changes, the auto RT will be changed, too. If the manually configured RT is coherent with the auto RT, both will be displayed. After the **auto** command is configured and the automatically generated RT value is 100 : 1, then if you delete value 100 : 1, only the value not the **auto** command will be deleted.
Configuration Examples	The following example sets RT for EVI 100. The values are import RT 100:1, 100:4, export RT 100:2, 100:4, and both auto. FS(config)# evpn FS(config-evpn)# vni 100 FS(config-evpn-vni)# route-target import 100:1 FS(config-evpn-vni)# route-target export 100:2 FS(config-evpn-vni)# route-target both 100:4 FS(config-evpn-vni)# route-target both auto
Platform Description	N/A

5.129 router bgp

	Use this command to enable the BGP protocol, configure the local autonomous system number and enter BGP protocol configuration mode. Use the no or default form of this command to restore the default setting. router bgp as-number no router bgp as-number default router bgp as-number	
Parameter Description	**Parameter**	**Description**
	as-number	AS number in the range from 1 to 65535 In the 10.4(3) or later versions, the 4-byte AS notation is supported, namely, the new AS notation range is from 1 to 4294967295, represented as from 1 to 65535.65535 in dot mode.
Defaults	This function is disabled by default.	
Command Mode	Global configuration mode	
Usage Guide	This command is used to start the BGP protocol. RFC4839 defines a new reserved AS notation 23456, which cannot be used. The original private AS notation in the range from 64512 to 65534 is still effective, 65535 is reserved for special purposes. RFC 5398 also defines two groups of new reserved AS notation for documents, whose ranges are from 64496 to 64511 and from 65536 to 65551.	

Configuration Examples	The following example enables the BGP protocol. FS(config)# router bgp 65000
Related Commands	**Command** / **Description** **ip routing** / Enables IP routing. **bgp router-id** / Sets the ID of the device running the BGP protocol **network** / Sets the network information to be advertised by the local BGP speaker.
Platform Description	None

5.130 synchronization

	Use this command to enable the synchronization mechanism of BGP and IGP routing information. Use the no or default form of this command to restore the default settings. synchronization no synchronization default synchronization
Parameter Description	**Parameter** / **Description** N/A / N/A
Defaults	This function is disabled by default.
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode or BGP Scope configuration mode.
Usage Guide	The synchronization between BGP and IGP aims to prevent the possible route black hole. In any of the two cases below, you may cancel the synchronization mechanism to ensure fast convergence of routing information. ● There is no route information which passes through this AS (In general, this AS is an end AS). ● All devices within this AS operate BGP protocol and the full connection relationship is established among all BGP Speakers (The adjacent relationship is established between any two BGP Speakers).
Configuration Examples	The following example enables the synchronization mechanism of BGP and IGP routing information. FS(config)# router bgp 65000 FS(config-router)# synchronization
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol.
Platform Description	None

5.131 table-map

	Use this command to control the route information distributed to the kernel table. Use the no or default form of this command to restore the default setting. table-map route-map-name no table-map

	default table-map
Parameter Description	**Parameter** / **Description** *route-map-name* / Name of the route-map
Defaults	No table-map is configured by default,
Command Mode	BGP configuration mode, BGP IPv4/IPv6 Unicast address family configuration mode, BGP IPv4/IPv6 VRF address family configuration mode or BGP Scope configuration mode.
Usage Guide	BGP uses the table-map to control the information distributed to the kernel routing table. The table-map is used to modify attributes of that route information, and it only takes effect on the IPv4 address-family.
Configuration Examples	The following example controls the route information distributed to the kernel table. FS(config)# router bgp 65000 FS(config-router)# table-map bgp_tm
Related Commands	**Command** / **Description** **route-map** / Configures the route-map
Platform Description	None

5.132 timers bgp

	Use this command to adjust the BGP network timer. Use the no or default form of this command to restore the default value. timers bgp keepalive holdtime [minimum-holdtime] no timers bgp default timers bgp
Parameter Description	**Parameter** / **Description** *keepalive* / Time interval to send the keepalive message to the BGP peer Range: 0-65535 seconds. *holdtime* / Time interval to consider the BGP peer alive Range: 0-65535 seconds. *Minimum-holdtime* / Allows a minimum holdtime value of neighbor advertisement. It is unrestricted when the value is 0. The range is 0 to 65535 seconds.
Defaults	*keepalive*: 60 seconds *holdtime*: 180 seconds *minum-holdtime:* 0 seconds
Command Mode	BGP configuration mode / BGP scope global configuration mode
Usage Guide	A proper keepalive value must not exceed one-third of the holdtime value. If the time is configured for an individual peer or a peer group, that peer or peer-group will use its time to replace the global time configuration and connect the peer. If the BGP peer group is specified, all members of the peer group adopt the settings of this command. If this

	command is set for a member of the peer, the setting will overwrite the setting for the group.
Configuration Examples	The following example adjusts the BGP network timer. FS(config)# router bgp 65000 FS(config-router)# timers bgp 80 240
Related Commands	**Command** / **Description** **neighbor timers** / Sets the keepalive and holdtime values on the basis of neighbors.
Platform Description	None

5.133 show bgp all

	Use this command to display all the address-families information of BGP route. The use of this command is consistent with other BGP's show commands. *Display the parameters of the route information.* *show bgp all [community [community-number [exact-match]] | filter-list path-list-number | community-list community-name [extact-match] | extcommunity-list extcommunity-name | regexp regexp | quote-regexp regexp | inconsistent-as]* *Display the route dampening parameter.* *show bgp all dampening { flap-statistics | dampened-paths | parameters }* *Display the related information of the neighbors.* *show bgp all neighbors [peer-address [received-routes | routes | advertised-routes | policy [detail]]]* *show bgp all summary* *Display the update-group information.* *show bgp [instance as-num] all update-group [neighbor-address | update-group-index] [summary]*	
Parameter Description	**Parameter**	**Description**
	community *community-number*	Displays the routing information including the specified community value. Community-number can be in the format of AA:NN (autonomous system number / 2-byte number), or the following pre-defined value: internet, no-export, local-as, no-advertise.
	community-list *community-name*	Displays the BGP routing information matching the specified community-list.
	exact-match	Routing information exactly matching the community value or community-list.
	dampening dampened-paths	Displays the restrained routing information.
	dampening flap-statistics	Displays the routing dampening statistics.
	dampening parameters	Displays the routing dampening parameters.
	extcommunity-list *extcommunity-name*	Displays the routing information including the specified extcommunity value.
	filter-list *path-list-number*	Displays the routing information matching the filter-list.
	inconsistent-as	Displays the routing information of the inconsistent source AS.
	neighbors [*peer-address*]	Displays all the BGP neighbors' information.
	neighbors *peer-address* **received-routes**	Displays all routing information received from the specified peer (including the accepted and refused route).
	neighbors *peer-address* **routes**	Displays all the accepted routing information received from the peer.
	neighbors *peer-address* **advertised-routes**	Displays all the routing information sent to the specified peer.

	neighbors *peer-address* **policy**	Displays the related routing policy information of BGP neighbors. (General)
	neighbors *peer-address* **policy detail**	Displays the related routing policy information of BGP neighbors. (Detail)
	quote-regexp *regexp*	Displays the BGP routing information with the AS path attribute matching the specified regexp within the double quote marks.
	regexp *regexp*	Displays the BGP routing information with the AS path attribute matching the specified regexp.
	Summary	Displays BGP neighbor information.
	update-group [*neighbor-address* | *update-group-index*]	Display update-group information. When *neighbor-address* is specified, display the update-group information of the specified neighbor. When *update-group-index* is specified, display the specified update-group information.
Command Mode	Privileged EXEC mode	
Usage Guide	N/A	
Configuration Examples	The following example shows all neighbors' information.	

```
FS(config)# show bgp all

For address family: IPv4 Unicast

BGP table version is 1, local router ID is 1.2.3.4

Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,

                    S Stale

Origin codes: i - IGP, e - EGP, ? - incomplete


   Network          Next Hop            Metric     LocPrf     Weight Path

*> 1.0.0.0          0.0.0.0                  0                    32768      ?


Total number of prefixes 1


For address family: IPv6 Unicast

BGP table version is 1, local router ID is 1.2.3.4

Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,

                    S Stale
```

```
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network          Next Hop            Metric     LocPrf     Weight Path
*> 5750:1::/120     ::                   0                     32768      ?

Total number of prefixes 1
```

Related Commands	**Command**	**Description**
	show bgp ipv4 unicast	Displays the IPv4 unicast route information of BGP
Platform Description	None	

5.134 show bgp ipv4 unicast

	Use this command to display the IPv4 unicast route information of BGP. show bgp ipv4 unicast [vrf vrf-name] [network [network-mask [longer-prefixes]]] show bgp ipv4 unicast [vrf vrf-name] community community-number [exact-match] show bgp ipv4 unicast [vrf vrf-name] community-list community-name [exact-match] show bgp ipv4 unicast [vrf vrf-name] extcommunity-list extcommunity-name show bgp ipv4 unicast [vrf vrf-name] dampening dampened-paths show bgp ipv4 unicast [vrf vrf-name] dampening flap-statistics show bgp ipv4 unicast [vrf vrf-name] filter-list path-list-number show bgp ipv4 unicast [vrf vrf-name] inconsistent-as show bgp ipv4 unicast [vrf vrf-name] prefix-list ip-prefix-list-name show bgp ipv4 unicast [vrf vrf-name] quote-regexp regexp show bgp ipv4 unicast [vrf vrf-name] regexp regexp show bgp ipv4 unicast[vrf vrf-name] route-map map-tag show bgp ipv4 unicast [vrf vrf-name] neighbors [neighbor-address [received-routes | routes | advertised-routes | policy [detail]]] show bgp ipv4 unicast [vrf vrf-name] cidr-only	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name
	network	Displays the specific routing information in the routing table
	network-mask	Displays the routing information included in the specified network.
	longer-prefixes	Displays the route map information.
	community *community-number*	Displays the routing information including the specified community value. Community-number can be in the format of AA:NN (autonomous system number / 2-byte number), or the following pre-defined value: internet, no-export, local-as, no-advertise.
	community-list *community-name*	Displays the BGP routing information matching the specified community-list.
	exact-match	Routing information exactly matching the community value or community-list.

	extcommunity-list ***extcommunity-name***	Displays the routing information including the specified extcommunity value.
	dampening dampened-paths	Displays the restrained routing information.
	dampening flap-statistics	Displays the routing dampening statistics.
	filter-list ***path-list-number***	Displays the routing information matching the filter-list.
	inconsistent-as	Displays the routing information of the inconsistent source AS.
	prefix-list ***ip-prefix-list-name***	Displays the routing information matching the specified prefix-list.
	quote-regexp ***regexp***	Displays the BGP routing information with the AS path attribute matching the specified regexp within the double quote marks.
	regexp ***regexp***	Displays the BGP routing information with the AS path attribute matching the specified regexp.
	route-map ***map-tag***	Displays the routing information matching the specified route-map filtering condition.
	neighbors [***neighbor-address*** **]**	Displays the BGP IPv4 unicast neighbor information.
	neighbors ***neighbor-address*** **received-routes**	Displays all routing information received from the specified peer (including the accepted and refused route).
	neighbors ***neighbor-address*** **ro utes**	Displays all the routing information received from the peer and accepted.
	neighbors ***neighbor-address*** **advertised-routes**	Displays all the routing information sent to the specified peer.
	neighbors ***neighbor-address*** **policy**	Displays the related routing policy information of BGP neighbors. (General)
	neighbors ***neighbor-address*** **policy detail**	Displays the related routing policy information of BGP neighbors. (Detail)
	cidr-only	Displays the routing information without the category.
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	Use this command to view the IPv4 unicast route information of BGP. You can filter the information with the specified parameter to display the matching route information.	
Configuration Examples	The following example displays the IPv4 unicast route information of BGP.	

```
FS# show bgp ipv4 unicast
BGP table version is 2, local router ID is 192.168.183.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
      S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete
  Network      Next Hop      Metric    LocPrf Path
*>i44.0.0.0      192.168.195.183      0      100    i
*>i64.12.0.0/16    192.168.195.183      0      100    i
*>i172.16.0.0/24 192.168.195.183      0      100    i
*>i202.201.0.0    192.168.195.183      0      100    i
*>i202.201.1.0    192.168.195.183      0      100    i
*>i202.201.2.0    192.168.195.183      0      100    i
*>i202.201.3.0    192.168.195.183      0      100    i
```

```
*>i202.201.18.0    192.168.195.183      0      100    i
Total number of prefixes 8
FS# show bgp ipv4 unicast community 11:2222
111:12345
BGP table version is 2, local router ID is 192.168.183.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
       S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete
  Network      Next Hop      Metric    LocPrf Path
*>i202.201.0.0    192.168.195.183      0      100    i
*>i202.201.1.0    192.168.195.183      0      100    i
*>i202.201.2.0    192.168.195.183      0      100    i
*>i202.201.3.0    192.168.195.183      0      100    i
Total number of prefixes 4
FS(config)# ip as-path access-list 5 permit .*
FS# show bgp ipv4 unicast filter-list 5
BGP table version is 2, local router ID is 192.168.183.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
       S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete
  Network      Next Hop      Metric    LocPrf Path
*>192.168.88.0    0.0.0.0        32768 ?
Total number of prefixes 1
FS# show ip bgp cidr-only
BGP table version is 2, local router ID is 192.168.183.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
       S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete
  Network      Next Hop      Metric    LocPrf Path
*>i64.12.0.0/16    192.168.195.183      0      100    i
*>i172.16.0.0/24 192.168.195.183      0      100    i
Total number of prefixes 2
FS# show bgp ipv4 unicast labels
Network      Next Hop      In Label/Out Label
1.1.1.1/32    192.167.1.1    17/18
1.1.1.2/32    192.167.1.1    nolabel/19
```

Field	Description
Network	Route prefix
Nexthop	Nexthop IP address of the route
In label	Label assigned by this router (if any).
Out label	Label learnt from the nexthop router (if any).

Related	**Command**	**Description**

Commands	**show ip bgp**	Displays the IPv4 unicast route information of BGP.
Platform Description	None	

5.135 show bgp ipv4 unicast dampening parameters

	Use this command to display the IPv4 unicast route dampening parameters configured for the BGP. show bgp ipv4 unicast [vrf vrf-name] dampening parameters	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	This command is used to display the IPv4 unicast route dampening parameters configured for BGP.	
Configuration Examples	The following example displays the IPv4 unicast route dampening parameters configured for the BGP. FS(config-router)# bgp dampening 25 10000 10000 200 FS# show bgp ipv4 unicast dampening parameters dampening 25 10000 10000 200 Dampening Control Block(s): Reachability Half-Life time : 25 min Reuse penalty : 10000 Suppress penalty : 10000 Max suppress time : 200 min Max penalty (ceil) : 29800000 Min penalty (floor) : 5000	
Related Commands	N/A	
Platform Description	None	

5.136 show bgp ipv4 unicast neighbors

	Use this command to display the related information of BGP IPv4 unicast neighbor. show bgp ipv4 unicast [vrf vrf-name] neighbors neighbor-address	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name
	neighbor-address	Neighbor IPv4 address
	neighbors *neighbor-address* **policy**	Displays the related routing policy information of BGP neighbors. (General)
	neighbors *neighbor-address* **policy detail**	Displays the related routing policy information of BGP neighbors. (Detail)
Command	Privileged EXEC mode	

Mode	
Usage Guide	This command is used to view the information of the connection with BGP IPv4 unicast neighbor.
Configuration Examples	The following example displays the related information of BGP IPv4 unicast neighbor. FS# show bgp ipv4 unicast neighbors BGP neighbor is 192.168.195.183, remote AS 23, local AS 23, internal link BGP version 4, remote router ID 44.0.0.1 BGP state = Established, up for 00:06:37 Last read 00:06:37, hold time is 180, keepalive interval is 60 seconds Neighbor capabilities: Route refresh: advertised and received (old and new) Address family IPv4 Unicast: advertised and received Graceful restart: advertised and received Remote Restart timer is 120 seconds Received 14 messages, 0 notifications, 0 in queue open message:1 update message:4 keepalive message:9 refresh message:0 dynamic cap:0 notifications:0 Sent 12 messages, 0 notifications, 0 in queue open message:1 update message:3 keepalive message:8 refresh message:0 dynamic cap:0 notifications:0 Route refresh request: received 0, sent 0 Minimum time between advertisement runs is 0 seconds For address family: IPv4 Unicast BGP table version 2, neighbor version 1 Index 2, Offset 0, Mask 0x4 Inbound soft reconfiguration allowed 8 accepted prefixes 0 announced prefixes Connections established 2; dropped 1 Local host: 192.168.195.239, Local port: 1074 Foreign host: 192.168.195.183, Foreign port: 179 Nexthop: 192.168.195.239 Nexthop global: :: Nexthop local: :: BGP connection: non shared network Last Reset: 00:06:43, due to BGP Notification sent Notification Error Message: (Cease/Unspecified Error Subcode) Using BFD to detect fast fallover
Related Commands	N/A
Platform Description	None

5.137 show bgp ipv4 unicast paths

	Use this command to display the path information of the IPv4 unicast in the route database. show bgp ipv4 unicast [vrf vrf-name] paths	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	This command is used to view the path information in the route database.	
Configuration Examples	The following example displays the path information of the IPv4 unicast in the route database. FS# show bgp ipv4 unicast paths Address Refcnt Path [0x1d7806a0:0] (67) [0x1d7389a0:13] (20) 10	
Related Commands	N/A	
Platform Description	None	

5.138 show bgp ipv4 unicast summary

	Use this command to display the related information of BGP IPv4 unicast. show bgp ipv4 unicast [vrf vrf-name] summary	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	This command is used to display the related information of BGP IPv4 unicast.	
Configuration Examples	The following example displays the related information of BGP IPv4 unicast. FS # show bgp ipv4 unicast summary BGP router identifier 192.168.183.1, local AS number 23 BGP table version is 2 2 BGP AS-PATH entries 1 BGP community entries Neighbor V AS MsgRcvd MsgSent TblVer InQ OutQ Up/Down State/PfxRcd	

	192.168.195.79 4 24 0 0 0 0 0 never Active 192.168.195.183 4 23 17 15 1 0 0 00:09:04 8 Total number of neighbors 2
Related Commands	**Command** / **Description** **router bgp** / Enables the BGP protocol
Platform Description	None

5.139 show bgp ipv4 unicast update-group

	Use this command to display information about an update-group in the BGP IPv4 unicast address family. **show bgp ipv4 unicast** [**vrf** *vrf-name*] **update-group** [*neighbor-address* | *update-group-index*] [**summary**]
Parameter Description	**Parameter** / **Description**
	vrf-name / Specifies a VRF instance name.
	neighbor-address / Specifies a neighbor that belongs to an update-group whose information needs to be displayed.
	update-group-index / Specifies an update-group whose information needs to be displayed.
	summary / Displays neighbor-related information.
Command Mode	Privileged EXEC mode
Default Level	14
Usage Guide	This command is used to display information about an update-group in the BGP IPv4 unicast address family.
Configuration Example	The following example displays information about an update-group in the BGP IPv4 unicast address family.

```
FS#show bgp ipv4 update-group
BGP version 4 update-group 1(ref 2), internal, Address Family: IPv4 Unicast
  Update message formated 2, replicated 2
  Minimum route advertisement interval is 0 seconds
  Minimum AS origination interval is 1 seconds
  Format state: Current working
                Refresh blocked
  Has 1 members:
   192.168.195.183
```

The following example displays the neighbor summary of update-group 1 in the BGP IPv4 unicast address family.

```
FS # show bgp ipv4 unicast update-group 1 summary
BGP router identifier 192.168.183.1, local AS number 23
```

```
BGP table version is 2
2 BGP AS-PATH entries
1 BGP community entries
Neighbor          V    AS    MsgRcvd   MsgSent   TblVer   InQ   OutQ   Up/Down    State/PfxRcd
192.168.195.79    4    24    0         0         0        0     0      never      Active
192.168.195.183   4    23    17        15        1        0     0      00:09:04   8
Total number of neighbors 2
```

Field description:

Field	Description
BGP router identifier	BGP router ID
local AS number	Local AS number of BGP
BGP table version	Version of the BGP routing table
BGP AS-PATH entries	Number of AS path entries
BGP community entries	Number of community attribute entries
Neighbor	Peer address
V	Protocol version
AS	Peer AS number
MsgRcvd	Number of received packets
MsgSent	Number of sent packets
State/PfxRcd	Status of the neighbor state machine or number of received routing entries

5.140 show bgp ipv6 unicast

Use this command to display the IPv6 unicast routing information of BGP.

```
show bgp ipv6 unicast [ vrf vrf-name ] [ ipv6-prefix [ longer-prefixes ] ]
show bgp ipv6 unicast [ vrf vrf-name ]community community-number [exact-match]
show bgp ipv6 unicast [ vrf vrf-name ]community-list community-name [exact-match]
show bgp ipv6 unicast [ vrf vrf-name ] extcommunity-list extcommunity-name
show bgp ipv6 unicast [ vrf vrf-name ]dampening dampened-paths
show bgp ipv6 unicast [ vrf vrf-name ]dampening flap-statistics
show bgp ipv6 unicast [ vrf vrf-name ]filter-list path-list-number
show bgp ipv6 unicast [ vrf vrf-name ]inconsistent-as
show bgp ipv6 unicast [ vrf vrf-name ]prefix-list ipv6-prefix-list-name
show bgp ipv6 unicast [ vrf vrf-name ]quote-regexp regexp
show bgp ipv6 unicast [ vrf vrf-name ] regexp regexp
show bgp ipv6 unicast[ vrf vrf-name ] route-map map-tag
show bgp ipv6 unicast [ vrf vrf-name ] neighbors [ neighbor-address [ received-routes | routes | advertised-routes | policy [ detail ] ] ]
```

Parameter Description

Parameter	Description
vrf-name	VRF name
IPv6-prefix	Displays the IPv6 routing information included in the specified

		network. The input format of the routing information prefix is X:X:X:X::X/<0-128>.
	longer-prefixes	Displays the route map information.
	community *community-number*	Displays the routing information including the specified community value. Community-number can be in the format of AA:NN (autonomous system number / 2-byte number), or the following pre-defined value: internet, no-export, local-as, no-advertise.
	community-list *community-name*	Displays the BGP routing information matching the specified community-list.
	exact-match	Routing information exactly matches the community value or community-list.
	extcommunity-list *extcommunity-name*	Displays the routing information including the specified extcommunity value.
	dampening dampened-paths	Displays the restrained routing information.
	dampening flap-statistics	Displays the routing dampening statistics.
	filter-list *path-list-number*	Displays the routing information matching the filter-list.
	inconsistent-as	Displays the routing information of the inconsistent source AS.
	prefix-list *ipv6-prefix-list-name*	Displays the routing information matching the specified prefix-list.
	quote-regexp *regexp*	Displays the BGP routing information with the AS path attribute matching the specified regexp within the double quote marks.
	regexp *regexp*	Displays the BGP routing information with the AS path attribute matching the specified regexp.
	route-map *map-tag*	Displays the routing information matching the specified route-map filtering condition.
	neighbors [*neighbor-address*]	Displays the BGP IPv6 unicast neighbor information.
	neighbors *neighbor-address* **received-routes**	Displays all routing information received from the specified peer (including accepted and refused routes).
	neighbors *neighbor-address* **routes**	Displays all the routing information received from the peer and accepted.
	neighbors *neighbor-address* **advertised-routes**	Displays all the routing information sent to the specified peer.
	neighbors *neighbor-address* **policy**	Displays the related routing policy information of BGP neighbors. (General)
	neighbors *neighbor-address* **policy detail**	Displays the related routing policy information of BGP neighbors. (Detail)
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	Use this command to view the IPv6 unicast route information of BGP. You can filter the information with the specified parameter to display the matching route information. The function and use of this command is similar to the **show bgp ipv4 unicast** command, please refer to the command.	

Configuration Examples	N/A	
Related Commands	**Command**	**Description**
	show bgp ipv4 unicast	Displays the IPv4 unicast route information of BGP.
Platform Description	None	

5.141 show bgp ipv6 unicast dampening parameters

	Use this command to display the IPv6 unicast route dampening parameters configured for BGP. show bgp ipv6 unicast [vrf vrf-name] dampening parameters	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name.
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	This command is used to display the IPv6 unicast route dampening parameters configured for the BGP. The function and use of this command are similar to the **show bgp ipv4 unicast dampening parameters** command. Please refer to the command.	
Configuration Examples	N/A	
Related Commands	**Command**	**Description**
	show bgp ipv4 unicast dampening parameters	Displays the IPv4 unicast route dampening parameters configured for BGP.
Platform Description	None	

5.142 show bgp ipv6 unicast neighbors

	Use this command to display the related information of BGP IPv6 unicast neighbor. show bgp ipv6 unicast [vrf vrf-name] neighbors neighbor-address	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name
	neighbor-address	Neighbor IPv6 address.
	neighbors *neighbor-address* **policy**	Related route policy information of BGP neighbor. (General)
	neighbors *neighbor-address* **policy detail**	Related route policy information of BGP neighbor. (Detail)
Command Mode	Privileged EXEC mode	

Usage Guide	This command is used to view the information of the connection with BGP IPv6 unicast neighbor. The function and use of this command are similar to the **show bgp ipv4 unicast neighbors** *neighbor-address* command. Please refer to the command.	
Configuration Examples	N/A	
Related Commands	**Command**	**Description**
	show bgp ipv4 unicast neighbors neighbor-address	Displays the related information of BGP IPv4 unicast neighbor.
Platform Description	None	

5.143 show bgp ipv6 unicast paths

	Use this command to display the path information of the IPv6 unicast in the route database. show bgp ipv6 unicast [vrf vrf-name] paths	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	This command is used to view the path information in the route database.	
Configuration Examples	The following example displays the path information of the IPv6 unicast in the route database. FS# show bgp ipv6 unicast paths Address Refcnt Path [0x1d7806a0:0] (67) [0x1d7389a0:13] (20) 10	
Related Commands	**Command**	**Description**
	show bgp ipv4 unicast paths	Displays the path information of the IPv4 unicast in the route database.
Platform Description	None	

5.144 show bgp ipv6 unicast summary

	Use this command to display the related information of BGP IPv6 unicast. show bgp ipv6 unicast [vrf vrf-name] summary	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name.
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	This command is used to display the related information of BGP IPv6 unicast. The function and use of this command are similar to the **show bgp ipv4 unicast summary** command. Please refer to the command.	
Configuration Examples	N/A	
Related Commands	**Command**	**Description**
	router bgp	Enables the BGP protocol
	show bgp ipv4 unicast summary	Displays the related information of BGP IPv4 unicast.
Platform Description	None	

5.145 show bgp ipv6 unicast update-group

	Use this command to display information about an update-group in the BGP IPv6 unicast address family. **show bgp ipv6 unicast** [**vrf** *vrf-name*] **update-group** [*neighbor-address* | *update-group-index*] [**summary**]	
Parameter Description	**Parameter**	**Description**
	vrf-name	Specifies a VRF instance name.
	neighbor-address	Specifies a neighbor that belongs to an update-group whose information needs to be displayed.
	update-group-index	Specifies an update-group whose information needs to be displayed.
	summary	Displays neighbor-related information.
Command Mode	Privileged EXEC mode	
Default Level	14	
Usage Guide	This command is used to display information about an update-group in the BGP IPv6 address family.	
Configuration Example	The following example displays information about an update-group in the BGP IPv6 unicast address family.	

```
FS#show bgp ipv6 update-group
BGP version 4 update-group 1(ref 2), internal, Address Family: IPv6 Unicast
  Update message formated 2, replicated 2
  Minimum route advertisement interval is 0 seconds
  Minimum AS origination interval is 1 seconds
  Format state: Current working
                Refresh blocked
  Has 1 members:
   192:168:195::183
```

The following example displays the neighbor summary of update-group 1 in the BGP IPv6 unicast address family.

```
FS # show bgp ipv6 unicast update-group 1 summary
BGP router identifier 192.168.183.1, local AS number 23
BGP table version is 2
2 BGP AS-PATH entries
1 BGP community entries
Neighbor          V   AS   MsgRcvd  MsgSent  TblVer  InQ  OutQ  Up/Down    State/PfxRcd
192:168:195::79   4   24   0        0        0       0    0     never      Active
192:168:195::183  4   23   17       15       1       0    0     00:09:04   8
Total number of neighbors 2
```

Field description:

Field	Description
BGP router identifier	BGP router ID
local AS number	Local AS number of BGP
BGP table version	Version of the BGP routing table
BGP AS-PATH entries	Number of AS path entries
BGP community entries	Number of community attribute entries
Neighbor	Peer address
V	Protocol version
AS	Peer AS number
MsgRcvd	Number of received packets
MsgSent	Number of sent packets
State/PfxRcd	Status of the neighbor state machine or number of received routing entries

Prompt N/A

Platform N/A

Description	

5.146 show bgp l2vpn

	Use the following command to display the BGP L2VPN routing information. show bgp l2vpn { evpn } all Use the following command to display the neighbor information of the BGP L2VPN EVPN address family. show bgp l2vpn evpn all { ethernet-ad | ethernet-segment | inclusive-multicast | ip-prefix | mac-ip } [detail] Use the following command to display the second type routing information of the BGP L2VPN EVPN address family. show bgp l2vpn evpn all mac-ip mac_addr [ip_addr [detail] | ipv6_addr [detail] | detail] Use the following command to display the fifth type routing information of the BGP L2VPN EVPN address family. show bgp l2vpn evpn all ip-prefix { ip_addr [detail] | ipv6_addr [detail] | detail } Use the following command to display the neighbor information of the BGP L2VPN address family. show bgp l2vpn { evpn } all neighbor [peer-address [policy [detail]]] Use the following command to display the neighbor summary information of the BGP L2VPN address family. show bgp l2vpn { evpn } all summary Use the following command to display the L2VPN EVPN information on the specified RD. show bgp l2vpn evpn rd vpn_rd [[ethernet-ad | ethernet-segment | inclusive-multicast | ip-prefix | mac-ip] [detail]] Use the following command to display the L2VPN EVPN information on the specified EVI. show bgp l2vpn evpn evi vni-id [[ethernet-ad | ethernet-segment | inclusive-multicast | ip-prefix | mac-ip] [detail]]
Parameter Description	

Parameter	Description
evpn	Displays EVPN information.
all	Displays all NLRI information that contains the VPLS instance or the VPWS instance.
ve_id:offset	Displays the VFI instance information of the specified ve_id:offset
ethernet-ad [detail]	Displays basic (detailed) information of the first type of BGP L2VPN EVPN routes.
ethernet-segment [detail]	Displays basic (detailed) information of the fourth type of BGP L2VPN EVPN routes.
inclusive-multicast [detail]	Displays basic (detailed) information of the third type of BGP L2VPN EVPN routes.
ip-prefix [detail]	Displays basic (detailed) information of the fifth type of BGP L2VPN EVPN routes.
ip-prefix [*ip_addr* [detail] | *ipv6_addr* [detail] | detail]	Displays basic (detailed) information of routes with specific IP address or IPv6 address in the fifth type of BGP L2VPN EVPN routes.
mac-ip [**detail**]	Displays basic (detailed) information of the second type of BGP L2VPN EVPN routes.
mac-ip ***mac_addr*** **[** ***ip_addr*** **[detail] |** ***ipv6_addr*** **[detail] | detail]**	Displays basic (detailed) information of routes with specific MAC addresses or MAC addresses+IP addresses/IPv6 addresses in the second type of BGP L2VPN EVPN routes.
neighbor [*peer-address*]	Displays the BGP L2VPN neighbor information.

		You can specify the specific neighbor information by entering the parameter *neighbor-address*. Otherwise all BGP L2VPN neighbor information is displayed.
	neighbor *peer-address* policy	Displays the summarized routing policy information on BGP neighbor.
	neighbor *peer-address* policy detail	Displays the detailed routing policy information BGP neighbor,
	summary	Displays main BGP L2VPN information, including site ID, OFFSET, LABEL BASE and NEXT HOP.
	rd *vpn_rd*	The specified RD.
	vfi *vfi_name*	The specified VFI instance.
	evi *vni-id*	The specified evl instance.
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	N/A	
Configuration Examples	The following example displays all L2VPN EVPN address family routing information.	

```
FS(config)# show bgp l2vpn evpn all
BGP table version is 16, local router ID is 1.1.1.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
                S Stale, b - backup entry
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network          Next Hop            Metric     LocPrf     Weight Path
Route Distinguisher: 1:100 (Default for EVI 1122)
*> 0:32:1.1.1.1/72    0.0.0.0                                  32768      i

Total number of prefixes 1
Route Distinguisher: 1.1.1.1:100 (Default for EVI 100)
*> 0:6:0011.2233.2016:0:0.0.0.0/128
                      0.0.0.0                                     32768      i
*>i0:6:00d0.f822.33df:0:0.0.0.0/128
                      2.2.2.2                  0          100          0      i
*> 0:6:0011.2233.2016:32:100.1.1.2/128
                      0.0.0.0                                     32768      i
*>i0:6:00d0.f822.33df:32:100.1.1.1/128
                      2.2.2.2                  0          100          0      i
*> 0:32:1.1.1.1/72    0.0.0.0                                  32768      i
*>i0:32:2.2.2.2/72    2.2.2.2                  0          100          0      i

Total number of prefixes 6
```

Command	Description
BGP table version	BGP table version.

	Local Router ID	Local Router ID. Generally it is a loopback address.
	status codes	Status codes: s :The route is dampened. d :Shielded route flap. h: Historical routes that no longer available * : Valid routes > : Optimal routes i : IBGP routes r : Fails to install the RIB routing table. S: Old routes.
	Origin Codes	Origin Codes: i: IGP. e: EGP. ?: Incomplete.
	Network	Routing information in the form aa:bb. The aa here represents site ID and the bb represents label model offset.
	Next hop	Next hop IP address.
	Metric	Metric value of the represent route (if be displayed.)
	LocPrf	Local priority.
	Path	AS path that reach the destination network.

Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

5.147 show bgp l2vpn update-group

	Use this command to display the update-group information of BGP L2VPN address family. show bgp l2vpn { evpn } all update-group [neighbor-address | update-group-index] [summary]	
Parameter Description	**Parameter**	**Description**
	evpn	Displays the L2VPN EVPN address family information.
	neighbor-address	Displays the update-group information of specified neighbor.
	update-group-index	Display the specified update-group information.
	summary	Display neighbor information.
Defaults	N/A	
Command Mode	Privileged EXEC mode	

Usage Guide	Display the update-group information of BGP L2VPN address family.
Configuration Examples	The following example displays the update-group information of BGP L2VPN EVPN address family

```
FS#show bgp l2vpn evpn all update-group
BGP version 4 update-group 1(ref 2), internal, Address Family: L2VPN EVPN
  Update message formated 2, replicated 2
  Minimum route advertisement interval is 0 seconds
  Minimum AS origination interval is 1 seconds
  Format state: Current working
                Refresh blocked
  Has 1 members:
   192.168.195.183
```

The following example displays the neighbor summay of update-group 1 of BGP L2VPN EVPN address family

```
FS # show bgp l2vpn evpn all update-group 1 summary
BGP router identifier 192.168.183.1, local AS number 23
BGP table version is 2
2 BGP AS-PATH entries
1 BGP community entries
Neighbor          V   AS   MsgRcvd  MsgSent  TblVer  InQ  OutQ  Up/Down   State/PfxRcd
192.168.195.79    4   24   0        0        0       0    0     never     Active
192.168.195.183   4   23   17       15       1       0    0     00:09:04  8
Total number of neighbors 2
```

Field	Description
BGP router identifier	BGP router ID
local AS number	Local AS number of BGP
BGP table version	Version of the BGP routing table
BGP AS-PATH entries	Number of AS path entries
BGP community entries	Number of community attribute entries
Neighbor	Peer address
V	Protocol version
AS	Peer AS number
MsgRcvd	Number of received packets
MsgSent	Number of sent packets
State/PfxRcd	Status of the neighbor state machine or number of received routing entries

Platform Description	N/A

5.148 show bgp statistics

	Use this command to display the BGP statistics information. show bgp statistics [vrf vrf-name]

Parameter Description	**Parameter**	**Description**
	vrf *vrf-name*	Displays the BGP statistics information of VRF.

Defaults	N/A
Command Mode	Privileged EXEC mode
Usage Guide	Without the **vrf** parameter, the global BGP statistics information will be displayed.
Configuration Examples	The following example displays the BGP statistics information.

```
FS#show bgp statistics
Local as 100, Router id 1.1.1.1
  Total neighbor 10, Established neighbor 9, Admin-Down neighbor 1
  IBGP neighbor 8, Established IBGP neighbor 8, Admin-Down IBGP neighbor 0
  EBGP neighbor 2, Established EBGP neighbor 1, Admin-Down EBGP neighbor 1
  AS-PATH entries 1, Community entries 1, Extended-Community entries 0

  For address family: IPv4 Unicast
    Activated neighbor 9, Unactivated neighbor 0
    Activated IBGP neighbor 8, Unactivated IBGP neighbor 0
    Activated EBGP neighbor 1, Unactivated EBGP neighbor 0

  For address family: IPv6 Unicast
    Activated neighbor 0, Unactivated neighbor 9
    Activated IBGP neighbor 0, Unactivated IBGP neighbor 0
    Activated EBGP neighbor 0, Unactivated EBGP neighbor 0
```

Parameter	Description
Router id	ID of BGP router.
Total neighbor	Total number of neighbors.
Established neighbor	Number of UP neighbors.
Admin-Down neighbor	Number of admin down neighbors.
IBGP neighbor	Number of IBGP neighbors.
Established IBGP neighbor	Number of UP IBGP neighbors.
Admin-Down IBGP neighbor	Number of admin down IBGP neighbors.
EBGP neighbor	Number of EBGP neighbors.
AS-PATH entries	Number of AS-PATH entries.
Community entries	Number of community entries.
Extended-Community	Number of extended community entries.
Established EBGP neighbor	Number of UP EBGP neighbors.
Admin-Down EBGP neighbor	Number of admin down EBGP neighbors.
Activated neighbor	Number of activated neighbors.
Unactivated neighbor	Number of unactivated neighbors, not including UP neighbors.
Activated IBGP neighbor	Number of activated IBGP neighbors.
Unactivated IBGP neighbor	Number of unactivated IBGP neighbors, not including UP neighbors.
Activated EBGP neighbor	Number of activated EBGP neighbors.

	Unactivated EBGP neighbor	Number of unactivated EBGP neighbors, not including UP neighbors.
Platform Description	N/A	

5.149 show evpn

	Use this command to display the EVI instance. show evpn [vni-id [detail] | detail]
Parameter Description	**Parameter** / **Description** *vni-id* / Indicates the ID of specified EVI instance.
Defaults	N/A
Command Mode	Privileged EXEC mode
Usage Guide	If an ID of EVI instance is exported, display the information of the EVI. IF no EVI ID is imported, display all EVIs' information.
Configuration Examples	The following example displays all information of EVI 100.

```
FS#show evpn 100 detail
EVI 100, RD 1.1.1.1:100(auto)
  Import VPN route-target communities
    RT: 100:100(auto)
  Export VPN route-target communities
    RT: 100:100(auto)
  EVI Layer 3 Interface: OverlayRouter 100
  All Route count: 6
    Ethernet Auto-discovery Route count: 0
    MAC/IP Advertisement Route count: 4
    Inclusive Multicast Ethernet Tag Route count: 2
    Ethernet Segment Route count: 0
    Install Route count: 3
```

Parameter	Description
RD	RD value of EVI.
EVI Layer 3 Interface	L3 interface associated with EVI.
Export VPN route-target communities	Value of the exported RT of EVI.
Import VPN route-target communities	Value of the imported RT of EVI.
Route count	Number of routes in EVI instance.

The following example displays key information of EVI.

```
FS#show evpn
vni          rd                 interface
100          1.1.1.1:100        OverlayRouter 100
300          1.1.1.1:300        N/A
789          1.1.1.1:789        N/A
1000         1.1.1.1:1000       OverlayRouter 1000
1122         1:100              N/A
2000         1.1.1.1:2000       OverlayRouter 2000
3344         1.1.1.1:3344       N/A
1678889      1.1.1.1:40489      N/A
Total number: 8
```

Parameter	Description
vni	vni-id of EVI.
rd	RD value of EVI
interface	L3 interface associated with EVI.

Related Commands	Command	Description
	N/A	N/A

Platform Description

N/A

5.150 show evpn mac

Use this command to display the mobilized or conflict MAC information

show evpn mac {conflict | mobility } [vni-id]

Parameter Description

Parameter	Description
conflict	Display the conflicted MAC
mobility	Display the mobilized MAC
vni-id	Display the ID of specific EVI instance

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

If the parameter has EVI ID, then display the MAC information of specific EVI; if no EVI ID is entered, display the MAC information of all EVI.

Configuration Examples

The following example checks the mobilized MAC information.

```
FS#show evpn mac mobility
vni     mac              count   remain-time
10      0055.1000.0004   2       72
10      0055.1000.000a   1       66
10      0055.1000.000e   1       72
10      0055.1000.0013   1       27
10      0055.1000.0015   4       75
```

Parameter	Description

vni	VNI-ID of EVI.
mac	Mobilized MAC address
count	Mobility times
remain-time	Remaining time of the timer for conflict. Unit: second.

The following example checks the conflict MAC information.

```
FS#show evpn mac conflict
FS#show evpn mac conflict
vni        mac          seq        retry-time
10         0011.0011.e69c  6       -
```

Parameter	Description
vni	vni-id of EVI.
mac	Mobilized MAC address
seq	Sequence number of conflict MAC address
Retry-time	Remaining time for retry. Unit: second

Related Commands	Command	Description
	N/A	N/A

Platform Description

N/A

5.151 show ip bgp

	Use this command to display the BGP IPv4 unicast address families' route information. The method of use is the same as other BGP show commands.
	show ip bgp [**vrf** *vrf-name*] [*network* [*network-mask* [**longer-prefixes**]] | **cidr-only** | **community** [*community-number* [**exact-match**]] | **filter-list** *path-list-number* | **community-list** *community-name* [**exact-match**] | **regexp** *regexp* | **quote-regexp** *regexp* | **extcommunity-list** *extcommunity-name* | **inconsistent-as** | **prefix-list** *ip-prefix-list-name* | **route-map** *map-tag*]
	Display route flap's parameters.
	show ip bgp [**vrf** *vrf-name*] **dampening** { **flap-statistics** | **dampened-paths** | **parameters** }
	Display neighbors' related information.
	show ip bgp [**vrf** *vrf-name*] **neighbors** [*peer-address* [**received-routes** | **routes** | **advertised-routes** [**policy** [**detail**]]]]
	show ip bgp [**vrf** *vrf-name*] **summary**
	Display directory information.
	show ip bgp [**vrf** vrf-name] **paths** Display route scan status. **show ip bgp scan**
	Display related information under VRF.
	show ip bgp { **vrf** *vrf-name* | **labels** } Display related information of BGP IPv4 unicast update-group. **show ip bgp** [**vrf** *vrf-name*] **update-group** [*neighbor-address* | *update-group-index*] [**summary**]

Parameter Description	Parameter	Description
	vrf-name	VRF name**.**
	network	Displays specific route information in the route table.
	network-mask	Displays route information in the specific network.
	longer-prefixes	Displays the route map information.
	cidr-only	Displays route information without specific category.
	community *community-number*	Displays route information containing specific community value. The *community-number* is the group number. The format is AA:NN (autonomous system number/2-byte figure), or the following pre-defined value: internet, no-export, local-as or no-advertise.
	community-list *community-name*	Displays the BGP route information of the specified community list. The *community-name* is the name of the community list.
	dampening dampened-paths	Displays dampened route information.
	dampening flap-statistics	Displays the route flap statistics.
	dampening parameters	Displays believed route flap parameters.
	extcommunity-list *extcommunity-name*	Displays route information containing specific extcommunity value.
	filter-list *path-list-number*	Displays the route information that complies with the filter list. The *path-list-numbe* is the marking number of the filter list.
	inconsistent-as	Displays the route information of inconsistent source AS.
	Labels	Displays the IPv4 label route information.
	neighbors *peer-address*	Displays the route information of BGP neighbors.
	neighbors *peer-address* received-routes	Displays all routing information received from the specified peer (including accepted and refused routes).
	neighbors *peer-address* routes	Displays all the routing information received from the peer and accepted.
	neighbors *peer-address* advertised-routes	Displays all the routing information sent to the specified peer.
	neighbors *peer-address* policy	Displays the related routing policy information of BGP neighbors. (General)
	neighbors *peer-address* policy detail	Displays the related routing policy information of BGP neighbors. (Detail)
	Paths	Displays the route information in the route database.
	prefix-list	Displays the route information that complies with the prefix list.
	quote-regexp *regexp*	Displays the BGP route information of regular expression in the specified double quotation mark of the AS route attribute.
	regexp *regexp*	Displays the BGP route information of specified regular expression of the AS route attribute.
	route-map	Displays the route information that complies with the route map.
	Scan	Displays the BGP route scanning status.
	summary	Displays related information of BGP neighbors.
	update-group [*neighbor-address* | *update-group-index*]	Display update-group information. When *neighbor-address* is specified, display the update-group

		information of the specified neighbor. When *update-group-index* is specified, display the specified update-group information.
Defaults	-	
Command Mode	Privileged EXEC mode	
Usage Guide	The **show ip bgp** command is the same as **show bgp ipv4 unicast** in terms of the function. All the parameters in **show bgp ipv4 unicast** apply to **show ip bgp**.	
Configuration Examples	-	
Configuration Examples	**Command**	**Description**
	show bgp ipv4 unicast	Displays IPv4 unicast route information in BGP route information.
Platform Description	-	

5.152 vni

	Use this command to create an EVI instance. Use the **no** form of this command to delete the EVI instance. Use the **default** form of this command to restore the default settings. **vni** *vni-id* **no vni** *vni-id* **default vni** *vni-id*	
Parameter Description	**Parameter**	**Description**
	vni-id	Indicates the VNI ID. Ranges from 1 to 16777215.
Defaults	N/A	
Command Mode	EVPN configuration mode	
Usage Guide	Configure the EVPN mode first, and then enter the evpn-vni configuration mode. Run exit command to exit.	
Configuration Examples	The following example configures an EVI instance in EVPN mode. FS(config)# evpn	

	FS(config-evpn)# vni 100	
Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

5.153 vni range

	Use this command to create EVI instances in batches and enter the EVI instance batch configuration mode. Use the **no** form of this command to delete EVI instances in batches. Use the **default** form of this command to restore the default settings. **vni range** *vni-id-list*	
	no vni range *vni-id-list*	
	default vni range *vni-id-list*	
Parameter Description	**Parameter**	**Description**
	vni-id-list	Name of the VNI ID list
Defaults	N/A	
Command Mode	EVPN configuration mode.	
Default Level	14	
Usage Guide	The configuration fails if the number of configured VNI instances exceeds the capacity or a VNI instance is being deleted. The RD values of different VNI instances must be different. Therefore, only the automatic RD configuration mode is available for configuring VNI instances in batches, and VNI instances cannot be configured manually.	
Configuration Examples	The following example configures EVI instances in batches in EVPN configuration mode. FS(config)# evpn FS(config-evpn)# vni range 100,200-300 FS(config-evpn-vni-range)#	
Verification	Run the **show running-config** command to display the EVPN configurations.	
Prompts	1. The following error information is displayed if the number of VNI instances exceeds the capacity. % this range configuration may beyond vni capacity(8000). please check your input	
	2. The following error information is displayed if a VNI instance is being deleted. % evpn evi 100 is deleting, Fail to configure vni range.	

6. PBR Commands

6.1 clear ip pbr statistics

	Use this command to clear the IPv4 PBR forwarded packet count.	
	clear ip pbr statistics [**interface** *if-name* **| local**]	
Parameter Description	**Parameter**	**Description**
	interface *if-name*	Specifies the interface name. If the interface name is specified, the device clears the IPv4 PBR forwarded packet count on that interface. Otherwise, the device clears the IPv4 PBR forwarded packet count on every interface where IPv4 PBR is enabled.
	local	Clears the IPv4 PBR forwarded packet count on the local interface.
Command Mode	Privileged EXEC mode.	
Usage Guide	Use this command to clear the IPv4 PBR forwarded packet count.	
Configuration Examples	The following example clears the IPv4 PBR forwarded packet count. FS#clear ip pbr statistics	
Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

6.2 clear ipv6 pbr statistics

	Use this command to clear the IPv6 PBR forwarded packet count.	
	clear ipv6 pbr statistics [**interface** *if-name* **| local**]	
Parameter Description	**Parameter**	**Description**
	interface *if-name*	Specifies the interface name. If the interface name is specified, the device clears the IPv6 PBR forwarded packet count on that interface. Otherwise, the device clears the IPv6 PBR forwarded packet count on every interface where IPv6 PBR is enabled.
	local	Clears the IPv6 PBR forwarded packet count on the local interface.
Defaults	N/A	
Command	Privileged EXEC mode.	

Mode	
Usage Guide	Use this command to clear the IPv6 PBR forwarded packet count.
Configuration Examples	The following example clears the IPv6 PBR forwarded packet count. FS#clear ipv6 pbr statistics
Related Commands	**Command** / **Description** N/A / N/A
Platform Description	N/A

6.3 ip local policy route-map

	Use this command to apply the policy-based routing (PBR) on the packets sent locally. Use the **no** form of this command to restore the default setting.
	ip local policy route-map *route-map*
	no ip local policy route-map
Parameter Description	**Parameter** / **Description** *route-map-name* / Name of the route map
Defaults	This function is disabled by default.
Command Mode	Global configuration mode
Usage Guide	This command is valid for the IP packets sent locally, but not the IP packets received locally. The IP packets received by the local are free from this command. To use the policy-based routing, you must specify the route map for it and create the route map. A route map contains multiple policies, and each policy defines one or more match rules and the corresponding operations. After policy-based routing is applied to an interface, the packets received by the interface will be checked. The packets that do not match any policy in the route map will be forwarded to the usual route. The packets that match a policy in the route map will be processed according to the operation defined in the policy. The **set interface** command for the policy-based routing does not support the load-balancing and only supports the redundancy backup.
Configuration Examples	The following examples send the packets with the source address 192.168.217.10 from the serial 2/0. The following example defines an ACL that match the IP packet. FS(config)#access-list 1 permit 192.168.217.10 The following example defines the route map. FS(config)#route-map lab1 permit 10 FS(config-route-map)#match ip address 1

	FS(config-route-map)#set interface serial 2/0 FS(config-route-map)#exit The following example applies PBR on the local interface. FS(config)#ip local policy route-map lab1

Related Commands	Command	Description
	access-list	Defines the access list rule.
	route-map	Defines the route map.
	set vrf	Defines the VRF instance of the policy-based IP packet.
	set ip next-hop	Defines the next hop of the policy-based routing.
	set ip default next-hop	Defines the default next hop of the policy-based routing.
	set interface	Defines the output port of the policy-based routing.
	set default interface	Defines the default policy-based routing output port.
	set ip tos	Sets the TOS in the head of the IP packet.
	set ip dscp	Sets the DSCP of the IP packet.
	set ip precedence	Sets the priority level in the head of the IP packet.
	match ip address	Sets the filtering rule.
	match length	Matches the packet length.
Platform Description	N/A	

6.4 ip policy

	Use this command to set the policy: redundant backup or load balancing used between multiple next hops of the PBR applied for the **set ip [default] nexthop** command in global configuration mode. Use the **no** form of this command to restore the default setting.
	ip policy { load-balance | redundance }
	no ip policy

Parameter Description	Parameter	Description
	load-balance | redundance	Specifies the policy: load balancing or redundant backup.
Defaults	Redundant backup is adopted by default.	
Command Mode	Global configuration mode	
Usage Guide	When you configure the **set ip next-hop** command in sub-route map, it is possible to configure multiple next	

hops. However, when you set redundant backup, only the first resolved next hop of the policy-based routing takes effect. When the load balancing is set, multiple resolved next hops of the policy-based routing take effect. The WCMP can be set up to 8 next hops, and the ECMP can be set up to 32 next hops. The resolved next hop refers to the ARP message learned by the next hop and the MAC address corresponding to this ARP exists in the MAC address table.

NPE80 does not support this command.

Configuration Examples

In the example below, there are multiple next hops configured in the route map. After the redundant backup is set in global configuration mode, only the first next hop among the sub-route map of the policy-based routing applied on the interface FastEthernet 0/0 takes effect.

The following example sets the ACL that match the IP packet.

```
FS(config)#access-list 1 permit 10.0.0.1
FS(config)#access-list 2 permit 20.0.0.1
```

The following example defines the route map.

```
FS(config)#route-map lab1 permit 10
FS(config-route-map)#match ip address 1
FS(config-route-map)#set ip next-hop 196.168.4.6
FS(config-route-map)#set ip next-hop 196.168.4.7
FS(config-route-map)#set ip next-hop 196.168.4.8
FS(config-route-map)#exit
FS(config)#route-map lab1 permit 20
FS(config-route-map)#match ip address 2
FS(config-route-map)#set ip next-hop 196.168.5.6
FS(config-route-map)#set ip next-hop 196.168.5.7
FS(config-route-map)#set ip next-hop 196.168.5.8
FS(config-route-map)#exit
```

The following example applies the policy-based routing on the interface.

```
FS(config)#interface FastEthernet 0/0
FS(config-if)#ip policy route-map lab1
FS(config-if)#exit
FS(config)#ip policy redundance
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.5 ip policy route-map

Use this command to apply the policy-based routing on an interface. Use the **no** form of this command to restore

	the default setting.	
	ip policy route-map *route-map*	
	no ip policy route-map	
Parameter Description	**Parameter**	**Description**
	route-map	Name of the route map
Defaults	This function is disabled by default.	
Command Mode	Interface configuration mode	
Usage Guide	The policy-based routing must be applied on the specified interface. That interface performs the policy-based routing only on the received packets. To use the policy-based routing, you must specify the route map for it and create the route map. A route map contains multiple policies, and each policy defines one or more match rules and the corresponding operations. After policy-based routing is applied to an interface, the packets received by the interface will be checked. The packets that do not match any policy in the route map will be forwarded to the usual route. The packets that match a policy in the route map will be processed according to the operation defined in the policy. Up to one route map can be configured on an interface. When you configure a route map on the interface for many times, the latter will overwrite the former.	
Configuration Examples	In the example below, when the interface FastEthernet0/0 receives a datagram, if the source address of the datagram is 10.0.0.1, it sets the next-hop as 196.168.4.6; if the source address is 20.0.0.1, it sets the next-hop as 196.168.5.6;, otherwise, the general forwarding will be performed. The following example sets the ACL matched with the IP packets. FS(config)#access-list 1 permit 10.0.0.1 FS(config)#access-list 2 permit 20.0.0.1 The following example defines the route map. FS(config)#route-map lab1 permit 10 FS (config-route-map)#match ip address 1 FS(config-route-map)#set ip next-hop 196.168.4.6 FS(config-route-map)#exit FS(config)#route-map lab1 permit 20 FS(config-route-map)#match ip address 2 FS(config-route-map)#set ip next-hop 196.168.5.6 FS(config-route-map)#exit The following example applies the route map on the interface. FS(config)#interface FastEthernet 0/0 FS(config-if)#ip policy route-map lab1 FS(config-if)#exit	

Related Commands	**Command**	**Description**
	access-list	Defines the access list rule.
	route-map	Defines the route map.
	set vrf	Defines the VRF instance of the policy-based IP packet.
	set ip next-hop	Defines the next hop of the policy-based routing.
	set ip default next-hop	Defines the default next hop of the policy-based routing.
	set interface	Defines the policy-based routing output port.
	set default interface	Defines the default policy-based routing output port.
	set ip tos	Sets the TOS in the head of the IP packet.
	set ip dscp	Sets the DSCP of the IP packet.
	set ip precedence	Sets the priority level in the head of the IP packet.
	match ip address	Sets the filtering rule.
	match length	Matches the packet length.
Platform Description	N/A	

6.6 ip policy-source in-interface

	Use this command to configure the source address policy-based routing for the IPv4 packets received on an interface. Use the **no** form of this command to disable the source address policy-based routing on the interface.	
	ip policy-source in-interface *interface-type sequence* { *source-address mask* | *source-address/mask* } {[**default**] **next-hop** *ip-address* [*weight*] | }[**default**] **interface** *out-interface-type* | **vrf** *vrf-name*}	
	no ip policy-source in-interface *interface-type sequence* [{*source-address mask* | *source-address/mask* } [[**default**] **next-hop** *ip-address* [*weight*] | [**default**] **interface** *out-interface-type* | **vrf** *vrf-name*]]	
Parameter Description	**Parameter**	**Description**
	interface-type	Interface type
	sequence	Policy sequence number. The lower the number is, the higher the priority is.
	source-address	Source IPv4 address.
	mask	Address mask.
	ip-address	Next hop IPv4 address
	weight	Next hop weight
	out-interface-type	Type of the next hop interface
	vrf-name	VRF instance name
Defaults	Source address policy-based routing is disabled by default.	
Command Mode	Global configuration mode	

Usage Guide	You can configure multiple **ip source-policy in-interface** commands on an interface. The policy with different source addresses must be configured with different sequence numbers. The lower the sequence number is, the higher the priority is. In case of the same sequence number, the priority order of the next hop type is as follows: **vrf** *vrf-name* > **next-hop** *ip-address* > **interface** *out-interface-type*> **default next-hop** *ip-address* > **default interface** *out-interface-type* The priority of the source address PBR is lower than that of the interface PBR.
Configuration Examples	In the example below, when the interface GigabitEthernet0/0 receives a datagram, if the source address of the datagram is 10.0.0.2, the next-hop is set as 196.168.1.2; otherwise, the general forwarding will be performed. The following example configures source address PBR in global configuration mode. FS(config)# ip source-policy in-interface gigabitEthernet 0/0 1 10.0.0.2 255.255.255.255 next-hop 196.168.1.2 FS(config)# ip source-policy in-interface gigabitEthernet 0/0 2 20.0.0.2 255.255.255.255 next-hop 196.168.2.2
Related Commands	**Command** / **Description** N/A / N/A
Platform Description	N/A

6.7 ipv6 local policy route-map

	Use this command to enable the policy-based routing on the packets sent locally. Use the **no** form of this command to restore the default setting.	
	ipv6 local policy route-map *route-map-name*	
	no ipv6 local policy route-map	
Parameter Description	**Parameter**	**Description**
	route-map-name	Name of the router map applied locally, which is configured by the **router-map** command.
Defaults	This function is disabled by default.	
Command Mode	Global Configuration mode	
Usage Guide	● This command is valid only for the IPv6 packets in accordance with the policy (for example, ping packets used for management) sent locally, but not the packets received locally. ● To use the policy-based routing, you must specify the route map for it and create the route map. A route map contains multiple policies, and each policy defines one or more match rules and the corresponding operations. After policy-based routing is applied to an interface, the packets received by the interface will be checked. The packets that do not match any policy in the route map will be forwarded to the usual route. The packets that match a policy in the route map will be processed according to the operation	

	defined in the policy.
Configuration Examples	The following examples display the PBR application process: The device sends the packets from the source address 2003:1000::10/80 to the 2001:100::/64, the packets will match ACL6 of aaa and be sent to the device 2003:1001::2. ● The following example defines the ACL matched with the IPv6 packet: FS(config)#ipv6 access-list aaa FS(config)#permit ipv6 2003:1000::10/80 2001:100::/64 ● The following example defines the router map. FS(config)#route-map pbr-aaa permit 10 FS(config-route-map)#match ipv6 address aaa FS(config-route-map)#set ipv6 next-hop 2003::1001::2 ● The following example applies the PBR on the device. FS(config)#ipv6 local policy route-map pbr-aaa

Related Commands	**Command**	**Description**
	match ipv6 address	Sets the ACL6 used to match the IPv6 packets in the IPv6 PBR.
	match length	Defines the length of matched packets.
	route-map	Defines the route map for PBR.
	set default interface	Defines the default next hop output port.
	set interface	Defines the next hop output port.
	set ipv6 default next-hop	Sets the default next hop of packet forwarding.
	set ipv6 next-hop	Sets the next hop of packet forwarding.
	set ipv6 precedence	Sets the priority field in the head of IPv6 packets.
	show ipv6 policy	Displays the current PBR application.
	show route-map	Displays the current router map configuration.
Platform Description	N/A	

6.8 ipv6 policy

	Use this command to set the policy: redundant backup or load balancing, applied for the **set ip nexthop** command in global configuration mode. Use the **no** form of this command to restore the default setting.
	ipv6 policy { load-balance | redundance }
	no ipv6 policy

Parameter Description	**Parameter**	**Description**
	load-balance	Sets the policy as load balancing.
	redundance	Sets the policy as redundant backup.

Defaults	Redundant backup is adopted by default.
Command Mode	Global configuration mode
Usage Guide	This command is valid for the IP packets sent locally, but not the IP packets received locally. The IP packets received by the local are free from this command. To use the policy-based routing, you must specify the route map for it and create the route map. A route map contains multiple policies, and each policy defines one or more match rules and the corresponding operations. After policy-based routing is applied to an interface, the packets received by the interface will be checked. The packets that do not match any policy in the route map will be forwarded to the usual route. The packets that match a policy in the route map will be processed according to the operation defined in the policy. The **set interface** command for the policy-based routing does not support the load-balancing and only supports the redundancy backup.
Configuration Examples	This function is valid for the multiple next-hops. When you configure the set ip next-hop command in sub-route map, it is possible to configure multiple next hops. However, when you set redundant backup, only the first resolved next hop takes effect. The second configured next hop will take effect only when the first one fails and the first next hop will take effect again if it recovers. When the load balancing is set, multiple next hops of the policy-based routing take effect. The WCMP can be set up to 8 next hops, and the ECMP can be set up to 32 next hops. The resolved next hop refers to the learned MAC address for the next-hop. The following example sets load-balancing mode for multiple nexthops. The following example configures an ACL matching with IP packets. FS(config)# ipv6 access-list 1 FS(config-ipv6-acl)# permit ipv6 1000::1 any FS(config)# ipv6 access-list 2 FS(config-ipv6-acl)# permit ipv6 2000::1 any The following example defines a route map. FS(config)# route-map lab1 permit 10 FS(config-route-map)# match ipv6 address 1 FS(config-route-map)# set ipv6 next-hop 2002::1 FS(config-route-map)# set ipv6 next-hop 2002::2 FS(config-route-map)# set ipv6 next-hop 2002::3 FS(config-route-map)# exit FS(config)# route-map lab1 permit 20 FS(config-route-map)# match ipv6 address 2 FS(config-route-map)# set ipv6 next-hop 2002::5 FS(config-route-map)# set ipv6 next-hop 2002::6 FS(config-route-map)# set ipv6 next-hop 2002::7 FS(config-route-map)# exit The following example applies policy-based routing on the interface.

	FS(config)# interface FastEthernet 0/0 FS(config-if)# ipv6 policy route-map lab1 FS(config-if)# exit FS(config)# ipv6 policy load-balance
Related Commands	

Command	Description
set ipv6 default next-hop	Defines the default next hop for forwarding the packets.
set ipv6 next-hop	Defines the next hop for forwarding the packets.
show ipv6 policy	Displays the current policy-based routing application.

Platform Description	N/A

6.9 ipv6 policy route-map

	Use this command to apply the policy-based routing on an interface in interface configuration mode. Use the **no** form of this command to restore the default setting. **ipv6 policy route-map** *route-map-name*
	no ip policy route-map
Parameter Description	

Parameter	Description
route-map-name	Name of the PBR router map applied locally, which is configured by the **router-map** command.

Defaults	This function is disabled by default..
Command Mode	Interface configuration mode
Usage Guide	The policy-based routing must be applied on the specified interface. That interface performs the policy-based routing only on the received packets. To use the policy-based routing, you must specify the route map for it and create the route map. A route map contains multiple policies, and each policy defines one or more match rules and the corresponding operations. After policy-based routing is applied to an interface, the packets received by the interface will be checked. The packets that do not match any policy in the route map will be forwarded to the usual route. The packets that match a policy in the route map will be processed according to the operation defined in the policy. Up to one route map can be configured on an interface. When you configure a route map on the interface for many times, the latter will overwrite the former.
Configuration Examples	An IPv6 packet is received on the fastEthernet 0/0. If the packet is sent from 10::/64 network segment, it is forwarded to the next hop of 2000:1; if the packet is sent from 20::/64 network segment, it is forwarded to the

next hop of 2000:2 or forwarded as usual.:

The following example configures an ACL matched with the IP packet.

```
FS(config)# ipv6 access-list acl_for_pbr1
FS (config-ipv6-acl)# permit ipv6 10::/64    any
FS(config)# ipv6 access-list acl_for_pbr2
FS (config-ipv6-acl)# permit ipv6 20::/64    any
```

The following example defines a route map.

```
FS(config)# route-map rm_pbr    permit 10
FS (config-route-map)# match ipv6 address acl_for_pbr1
FS(config-route-map)# set ipv6 next-hop 2000::1
FS(config-route-map)# exit
FS(config)# route-map rm_pbr    permit 20
FS(config-route-map)# match ipv6 address acl_for_pbr2
FS(config-route-map)# set ipv6 next-hop 2000::2
FS(config-route-map)# exit
```

The following example applies the route map to the interface.

```
FS(config)# interface FastEthernet 0/0
FS(config-if)# no switchport
FS(config-if)# ipv6 policy route-map rm_pbr
FS(config-if)# exit
```

Related Commands

Command	Description
route-map	Defines the route map.
match ipv6 address	Sets the IPv6 ACL used to match the IPv6 packets in the IPv6 PBR.
set ipv6 default next-hop	Defines the default next hop of the packet forwarding.
set ipv6 next-hop	Defines the next hop of the packet forwarding.
show ipv6 policy	Displays the current policy-based routing application.
show route-map	Displays the current route map configurations.

Platform Description

N/A

6.10 ipv6 policy-source in-interface

	Use this command to configure the source address policy-based routing for the IPv6 packets received on an interface. Use the **no** form of this command to disable the source address policy-based routing on the interface.
	ipv6 policy-source in-interface *interface-type sequence source-address/prefix-length* {[**default**] **next-hop** *ipv6-address* [*weight*] }| [**default**] **interface** *out-interface-type* | **vrf** *vrf-name*}
	no ipv6 policy-source in-interface *interface-type sequence* [*source-address/prefix-length* [[**default**] **next-hop** *ipv6-address* [*weight*]] | [**default**] **interface** *out-interface-type* | **vrf** *vrf-name*}

Parameter Description	**Parameter**	**Description**
	interface-type	Interface type
	sequence	Policy sequence number. The lower the number is, the higher the priority is.
	source-address	Source IPv6 address.
	Ipv6-address	Next hop IPv6 address
	weight	Next hop weight
	out-interface-type	Type of the next hop interface
	vrf-name	VRF instance name

Defaults	Source address PBR is disabled by default.
Command Mode	Global configuration mode
Usage Guide	You can configure multiple **ipv6 source-policy in-interface** commands on an interface. The policy with different source addresses must be configured with different sequence numbers. The lower the sequence number is, the higher the priority is. In case of the same sequence number, the priority order of the next hop type is as follows: **vrf** *vrf-name* > **next-hop** *ipv6-address* > **interface** *out-interface-type*> **default next-hop** *ipv6-address* > **default interface** *out-interface-type* The priority of the source address PBR is lower than that of the interface PBR.
Configuration Examples	In the example below, when the interface GigabitEthernet0/0 receives an IPv6 datagram, if the source address of the datagram is in the network segment of 10::/64, the next-hop is set as 2000:1; if the source address of the datagram is in the network segment of 20::/64, the next-hop is set as 2000:2; otherwise, the general forwarding will be performed. The following example configures source address PBR in global configuration mode. FS(config)# ipv6 source-policy in-interface gigabitEthernet 0/0 2 10::/64 next-hop 2000::1 FS(config)# ipv6 source-policy in-interface gigabitEthernet 0/0 2 20::/64 next-hop 2000::2

Related Commands	**Command**	**Description**
	N/A	N/A

Platform Description	N/A

6.11 show ip pbr bfd

	Use this command to display the correlation between the IPv4 policy router and BFD.
	show ip pbr bfd
Parameter Description	**Parameter** / **Description**
	N/A / N/A
Defaults	N/A
Command Mode	Privileged EXEC mode
Usage Guide	N/A
Configuration Examples	The following example displays the correlation between the IPv4 policy router and BFD.

```
FS# show ip pbr bfd
VRF ID    Ifindex    Host              State    Refcnt
     0         13    192.168.8.100       Up         2
```

Field Description

Field	Description
VRF ID	VRF of BFD neighbors correlated with the policy router
Ifindex	The interface index of BFD neighbors correlated with the policy router
Host	The peer IPv4 address
State	Up/Down status of BFD neighbors correlated with the policy router
Refcnt	Calculation referred by BFD neighbors

Related Commands	**Command** / **Description**
	N/A / N/A
Platform Description	N/A

6.12 show ip pbr route

	Use this command to display the IPv4 PBR information on the interface.	
	show ip pbr route [**interface** *if-name* **| local**]	
Parameter Description	**Parameter**	**Description**
	interface *if-name*	Specifies the interface name. If the interface name is specified, the IPv4 BPR information of this interface is displayed. Otherwise, the IPv4 BPR information of all interfaces where the IPv4 PBR is enabled is displayed.
	local	Displays the IPv4 PBR information on the local interface
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	Use this command to display the IPv4 PBR information.	
Configuration Examples	The following example displays the IPv4 PBR information on the interfaces.	

```
FS#show ip pbr route
PBR IPv4 Route Summay : 1
Interface              : GigabitEthernet 0/1
  Sequence             : 10
  ACL[0]               : 2900
ACL_CLS[0]         : 0
  Min Length           : None
  Max Length           : None
  VRF ID               : 0
  Route Flags        :
    Route Type         : PBR
    Direct             : Permit
    Priority           : High
    Tos_Dscp           : None
    Precedence         : None
  Tos_Dscp             : 0
  Precedence           : 0
  Mode                 : redundance
  Nexthop Count    : 1
    Nexthop[0]         : 192.168.8.100
    Weight[0]          : 1
    Ifindex[0]         : 2
```

Parameter	Description
PBR IPv4 Route Summay	IPv4 PBR route count.
Interface	Interface where IPv4 PBR is enabled.
Sequence	The PBR serial number.
ACL	The ACL ID used in the match rule.
ACL_CLS	The ACL type used in the match rule, such as the IP standard ACL.
Min Length	The minimum match length.
Max Length	The maximum match length.
VRF ID	Port-correlated VRF ID.
Route Flags	PBR flag bit: Route Type: "PBR" indicates PBR routes. "Normal" indicates common routes. Direct: PBR matching action, **permit** or **deny** Priority: PBR priority, **High** or **Low** Tos_Dscp: Displays whether the **tos** rule or the **dscp** rule is configured. Precedence: Displays whether the **set ip precedence** rule is configured.
Mode	Specifies the redundancy mode or the next hop load balancing mode.
Nexthop Count	Specifies the next hop number. ECMP supports up to 32 next hops.
Nexthop	Specifies the next hop IP address.
Weight	Specifies the next hop weight.
Ifindex	Specifies the outbound interface index corresponding to the next hop.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.13 show ip pbr route-map

Use this command to display the IPv4 PBR route-map information.

show ip pbr route-map *route-map-name*

Parameter Description

Parameter	Description
route-map-name	The route-map name.

Defaults	N/A
Command Mode	Privileged EXEC mode
Usage Guide	N/A
Configuration Examples	The following example displays the IPv4 PBR route-map information.

```
FS#show ip pbr route-map rm
Pbr VRF: GLOBAL, ID: 0
 Forward Mode: redundance
 Forwarding: On

route-map rm
  route-map index: sequence 10, permit
    Match rule:
      ACL ID :          0, ACL CLS: 0, Name: acl1
    Set rule:
      IPv4 Nexthop: 192.168.8.100, (VRF Name: , ID: 0), Weight: 0, Flags: 0
      PBR state info ifx: GigabitEthernet 0/1, Connected: true, Track State: Up
```

Field	Description
Pbr VRF	VRF name and VRF ID.
Forward Mode	Sets the load balance mode or the redundancy mode for the next hop.
Forwarding	Displays whether the IP route forwarding is enabled.
Route-map index	The serial number and the type of the sub-map.
Match rule	Match rule.
Set rule	Set rule.
PBR state info	PBR private data information, such as outbound interface and the link state of the next hop.

Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

6.14 show ip pbr source-route

	Use this command to display information about IPv4 source address-based PBR. **show ip pbr source-route** [**interface** *if-name*]	
Parameter	**Parameter**	**Description**

Description		
	interface *if-name*	Displays the IPv4 PBR applied to a specified interface if *if-name* is specified. Displays all applied IPv4 PBR information if *if-name* is not specified.
Command Mode	Privileged EXEC mode	
Default Level	14	
Usage Guide	You can use this command to display the configured source address-based PBR.	
Configuration Examples	The following example displays information about the configured source address-based PBR.	

```
FS# show ip pbr source-route
PBR IPv4 Source Route
Interface              : GigabitEthernet 0/1
  Sequence             : 10
  Source address : 10.1.1.1/24
  VRF ID               : 0
  Route Flags        :
    Route Type        : PBR
    Direct              : Permit
    Priority           : High
    Match_ipaddr    : Exist
  Mode                  : redundance
  Nexthop Count    : 1
    Nexthop[0]        : 192.168.8.100
    Weight[0]         : 1
    Ifindex[0]        : 2
```

Field description:

Field	Description
Interface	Interface to which the PBR is applied
Sequence	Sequence number of the PBR
VRF ID	ID of the VRF table associated with an interface
Route Flags	Flag bit of PBR: Route Type: type of routes. The value **PBR** indicates PBR routes while the value **Normal** indicates common routes. Direct: PBR matching mode. The options include **permit** and **deny**. Priority: priority of a PBR route. The options include **High** and **Low**.
Mode	Sets the next hop to work in redundancy mode or load balancing mode.

Nexthop Count	Sets the number of next hops. ECMP supports a maximum of 32 next hops.
Nexthop	Sets the next-hop IPv4 address.
Weight	Sets the next-hop weight value.
Ifindex	Sets the outbound interface index of the next hop.

6.15 show ip pbr statistics

	Use this command to display the IPv4 PBR forwarded packet count.	
	show ip pbr statistics [**interface** *if-name* **| local**]	
Parameter Description	**Parameter**	**Description**
	interface *if-name*	Specifies the interface name. If the interface name is specified, the IPv4 PBR forwarded packet count of this interface is displayed. Otherwise, the IPv4 PBR forwarded packet count of all interfaces where the IPv4 PBR is enabled is displayed.
	local	Displays the IPv4 PBR forwarded packet count on the local interface.
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	N/A	
Configuration Examples	The following example displays the IPv4 PBR forwarded packet count. FS#show ip pbr statistics IPv4 Policy-based route statistic gigabitEthernet 0/1 statistics : 10	
Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

6.16 show ip policy

	Use this command to display the interface configured with the policy-based routing and the name of route map applied on the interface.	
	show ip policy [*route-map-name*]	
Parameter	**Parameter**	**Description**

Description		
	route-map-name	Indicates the name of a route map.
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	You can use this command to verify the current PBR configured in the system.	
Configuration Examples	The following example displays the current PBR configured in the system. FS#show ip policy Banlance Mode: redundance Interface Route map local test FastEthernet 0/0 test	
Related Commands	**Command**	**Description**
	ip policy route-map	Applies the policy-based routing on the interface.
	ip local policy route-map	Applies the policy-based routing on the local interface.
Platform Description	N/A	

6.17 show ipv6 pbr bfd

	Use this command to display the correlation between the IPv6 policy router and BFD.	
	show ipv6 pbr bfd	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	N/A	
Configuration Examples	The following example displays the correlation between the IPv6 policy router and BFD. FS# show ipv6 pbr bfd	

```
VRF ID    Ifindex    Host                                    State    Refcnt
     0         13    2000::2                                   Up         1
```

Field Description

Field	Description
VRF ID	VRF of BFD neighbors correlated with the policy router
Ifindex	The interface index of BFD neighbors correlated with the policy router
Host	The peer IPv6 address
State	Up/Down status of BFD neighbors correlated with the policy router
Refcnt	Calculation referred by BFD neighbors

Related Commands	**Command**	**Description**
	N/A	N/A

Platform Description	N/A

6.18 show ipv6 pbr route

Use this command to display the IPv6 PBR information on the interface.

show ipv6 pbr route [**interface** *if-name* **| local**]

Parameter Description	**Parameter**	**Description**
	interface *if-name*	Specifies the interface name. If the interface name is specified, the IPv6 BPR information of this interface is displayed. Otherwise, the IPv6 BPR information of all interfaces where the IPv6 PBR is enabled is displayed.
	local	Displays the IPv6 PBR information on the local interface.

Defaults	N/A
Command Mode	Privileged EXEC mode
Usage Guide	N/A
Configuration Examples	The following example displays the IPv6 PBR information on the interfaces.

```
FS#show ipv6 pbr route
PBR IPv6 Route Summary : 1
```

```
Interface              : GigabitEthernet 0/2
  Sequence             : 10
  ACL[0]               : 2901
ACL_CLS[0]         : 0
  Min Length         : None
  Max Length         : None
  VRF ID             : 0
  Route Flags        :
    Route Type       : PBR
    Direct           : Permit
    Priority         : High
    Tos_Dscp         : None
    Precedence       : None
  Tos_Dscp           : 0
  Precedence         : 0
  Mode               : redundance
  Nexthop Count      : 1
    Nexthop[0]       : 10::1
    Weight[0]        : 1
    Ifindex[0]       : 3
```

Parameter	Description
PBR IPv4 Route Summay	IPv4 PBR route count.
Interface	Interface where IPv4 PBR is enabled.
Sequence	The PBR serial number.
ACL	The ACL ID used in the match rule.
ACL_CLS	The ACL type used in the match rule, such as the IP standard ACL.
Min Length	The minimum match length.
Max Length	The maximum match length.
VRF ID	Port associated VRF ID.
Route Flags	PBR flag bit: Route Type: "PBR" indicates PBR routes. "Normal" indicates common routes. Direct: PBR matching action, **permit** or **deny** Priority: PBR priority, **High** or **Low** Tos_Dscp: Displays whether the **tos** rule or the **dscp** rule is configured. Precedence: Displays whether the **set ip precedence** rule is configured.
Mode	Specifies the redundancy mode or the load balance mode for the next hop.
Nexthop Count	Specifies the next hop number. ECMP supports up to 32 next hops.

Nexthop	Specifies the next hop IP address.
Weight	Specifies the next hop weight.
Ifindex	Specifies the outbound interface index corresponding to the next hop

Related Commands	**Command**	**Description**
	N/A	N/A

Platform Description	N/A

6.19 show ipv6 pbr route-map

	Use this command to display the IPv6 PBR route-map information.
	show ipv6 pbr route-map *route-map-name*

Parameter Description	**Parameter**	**Description**
	route-map-name	The route-map name.

Defaults	N/A
Command Mode	Privileged EXEC mode
Usage Guide	N/A

Configuration Examples

The following example displays the IPv6 PBR route-map information.

```
FS#show ipv6 pbr route-map rm6
Pbr VRF: GLOBAL, ID: 0
 Forward Mode: redundance
 Forwarding: On

route-map rm6
  route-map index: sequence 10, permit
Match rule:
  ACL ID :          0, ACL CLS: 0, Name: acl6
    Set rule:
      IPv6 Nexthop: 10::1, (VRF Name: , ID: 0), Weight: 0, Flags: 0
       PBR state info ifx: GigabitEthernet 0/0, Connected: true, Track State: valid, Flags: 0
```

Field	**Description**
Pbr VRF	VRF name and VRF ID.

Forward Mode	Sets the load balancing mode or to the redundancy mode for the next hop.
Forwarding	Displays whether the IP route forwarding is enabled.
Route-map index	The serial number and the type of the sub-map.
Match rule	Match rule
Set rule	Set rule.
PBR state info	PBR private data information, such as outbound interface and the link state of the next hop.

Related Commands	**Command**	**Description**
	N/A	N/A

Platform Description	N/A

6.20 show ipv6 pbr source- route

Use this command to display the IPv6 source address PBR configuration.

show ipv6 pbr source-route [**interface** *if-name*]

Parameter Description	**Parameter**	**Description**
	interface *if-name*	(Optional) Displays the IPv6 source address PBR configuration on the specified interface. If the parameter is not configured, the IPv6 source address PBR configuration on all interfaces will be displayed.

Defaults	N/A
Command Mode	Privileged EXEC mode
Usage Guide	N/A

Configuration Examples

The following example displays the IPv6 source address PBR configuration.

```
FS# show ipv6 pbr source-route
PBR IPv6 Source Route
Interface          : GigabitEthernet 0/1
  Sequence         : 10
  Source address : 1000::1/64
  VRF ID           : 0
  Route Flags      :
    Route Type     : PBR
```

```
  Direct            : Permit
  Priority          : High
  Match_ipaddr      : Exist
 Mode               : redundance
 Nexthop Count      : 1
  Nexthop[0]        : 1001::2
  Weight[0]         : 1
  Ifindex[0]        : 3
```

Related Commands	Command	Description
	N/A	N/A

Platform Description	N/A

6.21 show ipv6 pbr statistics

Use this command to display the IPv6 PBR forwarded packet count.

show ip pbr statistics [**interface** *if-name* **| local**]

Parameter Description	Parameter	Description
	interface *if-name*	Specifies the interface name. If the interface name is specified, the IPv6 PBR forwarded packet count of this interface is displayed. Otherwise, the IPv6 PBR forwarded packet count of all interfaces where the IPv6 PBR is enabled is displayed.
	local	Displays the IPv6 PBR forwarded packet count on the local interface.

Defaults	N/A

Command Mode	Privileged EXEC mode

Usage Guide	N/A

Configuration Examples

The following example displays the IPv6 PBR forwarded packet count.

```
FS#show ipv6 pbr statistics
IPv6 Policy-based route statistic
 gigabitEthernet 0/1
    statistics : 20
```

Related Commands	Command	Description
	N/A	N/A

Platform Description	N/A

6.22 show ipv6 policy

	Use this command to display which interfaces are configured with IPv6 PBR.	
	show ipv6 policy [*route-map-name*]	
Parameter Description	**Parameter**	**Description**
	route-map-name	Name of the PBR router map.
Defaults	N/A	
Command Mode	Privileged EXEC mode	
Usage Guide	N/A	
Configuration Examples	The following example displays the current PBR applied in the system.	

```
FS#show ipv6 policy
Banlance Mode: redundance
Interface                    Route map
VLAN 1                       RM_for_Vlan_1
VLAN 2                       RM_for_Vlan_2
```

Field	Description
Balance Mode	The current PBR running mode.
Interface	The name of interface with PBR applied.
Route map	The name of route map applied on the interface.

Related Commands	**Command**	**Description**
	show route-map	Displays the current configured route map.
Platform Description	N/A	

7. VRF Commands

7.1 address-family

	Use this command to configure an IPv4 address family or IPv6 address family for a multiprotocol VRF.	
	address-family { **ipv4** | **ipv6** }	
Parameter Description	**Parameter**	**Description**
	ipv4	Enters IPv4 address family.
	ipv6	Enters IPv6 address family.
Defaults	No IPv4 address family or IPv6 address family is configured for a multiprotocol VRF.	
Command mode	VRF configuration mode	
Usage Guide	This command is applicable only to the multiprotocol VRF.	
Configuration Examples	The following example defines a multiprotocol VRF vrf1 and configures an IPv4 address family. FS(config)#vrf definition vrf1 FS(config-vrf)#address-family ipv4 FS(config-vrf-af)#	
Related Commands	**Command**	**Description**
	exit-address-family	Exits the VRF address family configuration mode.
	vrf definition	Defines a multiprotocol VRF.
Platform Description	N/A	
	Use this command to configure the VRF description.	
	description *string*	
Parameter Description	**Parameter**	**Description**
	string	VRF description character string. The maximum length is 244 characters.
Defaults	No VRF description is configured by default .	
Command mode	VRF configuration mode	
Usage Guide	N/A	

Configuration Examples	The following example defines a single-protocol IPv4 VRF vrf1 and configure the description to vpn-a. FS(config)#ip vrf definition vrf1 FS(config-vrf)#description vpn-a The following example defines a multiprotocol VRF vrf2 and configure the description to vpn-b. FS(config)#vrf definition vrf1 FS(config-vrf)#description vpn-b
Related Commands	**Command** / **Description**
	ip vrf / Defines a single-protocol IPv4 VRF.
	vrf definition / Defines a multiprotocol VRF.
Platform Description	N/A

7.2 exit-address-family

	Use this command to exit VRF address family configuration mode.
	exit-address-family
Parameter Description	**Parameter** / **Description**
	N/A / N/A
Defaults	N/A
Command mode	VRF address family configuration mode
Usage Guide	N/A
Configuration Examples	The following example defines a multiprotocol VRF *vrf1* and configures an IPv4 address family. FS(config)#vrf definition vrf1 FS(config-vrf)#address-family ipv4 FS(config-vrf-af)# exit-address-family FS(config-vrf)#
Related Commands	**Command** / **Description**
	address-family / Configures an IPv4 address family or IPv6 address family for a multiprotocol VRF.
	vrf definition / Defines a multiprotocol VRF.

Platform Description	N/A

7.3 ip vrf

	Use this command to create a VRF. Use the **no** form of this command to delete a VRF.	
	ip vrf *vrf-name*	
	no ip vrf *vrf-name*	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name
Defaults	No VRF is configured by default.	
Command mode	Global configuration mode	
Usage Guide	N/A	
Configuration Examples	The following example creates a VRF. FS(config)# ip vrf redvrf FS(config-vrf)#	
Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

7.4 ip vrf forwarding

	Use this command to add an interface or sub-interface to a VRF. Use the **no** form of this command to quit the VRF.	
	ip vrf forwarding *vrf-name*	
	no ip vrf forwarding *vrf-name*	
Parameter Description	**Parameter**	**Description**
	vrf-name	Name of the VRF that the interface or sub-interface joins
Defaults	By default, the interface does not belong to any VRF.	
Command	Interface configuration mode	

mode	
Usage Guide	You can bind the interface to the uni-protocol IPv4 VRF without the IPv6 enabled on the interface. On the device supporting the VRF, if the interface is bound to the uni-protocol IPv4 VRF with the IPv6 protocol enabled, the device cannot forward the IPv6 packets received on this interface.
Configuration Examples	The following example adds an interface or sub-interface to a VRF. FS(config-if-GigabitEthernet 0/0)# ip vrf forwarding redvrf
Related Commands	**Command** / **Description** N/A / N/A
Platform Description	N/A

7.5 ip vrf receive

	Use this command to import the host and direct-connected route of one interface into the specified VRF routing table. Use the **no** form of this command to remove the imported host and direct-connected route from the VRF.
	ip vrf receive *vrf-name*
	no ip vrf receive *vrf-name*
Parameter Description	**Parameter** / **Description** *vrf-name* / Name of the VRF that the host and direct-connected route imported to.
Defaults	By default, the host and direct-connected route of the interface are not imported to other VRFs
Command mode	Interface configuration mode
Usage Guide	Currently, the **ip vrf receive** command supports the VRF routing based on the PBR. This command is used to import the host with the main and slave addresses and direct-connected route of this interface into the specified VRF routing table. You need to execute this command multiple times to import this host and direct-connected route to multiple VRF routing tables. Unlike the **ip vrf forwarding** command, which does not bind the interface to the VRF and this interface still belongs to the global VRF. Configuring both **ip vrf forwarding** and **ip vrf receive** on an interface is not allowed. If one has been configured, configuring the other one will prompt an error message. If **ip vrf forwarding** has been configured, configuring **ip vrf receive** will prompt: % Cannot configure 'ip vrf receive' if interface is under a VRF If **ip vrf receive** has been configured, configuring **ip vrf forwarding** will prompt: % Cannot bind interface to a VRF if it has configed 'ip vrf receive'
Configuration	The following example imports the host and direct-connected route of one interface into the specified VRF

Examples	routing table. FS(config)# interface FastEthernet0/1 FS(config-if)# ip address 192.168.1.2 255.255.255.0 FS(config-if)# ip policy route-map PBR-VRF-SELECTION FS(config-if)# ip vrf receive VRF_1 FS(config-if)# ip vrf receive VRF_2 FS(config-if)# end
Related Commands	

Related Commands	Command	Description
	ip vrf forwarding	Adds the interface to a VRF.
	ip vrf	Creates a VRF.
	set vrf	Sets the VRF in the routing map configuration mode.

Platform Description	N/A

7.6 maximum routes

	Use this command to set the maximum routes limit within the VRF. Use the **no** form of this command to remove the setting.
	maximum routes *limit* { *warn-threshold* | **warning-only** }
	no maximum routes
Parameter Description	

Parameter Description	Parameter	Description
	limit	The maximum number of routes, in the range from 1 to 4,294,967,295. The routes which exceed the limits will not be added to the core routing table.
	warn-threshold	The warning will be printed when the threshold is reached. The threshold value is in the range from 1 to 100.
	warning-only	After the number of routes reaches *limit*, the warning will be printed but the routes will be added to the core routing table.

Defaults	N/A
Command Mode	Single-protocol VRF is configured in VRF configuration mode; multiple-protocol VRF is configured in address family mode.
Usage Guide	This command is used to set the maximum number of routes for the VRF.
Configuration Examples	The following example sets the maximum number of routes for vrf1 to 1,000, and enables the device to only print the warning. FS(config)# ip vrf vrf1 FS(config-vrf)# maximum routes 1000 warning-only

Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

7.7 vrf definition

	Use this command to create the multiprotocol VRF.	
	vrf definition *vrf-name*	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name, no more than 31 characters.
Defaults	N/A	
Command mode	Global configuration mode	
Usage Guide	The single-protocol VRF configuration command **ip vrf** cannot be used to edit a multiprotocol VRF; the multiprotocol VRF configuration command **vrf definition** cannot be used to edit a single-protocol IPv4 VRF.	
Configuration Examples	The following example s creates a multiprotocol VRF *vrf1*. FS(config)#vrf definition vrf1 FS(config-vrf)#	
Related Commands	**Command**	**Description**
	description	Configures the description.
	address-family	Configures an IPv4 address family or IPv6 address family for a multiprotocol VRF.
	exit-address-family	Exits the VRF address family configuration mode.
	vrf forwarding	Binds a network interface to a multiprotocol VRF.
Platform Description	N/A	

7.8 vrf forwarding

	Use this command to bind a network interface to a multiprotocol VRF.
	vrf forwarding *vrf-name*

Parameter Description	Parameter	Description
	vrf-name	VRF name, which shall be a multiprotocol VRF instead of a single-protocol VRF that supports IPv4 only.
Defaults	The network interface is not bound to any VRF.	
Command mode	Interface configuration mode	
Usage Guide	The configuration command **ip vrf forwarding** cannot be used to bind a network interface to a multiprotocol VRF; the configuration command **vrf forwarding** cannot be used to bind a network interface to a single-protocol IPv4 VRF. An interface cannot be bound to a multiprotocol VRF that is not configured with any address family. To bind a network interface to a multiprotocol VRF, you should delete the existing IPv4 addresses, VRRP IPv4 addresses, IPv6 addresses and VRRP IPv6 addresses, and disable IPv6 on the interface. When a network interface is bound to a multiprotocol VRF, no IPv4 address or VRRP IPv4 address should be configured for the interface if no IPv4 address family is configured for the VRF. You should configure an IPv4 address family for the VRF before configuring an IPv4 address and VRRP IPv4 address for the interface. When a network interface is bound to a multiprotocol VRF, no IPv6 address or VRRP IPv6 address should be configured for the interface if no IPv6 address family is configured for the VRF. You should configure an IPv6 address family for the VRF before configuring an IPv6 address and VRRP IPv6 address for the interface. If you delete a multiprotocol VRF's IPv4 address family, you should delete the IPv4 addresses and VRRP IPv4 addresses of all network interfaces bound to the VRF, and delete the IPv4 static routes whose routing VRF or next-hop VRF is that VRF. Likewise, if you delete a multiprotocol VRF's IPv6 address family, you should delete the IPv4 addresses and VRRP IPv6 addresses of all network interfaces bound to the VRF, disable IPv6 on the interfaces, and delete the IPv6 static routes whose routing VRF or next-hop VRF is that VRF.	
Configuration Examples	The following example binds the interface VLAN 1 to a multiprotocol VRF vrf1. FS(config)#vrf definition vrf1 FS(config-vrf)#address-family ipv4 FS(config-vrf-af)#exit-address-family FS(config-vrf)#address-family ipv6 FS(config-vrf-af)#exit-address-family FS(config-vrf)#interface vlan 1 FS(config-if)#vrf forwarding vrf1 FS(config-if)#ip address 1.1.1.1 255.255.255.0 FS(config-if)#ipv6 address 1000::1/64	
Related Commands	**Command**	**Description**
	vrf definition	Defines a multiprotocol VRF.

Platform Description	N/A

7.9 vrf receive

	Use this command to add the local host's route and direct route with the interface's IPv4/v6 address to the routing table of the specified VRF.	
	vrf receive *vrf-name*	
Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name, which should be a multiprotocol VRF instead of a single-protocol IPv4 VRF.
Defaults	N/A	
Command mode	Interface configuration mode	
Usage Guide	This command is not used to bind an interface to a VRF, and the interface is still a global interface. If the administrator needs to use PBR to choose VRF, the **vrf receive** command should be configured on the interfaces where PBR is applied for each selected VRF. When an IPv4 address family is configured for a multiprotocol VRF, the local host's route and direct route with the interface's IPv4 address is added to the IPv4 routing table of the specified VRF, and the local host's route with the IPv4 address of the master VRRP group on the interface is added to the IPv4 routing table of the specified VRF. When an IPv6 address family is configured for a multiprotocol VRF, the local host's route and direct route with the interface's IPv6 address is added to the IPv6 routing table of the specified VRF, and the local host's route with the IPv6 address of the master VRRP group on the interface is added to the IPv6 routing table of the specified VRF. The **ip vrf forwarding** and **vrf receive** commands are mutually exclusive on an interface, and so are the vrf forwarding and vrf receive commands. If both commands are configured on an interface, an error message will be shown. If the **ip vrf forwarding** or **vrf forwarding** command is configured first, and then the **vrf receive** command is configured, the following message will be displayed: % Cannot configure 'vrf receive' if interface is under a VRF If the **vrf receive** command is configured first, and then the **ip vrf forwarding** or **vrf forwarding** command is configured, the following message will be displayed: % Cannot configure 'vrf forwarding vrf2' on this interface, please delete'ip vrf receive' and 'vrf receive' first.	
Configuration Examples	The following example selects a VRF using IPv6 PBR on VLAN 1. FS(config)#vrf definition vrf1 FS(config-vrf)#address-family ipv6 FS(config-vrf-af)#exit-address-family FS(config-vrf)#vrf definition vrf2 FS(config-vrf)#address-family ipv6	

```
FS(config-vrf-af)#exit-address-family

FS(config-vrf)#route-map pbr-vrf-selection permit 10
FS(config-route-map)#match ipv6 address acl1
FS(config-route-map)#set vrf vrf1
FS(config-route-map)#route-map pbr-vrf-selection permit 20
FS(config-route-map)#set vrf vrf2

FS(config-route-map)#interface vlan 1
FS(config-if)#ipv6 policy route-map pbr-vrf-selection
FS(config-if)#ipv6 address 1000::1/64
FS(config-if)#vrf receive vrf1
FS(config-if)#vrf receive vrf2
```

Related Commands	**Command**	**Description**
	vrf definition	Defines a multiprotocol VRF.
	address-family	Configures an IPv4 address family or IPv6 address family for a multiprotocol VRF.
	set vrf	Configures a VRF in the route map configuration mode.

Platform Description	N/A

7.10 show ip vrf

	Use this command to display the VRF information.
	show ip vrf [**brief** | **detail** | **interfaces**]
Parameter Description	**Parameter** / **Description**
	brief — (Optional) Displays the VRF information in brief.
	detail — (Optional) Displays the VRF information in detail.
	interfaces — (Optional) Displays the VRF's interface information in detail.
Defaults	All VRF information is displayed without parameter specified.
Command mode	Privileged EXEC mode
Usage Guide	Use this command to display the VRF information, which can be divided into two levels: Use the keyword **brief** to display the information in brief. Use the keyword **detail** to display the information in detail. Use the keyword interfaces to display the VRF's interface information.
Configuration Examples	The following example displays the VRF information.

```
FS#show ip vrf
Name                                    Interfaces
aaa                                     GigabitEthernet 0/0
                                        GigabitEthernet 0/1
```

Related Commands	**Command** / **Description**
	N/A — N/A
Platform Description	N/A

7.11 show vrf

	Use this command to display the VRF configuration (including the single-protocol VRF and the multiple-protocol VRF).
	show vrf [**ipv4** | **ipv6** | **brief** | count | **detail**]
Parameter Description	**Parameter** / **Description**
	ipv4 — Displays the brief VRF (the single-protocol VRF) information of the IPv4 address family.

	Ipv6	Displays the VRF brief information of the IPv6 address family.
	brief	Displays the brief VRF (including the single-protocol VRF and the multiple-protocol) information.
	count	Displays the capacity of VRF and its current value.
	detail	Displays the detailed VRF (including the single-protocol VRF and the multiple-protocol) information.
Defaults	N/A	
Command mode	Privileged EXEC mode	
Usage Guide	N/A	
Configuration Examples	The following example displays brief information about all VRF.	

```
FS#show vrf
  Name          Default RD          Protocols    Interfaces
  aaa           <not set>           ipv4
  aab           <not set>
  bbb           <not set>           ipv6
  ccc           <not set>           ipv4,ipv6    Vl1
```

:

Field	Description
Name	VRF name.
Default RD	Default RD of the VRF.
Protocol	The address family of the VRF. IPv4 indicates the VRF is enabled in the IPv4 address family mode; ipv6 indicates the VRF is enabled in the IPv6 address family mode.
Interfaces	The interface list of the VRF. The interface where the [ip] vrf forwarding command has been configured will be displayed on that list.

Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

8. RIPng Commands

8.1 clear ipv6 rip

	Use this command to clear the RIPng routes.	
	clear ipv6 rip	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	None	
Command mode	Privileged EXEC mode	
Usage Guide	Running this command removes all RIPng routes and this operation may have great impact on the RIPng protocol. This command should be used with caution.	
Configuration Examples	The following example clears the RIPng routes: FS# clear ipv6 rip	
Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

8.2 default-metric

	Use this command to configure the default metric for RIPng. Use the **no** form of this command to restore the default value.	
	default-metric *metric*	
	no default-metric	
Parameter Description	**Parameter**	**Description**
	metric	Sets the default metric value. The valid range is from 1 to 16. The route is unreachable if the metric value is larger than or equal to 16.
Defaults	The default value is 1.	
Command mode	Routing process configuration mode.	

Usage Guide	This command shall be used with the **redistribute** command. When redistributing the route from one route process to RIPng, due to the incompatibility of metric calculation mechanisms of different routing protocols, it fails to translate the routing metric values. To this end, the RIPng metric value shall be defined when translating the metric values. If there is no defined metric value, use the **default-metric** command to define one; and the defined metric value will overwrite the value of the **default-metric** command. By default, the **default-metric** value is 1.
Configuration Examples	The following example shows how to set the RIPng metric value as 3 when redistributing OSPF process 100: FS(config-router)# default-metric 3 FS(config-router)# redistribute ospf 100
Related Commands	**Command** / **Description**
	redistribute / Redistributes the route from one route domain to another route domain.
Platform Description	N/A

8.3 distance

	Use this command to set the administrative distance of RIPng. Use the **no** form of this command to restore the default value.
	distance *distance*
	no distance
Parameter Description	**Parameter** / **Description**
	distance / Sets the RIPng administrative distance. The range is from 1 to 254.
Defaults	The default distance is 120
Command mode	Routing process configuration mode.
Usage Guide	N/A
Configuration Examples	The following example shows how to set the RIPng administrative distance as 160: FS(config)# ipv6 router rip FS(config-router)# distance 160
Related Commands	**Command** / **Description**

	N/A	N/A
Platform Description	N/A	

8.4 distribute-list

	Use this command to filter the in/out route in the prefix list. Use the **no** form of this command to remove route filtering.	
	distribute-list prefix-list *prefix-list-name* { **in** | **out** } [*interface-type interface-name*]	
	no distribute-list prefix-list *prefix-list-name* { **in** | **out** } [*interface-type interface-name*]	
Parameter Description	**Parameter**	**Description**
	prefix-list *prefix-list-name*	Name of the prefix list which is used to filter the route.
	in | **out**	Filters the in or out route in the distribute list.
	interface-type interface-name	(Optional) Applies the distribute list to the specified interface.
Defaults	By default, no distribute list is defined.	
Command mode	Routing process configuration mode.	
Usage Guide	This command is used to configure the route distribution control list to filter all update routes for the purpose of refusing to receive or send the specified routes. If the interface is not specified, the update routes on all interfaces are filtered.	
Configuration Examples	The following example shows how to filter the received update route on the interface eth0 (only those update routes within the **prefix-list** *allowpre* prefix list range can be received) FS(config)# ipv6 router rip FS(config-router)# distribute-list prefix-list allowpre in eth0	
Related Commands	**Command**	**Description**
	redistribute	Sets route redistribution.
Platform Description	N/A	

8.5 graceful-restart

	Use this command to configure the graceful restart (GR) function for the RIPng process. **graceful-restart** [**grace-period** *grace-period*]
	Use the **no** form of this command restore the default configurations.

	no graceful-restart [**grace-period**]
Parameter Description	

Parameter	Description
graceful-restart	Enables the GR function.
grace-period	Displays the configured grace period.
grace-period	Indicates the configured GR period, ranging from 1 to 1800 seconds. The default value is the smaller between twice of the update time and 60s.

Defaults	The GR function is enabled by default.
Command Mode	Routing process configuration mode
Default Level	14
Usage Guide	The GR function is configured based on RIPng instances. Different parameters can be configured for different RIPng instances as required. The GR period indicates the maximum duration from RIPng restart to RIPng GR completion. In this time period, the forwarding table before restart is used and the RIPng route is restored to the status before restart. After the GR period expires, the RIPng process exits the GR status and the common RIPng operation is performed. The **graceful-restart grace-period** command allows a user to modify the GR period in explicit mode. Note that GR is completed and the RIPng route is updated once before the RIPng route becomes invalid. If the GR period is improperly set, continuous data forwarding in the GR process cannot be ensured. A typical case is as follows: If the GR period is greater than the invalid time of the neighbor route, GR is not completed before the route becomes invalid and the route is not advertised to the neighbor again. The neighbor route stops forwarding data after the route becomes invalid, resulting in data forwarding interruption. Therefore, unless otherwise specified, it is not recommended to adjust the GR period. If the GR period needs to be configured, check configuration of the **timers** command to ensure that the GR period value is greater than the route update time and smaller than the route invalid time. When GR is performed for the RIPng process, ensure that the network environment is stable.
Configuration Examples	The following example enables the GR function for the RIPng process and configures the GR period. FS(config)# ipv6 router rip FS(config-router)# graceful-restart grace-period 90
Verification	Run the **show ipv6 rip** command to check whether the GR function is configured and query the configured grace period.
Prompts	N/A
Common Errors	N/A
Platform Description	N/A

8.6 ipv6 rip default-information

	Use this command to generate a default IPv6 route to the RIPng. Use the **no** form of this command to remove the default route.	
	ipv6 rip default-information { **only** | **originate**} [**metric** *metric-value*]	
	no ipv6 rip default-information	
Parameter Description	**Parameter**	**Description**
	only	Advertises the IPv6 default route only.
	originate	Advertises both of the IPv6 default route and other routes.
	metric *metric-value*	Sets the metric value for the default route. The valid range is from 1 to 15. The default metric is 1.
Defaults	By default, no default route is configured.	
Command mode	Interface configuration mode	
Usage Guide	With this command configured on an interface, the interface advertises an IPv6 default route and the route itself is not to join the device route forwarding table and the RIPng route database. To avoid the route loop, once this command has been configured on the interface, RIPng refuses to receive the default route update message advertised from the neighbor.	
Configuration Examples	The following example shows how to create a default route to the RIPng routing process on the interface ethernet0/0 and enable this interface to advertise the default route only: FS(config)# interface ethernet 0/0 FS(config-if)# ipv6 rip default-information only	
Related Commands	**Command**	**Description**
	show ipv6 rip	Displays the RIPng process and statistics.
	show ipv6 rip database	Displays the RIPng route.
Platform Description	N/A	

8.7 ipv6 rip enable

	Use this command to enable the RIPng on the interface. Use the **no** form of this command to disable RIPng on the interface.	
	ipv6 rip enable	
	no ipv6 rip enable	
Parameter	**Parameter**	**Description**

Description		
	N/A	N/A
Defaults	It is disabled by default.	
Command mode	Interface configuration mode.	
Usage Guide	This command is used to add the RIPng interface. Before this command is configured, if the RIPng is not enabled, use this command to enable the RIPng automatically.	
Configuration Examples	The following example shows how to enable the RIPng on the interface 0/0: FS(config)# interface ethernet 0/0 FS(config-if)# ipv6 rip enable	
Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	N/A	

8.8 ipv6 rip metric-offset

	Use this command to set the interface metric value. Use the **no** form of this command to remove the metric configurations.	
	ipv6 rip metric-offset *value*	
	no ipv6 rip metric-offset	
Parameter Description	**Parameter**	**Description**
	value	Sets the interface metric value on the interface. The valid range is from 1 to 16.
Defaults	The default value is 1.	
Command mode	Interface configuration mode.	
Usage Guide	Before the route is added to the routing list, the interface metric value shall be upon the route metric. To this end, the interface metric value influences the route usage.	
Configuration Examples	The following example shows how to set the metric value of the interface Ethernet 0/1 as 5: FS(config)# interface ethernet 0/1	

	FS(config-if)# ipv6 rip metric-offset 5
Related Commands	**Command** / **Description**
	N/A / N/A
Platform Description	N/A

8.9 ipv6 rip subvlan

	Use this command to enable RIPng on super VLANs. Use the no form of this command to restore the default setting. Ipv6 rip subvlan [all | vid] no ipv6 rip subvlan
Parameter Description	**Parameter** / **Description**
	all / Indicates that packets are allowed to be sent to all sub VLANs.
	vid / Specifies the sub VLAN ID. The value ranges from 1 to 4094.
Defaults	The default setting takes effect only on super VLANs with RIPng disabled.
Command Mode	Interface configuration mode.
Usage Guide	In normal cases, a super VLAN contains multiple sub VLANs. Multicast packets of a super VLAN are also sent to its sub VLANs. In this case, when RIPng multicast packets are sent over a super VLAN containing multiple sub VLANs, the RIPng multicast packets are replicated multiple times, and the device processing capability is insufficient. As a result, a large number of packets are discarded, causing the neighbor down error. In most scenarios, the RIPng function does not need to be enabled on a super VLAN. Therefore, the RIPng function is disabled by default. However, in some scenarios, the RIPng function must be run on the super VLAN, but packets only need to be sent to one sub VLAN. In this case, run this command to specify a particular sub VLAN. You must be cautious in configuring packet transmission to all sub VLANs, as the large number of sub VLANs may cause a device processing bottleneck, which will lead to the neighbor down error.
Configuration Examples	The following example sends the RIPng multicast packets to sub VLAN 1024 of super VLAN 300. FS(config)# interface vlan 300 FS(config-if-VLAN 300)# ipv6 rip subvlan 1024

8.10 ipv6 router rip

	Use this command to create the RIPng process and enter routing process configuration mode. Use the **no** form of this command to remove the RIPng process.	
	ipv6 router rip	
	no ipv6 router rip	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	No RIPng process is configured by default.	
Command mode	Global configuration mode.	
Usage Guide	N/A.	
Configuration Examples	The following example shows how to create the RIPng process and enter routing process configuration mode: FS(config)# ipv6 router rip	
Related Commands	**Command**	**Description**
	ipv6 rip enable	Enables the RIPng on the specified interface.
Platform Description	N/A	

8.11 passive-interface

	Use this command to disable the interface to send update packets. Use the **no** form of this command to enable the interface to send update packets.	
	passive-interface { **default** | *interface-type interface-num* }	
	no passive-interface { **default** | *interface-type interface-num* }	
Parameter Description	**Parameter**	**Description**
	default	Enables the passive mode on all interfaces.
	interface-type interface-num	Interface type and interface number.
Defaults	No passive interface is configured by default.	
Command mode	Routing process configuration mode.	

Usage Guide	You can use the **passive-interface default** command to enable the passive mode on all interfaces. Then ,use the **no passive-interface** *interface-type interface-num* command to remove the specified interface from the passive mode.
Configuration Examples	The following example shows how to enable the passive mode on all interfaces and remove interface ethernet 0/0 from the passive mode: FS(config-router)# passive-interface default FS(config-router)# no passive-interface ethernet 0/0
Related Commands	**Command** / **Description** N/A / N/A
Platform Description	N/A

8.12 redistribute

	Use this command to redistribute the route of other routing protocols to RIPng. Use the **no** form of this command to remove the redistribution configuration.
	redistribute { **bgp** | **connected** | **isis** [*area-tag*] | **ospf** *process-id* | **static**} [**metric** *metric-value* | **route-map** *route-map-name*]
	no redistribute { **bgp** | **connected** | **isis** [*area-tag*] | **ospf** *process-id* | **static**} [**metric** *metric-value* | **route-map** *route-map-name*]
Parameter Description	**Parameter** / **Description**
	bgp / Redistributes the BGP routes to RIPng.
	connected / Redistributes the connected routes to RIPng.
	isis [*area-tag*] / Redistributes the ISIS routes to RIPng. *area-tag* indicates the ISIS process number.
	ospf *process-id* / Redistributes the OSPF routes to RIPng. *process-id* indicates the OSPF process number, and the range is from 1 to 65,535.
	static / Redistributes the static routes to RIPng.
	metric *metric-value* / (Optional) Sets the metric value for the route redistributed to RIPng.
	route-map *route-map-name* / (Optional) Sets the redistribution route filtering.
Defaults	By default, the routes of other routing protocols are not redistributed. If the **default-metric** command is not configured, the default metric value is 1; By default, the **route-map** is not configured; By default, all sub-type routes in the specified routing process are redistributed.
Command mode	Routing process configuration mode.

Usage Guide	This command is used to redistribute the external routes to RIPng. It is unnecessary to transform the metric of one routing protocol into another routing protocol in the process of the route redistribution, for the metric calculation methods of the different routing protocols are different. The RIP and OSPF metric calculations are incomparable for the reason that the RIP metric calculation is hop-based while the OSPF one is bandwidth-based. The instance, from where the routing information is redistributed to the RIPng, must be specified in the process of configuring the multi-instance protocol redistribution.
Configuration Examples	The following example shows how to redistribute the static route, use the route map *mymap* to filter and set the metric value as 8: FS(config)# ipv6 router rip FS(config-router)# redistribute static route-map mymap metric 8
Related Commands	**Command** / **Description**
	default-metric / Defines the default RIPng metric value when redistributing other routing protocols.
	distribute-list / Filters the RIPng routing update packets.
Platform Description	N/A

8.13 show ipv6 rip

	Use this command to show the parameters and each statistical information of the RIPng routing protocol process.
	show ipv6 rip
Parameter Description	**Parameter** / **Description**
	N/A / N/A
Defaults	N/A
Command mode	Privileged EXEC mode or user mode.
Usage Guide	N/A
Configuration Examples	FS# show ipv6 rip Routing Protocol is "RIPng" Sending updates every 10 seconds with +/-50%, next due in 8 seconds Timeout after 30 seconds, garbage collect after 60 seconds Outgoing update filter list for all interface is:

```
distribute-list prefix aa out
Incoming update filter list for all interface is: not set
Default redistribution metric is 1
Default distance is 120
Redistribution:
Redistributing protocol connected route-map rm
Redistributing protocol static
Redistributing protocol ospf 1
Default version control:    send version 1, receive version 1
Interface                   Send    Recv
VLAN 1                      1       1
Loopback 1                  1       1
Routing Information Sources:
None
```

Related Commands	**Command**	**Description**
	show ipv6 rip	Displays the parameters and each statistical information of the RIPng process.

Platform Description	N/A

8.14 show ipv6 rip database

Use this command to display the RIPng route entries.

show ipv6 rip database

Parameter Description	**Parameter**	**Description**
	N/A	N/A

Defaults	N/A
Command mode	Privileged EXEC mode or user mode.
Usage Guide	N/A

Configuration Examples

```
FS# show ipv6 rip database
Codes: R - RIPng,C - Connected,S - Static,O - OSPF,B - BGP
sub-codes:n - normal,s - static,d - default,r - redistribute,
i - interface, a/s - aggregated/suppressed
S(r)     2001:db8:1::/64, metric 1, tag 0
Loopback 0/::
```

```
S(r)      2001:db8:2::/64, metric 1, tag 0
Loopback 0/::
C(r)      2001:db8:3::/64, metric 1, tag 0
VLAN 1/::
S(r)      2001:db8:4::/64, metric 1, tag 0
Null 0/::
C(i)      2001:db8:5::/64, metric 1, tag 0
Loopback 1/::
S(r)      2001:db8:6::/64, metric 1, tag 0
Null 0/::
```

Related Commands	**Command**	**Description**
	N/A	N/A

Platform Description	N/A

8.15 split-horizon

Use the **split-horizon** command to enable the RIPng split-horizon function in routing process configuration mode. Use the **no** form of this command to disable this function. Use the **split-horizon poisoned-reverse** command to enable the RIPng poisoned reverse horizontal split function in routing process configuration mode. Use the no form of this command to disable this function.

split-horizon [**poisoned-reverse**]

no split-horizon [**poisoned-reverse**]

Parameter Description	**Parameter**	**Description**
	poisoned-reverse	(Optional) Enables the poisoned-reverse horizontal split.

Defaults	RIPng split horizon is enabled by default.
Command mode	Routing process configuration mode.
Usage Guide	In the process of packet updating, split-horizon function prevents some routing information from being advertised through the interface learning those routing information. The poisoned reverse horizontal split function advertises some routing information to the interface learning those routing information, and the metric value is set as 16. The RIPng routing protocol belongs to the distance vector routing protocol, so the horizontal split shall be noticed in the actual application. You can use the **show ipv6 rip** command to determine whether the RIPng split-horizon function is enabled or not.
Configuration Examples	The following example shows how to disable the RIPng horizontal split:

```
FS(config)# ipv6 router rip
```

	FS(config-router)# no split-horizon
Related Commands	**Command** / **Description**
	N/A / N/A
Platform Description	N/A

8.16 timers

	Use this command to adjust the RIPng timer. Use the **no** form of this command to restore the default settings.
	timers *update invalid flush*
	no timers
Parameter Description	**Parameter** / **Description**
	update / Sets the routing update time, in seconds. The update parameter defines the period of sending the routing update packets by the device. The invalid and flush parameter reset once the update packets are received.
	invalid / Sets the routing invalid time, in seconds, starting from receiving the last valid update packet. The invalid parameter defines the invalid time for the un-updated routing in the routing list. The routing invalid time shall be three times larger than the routing update time. The routing will be invalid if no update packets are received within the routing invalid time, and it will reset if the update packets are received within the invalid time.
	flush / Sets the routing flush time, in seconds, starting from RIPng entering to invalid state. The invalid routing will be removed from the routing list if the flush time expires.
Defaults	The default update time is 30 seconds; the default invalid time is 180 seconds; and the default flush time is 120 seconds.
Command mode	Routing process configuration mode.
Usage Guide	Adjusting the above time may speed up the RIPng convergence time and the troubleshooting time. The RIPng time must be consistent for the devices connecting to the same network. You are not recommended to adjust the RIP time, except for the specific requirement. Use the **show ipv6 rip** command to view the current RIPng time parameter setting. In the low-speed link, with the short time configured, large amount of the update packets consumes a lot of bandwidth. Generally, the short time can be configured in the Ethernet or 2Mbps-higher line to shorten the convergence time of the network routing.

Configuration Examples	The following example shows how to send the RIP update packets every 10 seconds. The routing will be invalid if no update packets are received within 30 seconds, and the routing will be removed after being invalid for 90 seconds. FS(config)# ipv6 router rip FS(config-router)# timers 10 30 90	
Related Commands	**Command**	**Description**
	show ipv6 rip	Displays the parameters and the statistical information of the RIPng process.
	show ipv6 rip database	Displays the RIPng routes.
Platform Description	N/A	

9. NSM Commands

9.3 clear ip route

	Use this command to clear the route cache.
	clear ip route [**vrf** *vrf_name*] { ***** **|** *network* [*netmask*] | }

	Parameter	Description
Parameter Description	**vrf *vrf_name***	(Optional) Specifies the route cache of the specified VRF instance. If no VRF is specified, the route cache of all VRF instances is cleared.
	*	Clears all route cache.
	network	Specifies the route cache of the network or subnet.
	netmask	(Optional) Subnet mask. If no subnet mask is specified, the longest match principle is used when you match *network* with the route. The cache of the longest match is cleared.

Command Mode	Privileged EXEC mode	
Usage Guide	Clearing route cache clears the corresponding routes and triggers the routing protocol relearning. Please note that clearing all route cache leads to temporary network disconnection.	
Examples	The following example clears the cache of the route which is the longest match with IP address 192.168.12.0. clear ip route 192.168.12.0	
Related Commands	**Command**	**Description**
	N/A	N/A
Platform Description	This command is not supported on 2-layer devices.	

9.4 ip default-network

	Use this command to configure the default network globally. Use the **no** or **default** form of this command to restore the default setting.
	ip default-network *network* **no ip default-network** *network* **default ip default-network** *network*

	Parameter	Description
Parameter Description	*network*	Default network

Defaults	The default is 0.0.0.0/0.
Command Mode	Global configuration mode
Usage Guide	The goal of this command is to generate the default route. The default network must be reachable in the routing table, but not the directly connected network. The default network always starts with an asterisk ("*"), indicating that it is the candidate of the default route. If there is connected route and the route without the next hop in the default network, the default route must be a static route.
Examples	The following example sets 192.168.100.0 as the default network. Since the static route to the network is configured, the device will automatically generate a default route.

	ip route 192.168.100.0 255.255.255.0 serial 0/1 ip default-network 192.168.100.0 The following example sets 200.200.200.0 as the default network. The route becomes the default one only when it is available in the routing table. ip default-network 200.200.200.0

Related Commands	Command	Description
	show ip route	Displays the routing table.

9.5 ip fast-reroute route-map

	Use this command to enable static fast reroute. Use the **no** or **default** form of this command to restore the default setting.
	ip fast-reroute [**vrf** *vrf-name*] **static route-map** *route-map-name*
	no ip fast-reroute [**vrf** *vrf-name*]
	default ip fast-reroute [**vrf** *vrf-name*] **route-map**

Parameter Description	Parameter	Description
	vrf *vrf-name*	VRF
	route-map *route-map-name*	Route map
	static	Backup route

Default	This function is disabled by default.
Command Mode	Global configuration mode
Usage guideline	Fast reroute provides an active next-hop and a backup one. If the active next-hop fails, the backup next-hop is used for forwarding. To enhance the performance of fast reroute, enable the BFD detection function for the active next-hop. For interfaces that are up or down, to shorten the interruption time of fast reroute, configure **carrier-delay** *0 in the interface configuration mode of the active outbound interface to optimize the performance.* For static fast reroute, if the active next-hop fails, the backup next-hop is used for forwarding.
Examples	The following example sets the backup next-hop of all static routes to 192.168.1.2 through the outbound interface of GigabitEthernet 0/1. FS(config)# route-map fast-reroute FS(config-route-map)# set fast-reroute backup-nexthop GigabitEthernet 0/1 192.168.1.2 FS(config-route-map)# exit FS(config)# ip fast-reroute static route-map fast-reroute

Related command	Command	Description
	fast-reroute	Configures OSPF fast reroute.
Platform Description	This command is not supported on 2-layer devices.	

9.6 ip route

	Use this command to configure a static route. Use the **no** or **default** form of this command to restore the default setting.	
	ip route [**vrf** *vrf_name*] *network net-mask* { *ip-address* | *interface* [*ip-address*] } [*distance*] [**tag** *tag*] [**permanent | {track** *object-number* **| arp}**] [**weight** *number*] [**description** *description-text*] [**disabled** | **enabled**] [**global**]	
	no ip route [**vrf** *vrf_name*] *network net-mask* { *ip-address* | *interface* [*ip-address*] } [*distance*]	
	no ip route [**vrf** *vrf_name*] **all**	
	default ip route [**vrf** *vrf_name*] *network net-mask* { *ip-address* | *interface* [*ip-address*] } [*distance*]	
	default ip route [**vrf** *vrf_name*] **all**	
Parameter Description	**Parameter**	**Description**
	vrf *vrf_name*	Name of the VRF, which can be the single protocol IPv4 VRF or configured IPv4 address family multi-protocol VRF.
	network	Network address of the destination
	net-mask	Mask of the destination
	ip-address	The next hop IP address of the static route
	interface	(Optional) The next hop egress of the static route
	distance	(Optional) The administrative distance of the static route
	tag	(Optional) The tag of the static route
	permanent	(Optional) Permanent route ID
	track *object-number*	(Optional) Indicates correlation with Track. *object-number* indicates the ID of the track object. By default, the static route is not correlated with the Track function.
	weight *number*	(Optional) Indicates the weight of the static route. The weight is 1 by default.
	description *description-text*	(Optional) Indicates the description of the static route. By default, no description is configured. *description-text* is a string of one to 60 characters.
	disabled/enabled	(Optional) Indicates the enable flag of the static route. The flag is enabled by default.
	global	(Optional) Indicates that the next hop belongs to a global VRF. By default, the VRF of the next hop is the same as the VRF specified by *vrf name*.
Defaults	No static route is configured by default.	
Command Mode	Global configuration mode	
Usage Guide	The default administrative distance of the static route is 1. Setting the administrative distance allows the learnt dynamic route to overwrite the static route. Setting the administrative distance of the static route can enable route	

	backup, which is called floating route in this case. For example, the administrative distance of the OSPF is 110. You can set its administrative distance to 125. Then the data can switch over the static route when the route running OSPF fails. You can specify the VRF that the static route belongs to. The default weight of the static route is 1. To view the static route of non default weight, execute the show ip route weight command. The parameter weight is used to enable WCMP. When there are load-balanced routes to the destination, the device assigns data flows by their weights. The higher the weight of a route is, the more data flow the route carries. WCMP limit is generally 32 for routers. However, WCMP limit varies by switch models for their chipsets support different weights. When the sum of the weights of load balanced routes is beyond this weight limit, the excessive ones will not take effect. Enablement/disablement shows the state of the static route. Disablement means the static route is not used for forwarding. The forwarding table used the permanent route until administrator deletes it. Association between a static route and an ARP object can be specified. When association between a static route and an ARP object is configured and the ARP object corresponding to the next hop and egress of the route does not exist, the static route does not take effect. When the ARP object corresponding to the next hop and egress of the route exits, the static route takes effect based on another status. Association between a static route and an ARP object cannot be used for routes with the permanent attribute.
Examples	The following example adds a static route to the destination network of 172.16.100.0/24 whose next hop is 192.168.12.1 and administrative distance is 15. ip route 172.16.199.0 255.255.255.0 192.168.12.1 155 If the static route has not a specific interface, data flows may be sent thought other interface in case of interface failure. The following example configures data flows to be sent through fastehternet 0/0 to the destination network of 172.16.100.0/24. ip route 172.16.199.0 255.255.255.0 fastethernet 0/0 192.168.12.1
Related Commands	This command is not supported on 2-layer devices.

9.7 ip route static bfd

	Use this command to correlate the static route with BFD. Use the **no** or **default** form of this command to restore the default setting.	
	ip route static bfd [**vrf** *vrf-name*] *interface-type interface-number gateway* [**source** *ip-address*]	
	no ip route static bfd [**vrf** *vrf-name*] *interface-type interface-number gateway* [**source** *ip-address*]	
	default ip route static bfd [**vrf** *vrf-name*] *interface-type interface-number gateway* [**source** *ip-address*]	
	Use this command to correlate the static route with BFD. Use the **no** or **default** form of this command to restore the default setting.	
Parameter Description	**Parameter**	**Description**
	vrf *vrf-name*	(Optional) Specifies the VRF name of the static route. By default, it is global VRF,
	interface-type interface-number	Interface type and interface number.
	gateway	Specifies the gateway IP address, that is, the BFD neighbor IP address. If the next hop of the static route is the neighbor, the BFD will detect whether this neighbor is reachable.
	source *ip-address*	(Optional) The source IP address of the BFD session. If the neighbor device is multi hops away, you should specify the source

		IP address for the BFD session. No source IP a ddress is specified by default.
Defaults	The static address is not correlated with BFD by default.	
Command Mode	Global configuration mode	
Usage Guide	Please make sure the BFD session parameters have been configured before executing this command.	

Examples	The following example correlates the static route with BFD, and detects the reachability of path to the neighbor 172.16.0.2.
	FS(config)# interface GigabitEthernet 0/1
	FS(config-if-GigabitEthernet 0/1)# no switchport // No need to perform this command on the router.
	FS(config-if-GigabitEthernet 0/1)# ip address 172.16.0.1 255.255.255.0
	FS(config-if-GigabitEthernet 0/1)# bfd interval 50 min_rx 50 multiplier 3
	FS(config-if-GigabitEthernet 0/1)#exit
	FS(config)# ip route static bfd GigabitEthernet 0/1 172.16.0.2
	FS(config)# ip route 10.0.0.0 255.0.0.0 GigabitEthernet 0/1 172.16.0.2	

Related Commands	N/A	
Platform Description	This command is not supported on 2-layer devices.	

9.8 ip route static inter-vrf

	Use this command to enable packets to be forwarded over VRF instances through the static route. Use the **no** or **default** form of this command to disable this function.	
	ip route static inter-vrf	
	no ip route static inter-vrf	
	default ip route static inter-vrf	
	Use this command to enable packets to be forwarded over VRF instances through the static route. Use the **no** or **default** form of this command to disable this function.	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	This function is enabled by default.	
Command Mode	Global configuration mode	
Usage Guide	If the **no** form of this command is executed, packets are unable to be forwarded over VRF instances through the static route. If this command is executed and you want to use the **no** form of this command to disable such function, the following information will be displayed. *Aug 7 10:58:34: %NSM-6-ROUTESACROSSVRF: Un-installing route [x.x.x.x/8] from global routing table with outgoing interface x/x.	
Examples	The following example disables packets to be forwarded over VRF instances through the static route. FS(config)# no ip route static inter-vrf	
Related Commands	N/A	
Platform	This command is not supported on 2-layer devices.	

Description	

9.9 ip routing

	Use this command to enable IP routing in the global configuration mode. Use the **no** or **default** form of this command to disable this function. **ip routing** **no ip routing** **default ip routing**
Defaults	This function is enabled by default.
Command Mode	Global configuration mode
Usage Guide	IP routing is not necessary when the switch serves as bridge or VoIP gateway. When a device functions only as a bridge or VoIP gateway, the IP routing function of the FSOS software is not required. In this case, the IP routing function of the FSOS software can be disabled. After the IP routing function is disabled, the device functions as a common host. The device can send and receive packets but cannot forward packets. All route-related configurations will be deleted except the static route configuration. A large number of static routes may be configured. If a user runs the **no ip routing** command, the configuration of a large number of static routes may be lost. To prevent this situation, the static route configuration will be hidden temporarily when the **no ip routing** command is run. If the **ip routing** command is run again, the static route configuration can be restored. Note that if the process or whole system restarts when the **no ip routing** command is run, the static route configuration will not be reserved.
Examples	The following example disables IP routing. FS(config)# no ip routing
Related Commands	N/A
Platform Description	This command is not supported on 2-layer devices.

9.10 ip static route-limit

	Use this command to set the upper threshold of the static route. Use the **no** or **default** form of this command to restore the default setting.	
	ip static route-limit *number*	
	no ip static route-limit	
	default ip static route-limit	
Parameter Description	**Parameter**	**Description**
	number	Upper threshold of static routes in the range from 1 to 10000
Defaults	The default is 1000.	
Command Mode	Global configuration mode	
Usage Guide	The goal is to control the number of static routes. You can view the upper threshold of the configured non-default static routes with the **show running-config** command.	
Examples	The following example sets the upper threshold of the static routes to 9000 and then restores the setting to the default value.	

	FS(config)#ip static route-limit ? <1-1000000> Global limit value(default value: 1000) FS(config)# ip static route-limit 9000 FS(config)# no ip static route-limit
Related Commands	N/A
Platform Description	This command is not supported on 2-layer devices.

9.11 ipv6 route

	Use this command to configure an ipv6 static route. Use the **no** or **default** form of this command to restore the default setting.
	ipv6 route [**vrf** *vrf-name*] *ipv6-prefix / prefix-length* { *ipv6-address* [**nexthop-vrf** { *vrf-name1* | **default** }] | *interface* [*ipv6-address* [**nexthop-vrf** { *vrf-name1* | **default** }]] } [*distance*] [**tag** *tag*] [**weight** *number*] [**description** *description-text*]
	no ipv6 route [**vrf** *vrf-name*] *ipv6-prefix / prefix-length* { *ipv6-address* [**nexthop-vrf** { *vrf-name1* | **default** }] | *interface* [*ipv6-address* [**nexthop-vrf** { *vrf-name1* | **default** }]] } [*distance*]
	no ipv6 route [**vrf** *vrf_name*] **all**
	default ipv6 route [**vrf** *vrf-name*] *ipv6-prefix / prefix-length* { *ipv6-address* [**nexthop-vrf** { *vrf-name1* | **default** }] | *interface* [*ipv6-address* [**nexthop-vrf** { *vrf-name1* | **default** }]] } [*distance*] **default ipv6 route** [**vrf** *vrf_name*] **all**

Parameter Description

Parameter	Description
vrf *vrf-name*	Name of VRF, which must be the configured IPv6 address family multi-protocol VRF
prefix-length	Mask length of the destination
ipv6-address	The next hop IP address of the static route
interface	(Optional) The next hop egress of the static route
nexthop-vrf *vrf-name1*	(Optional) VRF the nexthop belongs, which must be the configured IPv6 address family multi-protocol VRF.
distance	(Optional) The administrative distance of the static route. The default is 1.
tag	(Optional) The tag value of the static route. The default is 0.
weight *number*	(Optional) Indicates the weight of the static route, which must be specified when you configure equal-cost routes. The weight ranges from 1 to 8. When the weights of all equal-cost routes of a route are summed up, the sum cannot exceed the maximum number of equal-cost routes that can be configured for the route. Weighting of equal-cost routes of a route indicates the traffic ratio of these routes. The weight is 1 by default.
description*description-text*	(Optional) Indicates the description of the static route. By default, no description is configured. *description-text* is a string of one to 60 characters.

Defaults	No IPv6 static route is configured by default.
Command Mode	Global configuration mode
Usage Guide	When the multi-protocol VRF deletes the IPv6 address family, the IPv6 static route of VRF that the route or nexthop belongs is deleted. If the VRF of the IPv6 static route interface is not same as the nexthop's VRF, then this IPv6 static route takes no effect. The default administrative distance of the static route is 1. Setting the administrative distance allows the learnt dynamic route to overwrite the static route. Setting the administrative distance of the static route can enable route backup, which is called floating route in this case. For example, the administrative distance of the OSPF is 110. You can set its administrative distance to 125. Then the data can switch over the static route when the route running OSPF fails.
Examples	The following example adds a static route to the destination network of 2001::/64 whose next hop is 2002::2 and administrative distance are 115. ipv6 route 2001::/64 2002::2 115 If the static route has not a specific interface, data flows may be sent thought other interface in case of interface failure. The following example configures that data flows are sent through fastehternet 0/0 to the destination network of 2001::/64. ipv6 route 2001::/64 fastethernet 0/0 2002::2
Related Commands	**Command** / **Description** show ipv6 route / Displays IPv6 routing table.
Platform Description	This command is not supported on 2-layer devices.

9.12 ipv6 route static bfd

	Use this command to correlate the static route with BFD. Use the **no** or **default** form of this command to restore the default setting.
	ipv6 route static bfd [**vrf** *vrf-name*] *interface-type interface-number gateway* [**source** *ip-address*]
	no ipv6 route static bfd [**vrf** *vrf-name*] *interface-type interface-number gateway* [**source** *ip-address*]
	default ipv6 route static bfd [**vrf** *vrf-name*] *interface-type interface-number gateway* [**source** *ip-address*]
Parameter Description	**Parameter** / **Description** **vrf** *vrf-name* / (Optional) Specifies the VRF name of the static route. By default, it is global VRF, *interface-type interface-number* / Interface type and interface number. *gateway* / Specifies the gateway IP address, that is, the BFD neighbor IP address. If the next hop of the static route is the neighbor, the BFD will detect whether this neighbor is reachable. **source** *ipv6-address* / (Optional) The source IP address of the BFD session. If the neighbor device is multi hops away, you should specify the source IP address for the BFD session. No source IP address is specified by default.
Defaults	The static route is not associated with BFD by default.
Command Mode	Global configuration mode

Usage Guide	Please make sure the BFD session parameters have been configured before executing this command.
Examples	The following example correlates the static route with BFD, and detects the reachability of path to the neighbor *2001:1::2*. FS(config)# interface GigabitEthernet 0/1 FS(config-if)# no switchport // FS(config-if)# ip address 2001:1::1/64 FS(config-if)# bfd interval 50 min_rx 50 multiplier 3 FS(config-if)#exit FS(config)# ipv6 route static bfd GigabitEthernet 0/1 2001:1::2 FS(config)# ipv6 route 2002::/64 GigabitEthernet 0/1 2001:1::2
Related Commands	N/A
Platform Description	This command is not supported on 2-layer devices.

9.13 ipv6 static route-limit

	Use this command to set the upper threshold of the static route. Use the **no** or **default** form of this command to restore the default setting.
	Ipv6 static route-limit *number*
	no ipv6 static route-limit
	default ipv6 static route-limit

Parameter Description	**Parameter**	**Description**
	number	Upper threshold of static routes in the range from 1 to 10000.

Defaults	The default is 1000.

Command Mode	Global configuration mode

Usage Guide	The goal is to control the number of static routes. You can view the upper threshold of the configured non-default static routes with the show running config command.

Examples	The following example sets the upper threshold of global ipv6 static routes to 900, default VRF static routes to 200, VRF test static routes to 100, and then restores the setting to the default value. FS(config)#ipv6 static route-limit ? <1-10000> Global limit value(default value: 1000) FS(config)# ipv6 static route-limit 900 FS(config)# no ipv6 static route-limit

Related Commands	**Command**	**Description**
	ipv6 route	Configures the IPv6 static route.
	show ipv6 route	Displays the IPv6 routing table.

Platform Description	This command is not supported on 2-layer devices.

9.14 ipv6 unicast-routing

	Use this command to enable the IPv6 route function of the FSOS. Use the **no** or **default** form of this command to disable this function.
	ipv6 unicast-routing
	no ipv6 unicast-routing
	default ipv6 unicast-routing

Parameter Description	N/A

Defaults	This function is enabled by default.

Command Mode	Global configuration mode

Usage Guide	This function can be disabled if the device is just used as the bridge-connection device or the VOIP gateway device.

Examples	The example disables the IPv6 route function of FSOS. FS# no ipv6 unicast-routing

Related Commands	**Command**	**Description**
	ipv6 route	Configure the IPv6 static route.
	show ipv6 route	Displays the IPv6 routing table.

Platform Description	This command is not supported on 2-layer devices.

9.15 maximum-paths

	Use this command to specify the number of equivalent routes. Use the **no** or **default** form of this command is used to restore the default setting.
	maximum-paths *number*
	no maximum-paths
	default maximum-paths

Parameter Description	**Parameter**	**Description**
	number	Number of equivalent routes in the range from 1 to 32

Defaults	The default is 32 for routers. For switches, it depends on switch models.

Command Mode	Global configuration mode

Usage Guide	The number of equivalent routes is configured to control the number of equivalent routes. After the number of equivalent routes is configured by running the **maximum-paths** command, the number of load-sharing channels in load-sharing mode will not exceed the number of configured static routes. You can run the **show running config** command to query the number of configured static routes. This command takes effect both to IPv4 and IPv6 addresses. After this command is configured, the maximum number of equivalent routes to an IPv4 or IPv6 destination is equal to the configured value.

Examples	The following example sets the number of equivalent routes to 10 and then restores the default setting. maximum-paths 10 no maximum-paths 10

9.16 show ip route

	Use the commands to display the configuration of the IP routing table.	
	show ip route [[**vrf** *vrf_name*] [*network* [*mask* [**longer-prefix**]] | **count** | *protocol* [*process-id*] | **weight**]]	
	show ip route [**vrf** *vrf-name*] [[**normal** | **ecmp** | **fast-reroute**] [*network* [*mask*]]	
Parameter Description	**Parameter**	**Description**
	vrf *vrf_name*	(Optional) Displays the route information of the VRF.
	network	(Optional) Displays the route information to the network.
	mask	(Optional)Displays the route information to the network of this mask.
	longer-prefix	(optional) Displays the routes that match the specified prefix.
	count	(Optional)Displays the number of existent routes. (for the ECMP/WCMP route, displays one route)
	protocol	(Optional) Displays the route information of specific protocol.
	process-id	(Optional) Routing protocol process ID.
	weight	(Optional) Displays the route information of non default weight.
	normal	Displays normal routes and not equivalent routes or fast reroutes.
	ecmp	Displays only equivalent routes.

	fast-reroute	(Optional) Displays the master/standby route of fast reroute.

Command Mode	Privileged EXEC mode/ Global configuration mode/Interface configuration mode/ Routing protocol configuration mode/ Route map configuration mode

Usage Guide	This command can display route information flexibly. This command shows all routes. To show different attributes of routes, specify normal | ecmp | fast-reroute.

Examples

The following example displays the configuration of the IP routing table.

```
FS# show ip route

Codes:   C - Connected, L - Local, S - Static
         R - RIP, O - OSPF, B - BGP, I - IS-IS, V - Overflow route
         N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
         E1 - OSPF external type 1, E2 - OSPF external type 2
         SU - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
         IA - Inter area, * - candidate default
Gateway of last resort is no set
S      20.0.0.0/8 is directly connected, VLAN 1
S      22.0.0.0/8 [1/0] via 20.0.0.1
O E2 30.0.0.0/8 [110/20] via 192.1.1.1, 00:00:06, VLAN 1
R      40.0.0.0/8 [120/20] via 192.1.1.2, 00:00:23, VLAN 1
B      50.0.0.0/8 [120/0] via 192.1.1.3, 00:00:41
C      192.1.1.0/24 is directly connected, VLAN 1
C      192.1.1.254/32 is local host.
```

```
FS# show ip route 30.0.0.0
Routing entry for 30.0.0.0/8
Distance 110, metric 20
Routing Descriptor Blocks:
192.1.1.1, 00:01:11 ago, via VLAN 1, generated by OSPF, extern 2
```

```
FS# show ip route count
--------- route info ----------
the num of active route: 5
```

```
FS# show ip route weight
------------[distance/metric/weight]-----------
S      23.0.0.0/8 [1/0/2] via 192.1.1.20
S      172.0.0.0/16 [1/0/4] via 192.0.0.1
```

```
FS#show ip route normal

Codes:   C - Connected, L - Local, S - Static
         R - RIP, O - OSPF, B - BGP, I - IS-IS, V - Overflow route
         N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
         E1 - OSPF external type 1, E2 - OSPF external type 2
         SU - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
         IA - Inter area, * - candidate default
Gateway of last resort is no set
S      20.0.0.0/8 is directly connected, VLAN 1
S      22.0.0.0/8 [1/0] via 20.0.0.1
O E2 30.0.0.0/8 [110/20] via 192.1.1.1, 00:00:06, VLAN 1
R      40.0.0.0/8 [120/20] via 192.1.1.2, 00:00:23, VLAN 1
B      50.0.0.0/8 [120/0] via 192.1.1.3, 00:00:41
C      192.1.1.0/24 is directly connected, VLAN 1
C      192.1.1.254/32 is local host
```

```
FS#show ip route ecmp

Codes:   C - Connected, L - Local, S - Static
         R - RIP, O - OSPF, B - BGP, I - IS-IS, V - Overflow route
         N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
         E1 - OSPF external type 1, E2 - OSPF external type 2
         SU - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
         IA - Inter area, * - candidate default
Gateway of last resort is 192.168.1.2 to network 0.0.0.0
S*     0.0.0.0/0 [1/0] via 192.168.1.2
                 [1/0] via 192.168.2.2
O IA 192.168.10.0/24 [110/1] via 35.1.10.2, 00:38:26, VLAN 1
                             [110/1] via 35.1.30.2, 00:38:26, VLAN 3
```

```
FS#show ip route fast-reroute

Codes:   C - Connected, L - Local, S - Static
         R - RIP, O - OSPF, B - BGP, I - IS-IS, V - Overflow route
         N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
         E1 - OSPF external type 1, E2 - OSPF external type 2
         SU - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
         IA - Inter area, * - candidate default
Status codes: m - main entry, b - backup entry, a – active entry
```

```
Gateway of last resort is 192.168.1.2 to network 0.0.0.0
S*      0.0.0.0/0 [ma] via 192.168.1.2
                       [b] via 192.168.2.2
O IA 192.168.10.0/24 [m] via 35.1.10.2, 00:38:26, VLAN 1
                              [ba]    via 35.1.30.2, 00:38:26, VLAN 3
```

```
FS# show ip route fast-reroute 30.0.0.0
Routing entry for 30.0.0.0/8
Distance 110, metric 20
Routing Descriptor Blocks:
[m] 192.1.1.1, 00:01:11 ago, via VLAN 1, generated by OSPF, extern 2
[ba]192.1.1.1, 00:01:11 ago, via VLAN 1, generated by OSPF, extern 2
```

Field	Description
O	Source routing protocol, which may be: C: directly connected route S: static route R: RIP route B: BGP route O: OSPF route I: IS-IS route
E2	Route type, which may be: E1: OSPF external route type 1 E2: OSPF external route type 2 N1: OSPF NSSA external type 1 N2: OSPF NSSA external type 2 IA: OSPF area internal route SU: IS-IS summary route L1: IS-IS level-1 route L2: IS-IS level-2 route IA: IS-IS area internal route
20.0.0.0/8	Network address and mask of the destination network
[1/0]	Administrative distance/metric

9.17 show ip route static bfd

	Use this command to display the IP route correlated BFD information
	show ip route [[**vrf** *vrf_name*] **static bfd**

Parameter	Parameter	Description

Description	**vrf** *vrf-name*	(Optional) Displays route information of the specified VRF. The default is global VRF.

Defaults	N/A

Command Mode	Privileged EXEC mode

Usage Guide	Use this command to display the IP route correlated BFD information

Examples

The following example displays the IP route correlated BFD information,

```
FS(config)#show ip route static bfd
S       10.0.0.0/8 via 100.100.100.25, GigabitEthernet 0/3, BFD state is Up
S       20.0.0.0/8 via 200.100.100.25, GigabitEthernet 0/4, BFD state is Admin
```

Field	Description
S	Static route
BFD state	State of the static route correlated BFD.

Related Commands	N/A

Platform Description	This command is not supported on 2-layer devices.

9.18 show ip route summary

	Use this command to display the statistical information about one routing table.
	show ip route [**vrf** *vrf_name*] **summary**
	Use this command to display the statistical information about all routing tables.
	show ip route summary all

Parameter Description	**Parameter**	**Description**
	vrf-name	VRF name

Defaults	N/A

Command Mode	Privileged EXEC mode

Usage guideline	N/A

Examples

The following example displays the statistics of the global routing table.

```
FS# show ip route summary
Codes: NORMAL – Normal route ECMP – ECMP route FRR – Fast-Reroute route

 Memory: 2000 bytes
Entries: 22,based on route prefixes
                    NORMAL ECMP FRR TOTAL
        Connected 3 0 0 3
        Static 2 1 1 4
        RIP    1 2 1 4
        OSPF 2 1 1 4
        ISIS 1 2 0 3
        BGP    2 1 1 4
        TOTAL 11 7 4 22
```

The following example displays the statistics of all routing tables.

```
FS# show ip route summary all
Codes: NORMAL – Normal route ECMP – ECMP route FRR – Fast-Reroute route

IP routing table count:2
Total
    Memory: 4000 bytes
    Entries: 44,based on route prefixes
                    NORMAL ECMP FRR TOTAL
        Connected 6 0 0 6
        Static 4 2 2 8
        RIP    2 4 2 8
        OSPF 4 2 2 8
        ISIS 2 4 0 6
        BGP    4 2 2 8
        TOTAL 22 14 8 44

Global
    Memory: 2000 bytes
    Entries: 22,based on route prefixes
                    NORMAL ECMP FRR TOTAL
        Connected 3 0 0 3
        Static 2 1 1 4
        RIP    1 2 1 4
        OSPF 2 1 1 4
        ISIS 1 2 0 3
        BGP    2 1 1 4
        TOTAL 11 7 4 22
```

```
VRF1
 Memory: 2000 bytes
      Entries: 22,based on route prefixes
      Entries: 29,based on route nexthops
NORMAL
ECMP FRR TOTAL
              Connected 3 0 0 3
              Static 2 1 1 4
              RIP    1 2 1 4
              OSPF 2 1 1 4
             ISIS 1 2 0 3
              BGP    2 1 1 4
              TOTAL 11 7 4 22
```

Field	Description
NORMAL	Type of the table entries. Value: NORMAL: common routes (not ECMP or FRR); ECMP: equivalent route; FRR: fast reroute; TOTAL: total
Memory	Memory occupied by the table.
Entries	Number of entries (based on prefix, not next-hop)
Connected	Protocol type. Value: Connected: direct connection; Static: static; RIP: RIP; OSPF: OSPF; ISIS: ISIS; BGP: BGP; TOTAL: total

9.19 show ip route track-table

	Use this command to display the IP route correlated Track information.
	show ip route [[**vrf** *vrf_name*] **track-table**

	Parameter	Description
Parameter Description	**vrf** *vrf_name*	(Optional) Displays the route information of the specified VRF name. The default is global VRF,

Defaults	N/A

Command Mode	Privileged EXEC mode

Usage Guide	Use this command to display the IP route correlated Track information.

Examples	The following example displays the IP route correlated Track information. FS(config)#show ip route track-table ip route 10.0.0.0 255.0.0.0 GigabitEthernet 0/0 track 2 state is [up] ip route 20.0.0.0 255.0.0.0 GigabitEthernet 0/0 2 track 3 state is [down] :

Field	Description
track	Track target index
state	Track target state

Related Commands	**Command**	**Description**
	N/A	N/A

Platform Description	This command is not supported on 2-layer devices.

9.20 show ipv6 route

	Use the command to display the configuration of the IPv6 routing table.
	show ipv6 route [[**vrf** *vrf_name*] [*ipv6-prefix* / *prefix-length* [**longer-prefixes**] | *protocol* [*process-id*] | **weight**]]

Parameter Description	**Parameter**	**Description**
	vrf *vrf-name*	(Optional) Specifies a VRF.
	ipv6-prefix/prefix-length	(Optional) Specifies a prefix for route's IPv6 address.
	longer-prefixes	(Optional) Displays the route with an IPv6 address prefix mostly matched.
	protocol	((Optional) Displays the route information of specific protocol.
	process-id	(Optional) Specifies a route process ID.
	weight	(Optional) Displays the non-default-weight routes only.

Defaults	All routes are displayed by default.

Command Mode	Privileged EXEC mode

Usage Guide	Use this command to display route information.

Examples	The following example displays the IPv6 routing table. FS(config)# show ipv6 route IPv6 routing table - Default - 7 entries

```
Codes:  C - Connected, L - Local, S - Static
        R - RIP, O - OSPF, B - BGP, I - IS-IS, V - Overflow route
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2
        SU - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
        IA - Inter area

C       10::/64    via Loopback 1, directly connected
L       10::1/128    via Loopback 1, local host
S       20::/64    [20/0] via 10::4, Loopback 1C
C       FE80::/10 via Null 0, directly connected
C       FE80::/64    via Loopback 1, directly connected
L       FE80::2D0:F8FF:FE22:33AB/128    via Loopback 1, local host
```

Field	Description
O	Source routing protocol, which may be: C: directly connected route S: static route R: RIP route B: BGP route O: OSPF route I: IS-IS route
E2	Route type, which may be: E1: OSPF external route type 1 E2: OSPF external route type 2 N1: OSPF NSSA external type 1 N2: OSPF NSSA external type 2 IA: OSPF area internal route SU: IS-IS summary route L1: IS-IS level-1 route L2: IS-IS level-2 route IA: IS-IS area internal route
20::/64	Network address and mask of the destination network
[20/0]	Administrative distance/metric

Related Commands	Command	Description
	ipv6 route	Configures the IPv6 static route.

Platform	This command is not supported on 2-layer devices.

Description	

9.21 show ip route static bfd

	Use this command to display the IPv6 route correlated BFD information
	show ipv6 route [[**vrf** *vrf_name*] **static bfd**

	Parameter	Description
Parameter Description	**vrf** *vrf-name*	(Optional) Displays the route information of the designated VRF name of the static route. The default is global VRF,

Defaults	N/A

Command Mode	Privileged EXEC mode

Usage Guide	Use this command to display the IPv6 route correlated BFD information.

Examples

The following example displays the IPv6 route correlated BFD information.

```
FS(config)#show ip route static bfd
S       25::/64 via 100::25, GigabitEthernet 0/3, BFD state is Up
S       26::/64 via 200::25, GigabitEthernet 0/4, BFD state is Admin
```

Field	Description
S	Static route
BFD state	State of the static route associated BFD

Related Commands	N/A

Platform Description	This command is not supported on 2-layer devices.

9.22 show ipv6 route summary

	Use this command to display the statistics of the IPv6 routing table of a specified VRF.
	show ipv6 route [**vrf** *vrf-name*] **summary**
	Use this command to display statistics of all IPv6 routing tables.
	show ipv6 route summary all

	Parameter	Description
Parameter Description	*vrf-name*	(Optional) VRF name. If no VRF name is specified, statistics of the IPv6 routing table of the global VRF are displayed.

Defaults	N/A

Command Mode	Privileged EXEC mode

Usage Guide	N/A

Examples

The following example displays statistics of IPv6 routing table of the global VRF.

```
FS#show ipv6 route summary
IPv6 routing table name is -    Default(0) global scope - 5 entries
IPv6 routing table default maximum-paths is 32
Local                 2
Connected             3
Static                0
PIP                   0
OSPF                  0
BGP                   0
------------------------
Total                 5
```

The following example displays t statistics of all IPv6 routing tables.

```
FS#show ipv6 route summary
IPv6 routing table name is -    Default(0) global scope - 5 entries
IPv6 routing table default maximum-paths is 32
Local                 2
Connected             3
Static                0
PIP                   0
OSPF                  0
BGP                   0
------------------------
Total                 5
```

Field	Description
Memory	The memory size occupied by the current routing table.
Entries	The entries in the current routing table (based on the entry prefix instead of the next hop entry.)
Connected	Describes the protocol type of the entry. The field can be; Connected: Connected route entry. Static: Static route entry. RIP: RIP route entry. OSPF: OSPF route entry. ISIS: ISIS route entry.

	BGP: BGP route entry. TOTAL: Total number of all protocol entries.
IPv6 routing table count	The number of the routing tables.
Global	The name of the current routing table. The field can be: Global : Global (The default VRF) VRF1: VRF name. TOTAL: All VRF routing table summaries.

Related Commands	Command	Description
	N/A	N/A

Platform Description	This command is not supported on 2-layer devices.

10. Protocol-independent Commands

10.1 accept-lifetime

	Use this command in the encryption key configuration mode to specify the lifetime of an encryption key in its receiving direction. Use the no form of this command to restore the default value.	
	accept-lifetime *start-time* {**infinite** | *end-time* | **duration** *seconds*}	
	no accept-lifetime	
Parameter description	**Parameter**	**Description**
	start-time	Start time of the lifetime.
	infinite	Indicates that the encryption key is valid for ever.
	end-time	*End time of the encryption key. It must be later than the start time.*
	duration *seconds*	Duration of the encryption key after the start time. The value ranges from 1 to 2147483646.
Default	infinite	
Command mode	Encryption key configuration mode	
Usage guideline	Use this command to specify the lifetime of an encryption key in its receiving direction.	
Examples	The following example configures the lifetime from 0:00 on September 9, 2000 to 0:00 on October 12, 2011. FS(config)# key chain ripkeys FS(config-keychain)# key 1 FS(config-keychain-key)#accept-lifetime 00:00:00 Sep 9 2000 00:00:00 Dec 12 2011	
Related command	**Command**	**Description**
	-	-
Platform description	-	

10.2 ip as-path access-list

	Use this command to configure an autonomous system (AS) path filter using a regular expression. Use the **no** form of this command to remove the AS path filter using a regular expression.	
	ip as-path access-list *path-list-num* { **permit** | **deny** } *regular-expression*	
	no ip as-path access-list *path-list-num* [{ **permit** | **deny** } *regular-expression*]	
Parameter description	**Parameter**	**Description**
	path-list-num	Specifies the AS-path access-list number. The range is from 1 to 500.

	permit	Permits advertisement based on matching conditions.
	deny	Denies advertisement based on matching conditions.
	regular-expression	Regular expression that defines the AS-path filter. The expression length range is from 1 to 255 characters.
Default	By default, no AS path filter using a regular expression is configured.	
Command mode	Global configuration mode	
Usage guideline	N/A	
Examples	The following example configures an AS path filter matching the path which contains AS number 123 only. FS(config)# ip as-path access-list 105 deny ^123$	
Related command	**Command**	**Description**
	-	-
Platform description	-	

10.3 ip community-list

	Use this command to define a standard or expanded community list and control access to it. Use the **no** form of this command to remove the setting.
	ip community-list { *community-list-number* **| standard** *community-list-name* } { **permit | deny** }
	ip community-list { *community-list-number* | **expanded** *community-list-name* } { **permit | deny** } [*regular-expression*]

Parameter description	**Parameter**	**Description**
	standard	Indicates standard community list numbered in 1 to 99.
	expanded	Indicates expanded community list numbered in 100 to 199.
	permit	Permits access to the community list.
	deny	Denies access to the community list.
	community-number	Community number in the form of AA:NN(AS number/2-byte numerical) in the range of 1 to 255 characters. It may also be one of the following value:

Default configuration	None

Command	Global configuration mode.

mode	

Usage guidelines	This command is used to define the community list for BGP.

Examples	FS(config)# ip community-list standard 1 deny *100.20.200.20* FS(config)# ip community-list standard 1 permit internet

	Command	Description
Related commands	match community	Match the community list.
	set community-list delete	Remove the community value of the BGP path according to the community list.
	show ip community-list	Show the community list information.

10.4 ip extcommunity-list

	Use this command to create an extcommunity list and add an entry to the list. Use the **no** form of this command to remove the setting.
	ip extcommunity-list {*expanded-list* | **expanded** *list-name* } { **permit | deny** } [*regular-expression*]
	ip extcommunity-list {*standard-list* **| standard** *list-name* } { **permit | deny** } [**rt** *value*] [**soo** *value*]
	no ip extcommunity-list {*expanded-list* **| expanded** *list-name* **|** *standard-list* **| standard** *list-name* }
	ip extcommunity-list {*expanded-list* | **expanded** *list-name*| *standard-list* | **standard** *list-name* }
	no ip extcommunity-list {*expanded-list* | **expanded** *list-name* | *standard-list* | **standard** *list-name*}

	Parameter	Description
Parameter description	*expand-list*	Indicates an extended extcommunity list, ranging from 100 to 199. One extcommunity list may contain multiple rules.
	standard-list	Indicates a standard extcommunity list, ranging from 1 to 99. One extcommunity list may contain multiple rules.
	expanded *list-name*	Indicates the name of an extended extcommunity, comprising not more than 32 characters. When using this parameter, you enter the extcommunity list configuration mode.
	standard *list-name*	Indicates the name of a standard extcommunity list, comprising not more than 32 characters. When using this parameter, you enter the extcommunity list configuration mode.
	permit	Defines an extcommunity rule for permitting.
	deny	Defines an extcommunity rule for denying.
	regular-expression	(optional) Defines a matching template that is used to match an extcommunity.
	sequence-number	(Optional) Defines the sequence number of a rule, ranging from 1 to 2,147,483,647. If no sequence number is specified, the sequence number automatically increases by 10 when a rule is added by default. The initial number is 10.

	rt	(Optional) Sets the RT attribute value. This command can be used only for the standard extcommunity configuration, but not for the extended extcommunity configuration.
	soo	(Optional) Sets the SOO attribute value. This command can be used only for the standard extcommunity configuration, but not for the extended extcommunity configuration.
	value	Indicates the value of an extended community (extend_community_value).

Default	It is disabled by default.

Command mode	Global configuration mode and ip extcommunity-list configuration mode.

Usage guidelines	This command is used to define the extcommunity list.
Examples	1.The following example defines an ip extcommunity-list.
	FS(config)# ip extcommunity-list 1 permit rt 100：1 FS(config)# ip extcommunity-list standard aaa permit rt 100：2 FS(config)# ip extcommunity-list expanded ext1 permit 200：[0~9][0~9]
	2. The following example displays how to use ip extcommunity.
	FS(config)# route-map rt_in_filter FS(config-route-map)# match extcommunity 1 FS(config-route-map)# match extcommunity ext1 FS(config)# router bgp 100 FS(config-router)# address-family vpn FS(config-router-af)#neighbor 3.3.3.3 send-community extended FS(config-router-af)#neighbor 3.3.3.3 route-map rt_in_filter in

10.5 ip prefix-list

	Use this command to create a prefix list or add an entry to the prefix list. Use the **no** form of this command to remove the prefix list or an entry.
	ip prefix-list *prefix-list-name* [**seq** *seq-number*] { **deny** | **permit** } *ip-prefix* [**ge** *minimum-prefix-length*][**le** *maximum-prefix- length*]
	no ip prefix-list *prefix-list-name* [**seq** *seq-number*] { **deny** | **permit** } *ip-prefix* [**ge** *minimum-prefix-length*][**le** *maximum-prefix- length*]

Parameter description	**Parameter**	**Description**
	prefix-list-name	Name of the prefix list

	seq-number	Sequence number of an entry in the range of 1 to 2147483647. When you execute this command to add an entry without a sequence number, the system allocates a default sequence number for the entry. The default sequence number of the first entry is 5. Every subsequential entry without a sequence number uses the time of 5 larger than the previous sequence number as the default sequence number.
	deny	Deny the route matching the prefix list.
	permit	Permit the route matching the prefix list.
	ip-prefix	Network address and mask. Network address can be any valid IP address and the mask length is in the range of 0 to 32.
	minimum-prefix-length	(Optional) Minimum length of the prefix (the starting length) Note: “ge” indicates the operation of “larger than” and “equivalent to”.
	maximum-prefix-length	(Optional) Maximum length of the prefix (the ending length) Note: “le” indicates the operation of “less than” and “equivalent to”.

Default configuration	None

Command mode	Global configuration mode.

Usage guidelines	The ip prefix-list command configures the prefix list, with the permit or deny keyword to determine the action in case of matching. You can execute this command to define an exact match, or use “ge” or “le” to define a range match for a prefix for flexible configuration. “ge” indicates the range of minimum-prefix-length to 32; “le” indicates the range of the mask length of the IP prefix to maximum-prefix-length; “ge” and “le” indicates the range of minimum-prefix-length to maximum-prefix-length, namely, mask length of IP prefix < minimum-prefix-length < maximum-prefix-length <=32.

Examples	The following example filters the RIP routes the OSPF redistributes by the destination IP address following the rule defined in the associated IP prefix list, for example, redistribute the routes whose destination IP address is in the range 201.1.1.0/24. FS# configure terminal FS(config)# ip prefix-list pre1 permit *201.1.1.0/24* FS(config)# router ospf FS(config-router)# distribute-list prefix pre1 out rip FS(config-router)# end

10.6 ip prefix-list description

	Use this command to add the description of a prefix list. Use the **no** form of this command to delete the description.
	ip prefix-list *prefix-list-name* **description** *description-text*
	no ip prefix-list *prefix-list-name* **description**

	Parameter	Description
Parameter description	*prefix-list-name*	Name of the prefix list
	description-text	Description of the prefix list

Default configuration	No description is added for a prefix list, by default.

Command mode	Global configuration mode

Examples	The example below adds the description for the prefix list: FS# configure terminal FS(config)# ip prefix-list *pre* description Deny *routes from Net-A*

10.7 ip prefix-list sequence-number

	Use this command to enable sort function for a prefix list. Use the **no** form of this command to disable the sort function.
	ip prefix-list sequence-number
	no ip prefix-list sequence-number

Parameter description	Disabled

Default configuration	No sequence number is added for a prefix list, by default.

Command mode	Global configuration mode

Examples	The example below adds a sequence number for the prefix list: FS# configure terminal FS(config)# ip prefix-list pre description deny routes from Net-A

	Command	Description
Related commands	ip prefix-list	Configure the prefix list.

Platform description	N/A

10.8 ipv6 prefix-list

	Use this command to create an IPv6 prefix list or add an entry in the prefix list. Use the **no** form of this command to delete an IPv6 prefix list or an entry in the prefix list.	
	Ipv6 prefix-list *prefix-list-name*[**seq** *seq-number*] { **deny** | **permit**} *ipv6-prefix* [**ge** *minimum-prefix-length*][**le** *maximum-prefix- length*]	
	no ipv6 prefix-list *prefix-list-name*[**seq** *seq-number*] { **deny** | **permit**} *ipv6-prefix* [**ge** *minimum-prefix- length*][**le** *maximum-prefix- length*]	
Parameter description	**Parameter**	**Description**
	prefix-list-name	Name of the prefix list
	seq-number	Sequence number of an entry in the prefix list. Its range is 1 to 4294967294. If the sequence number is not specified in this command, the system will allocate a default one for the entry. The default sequence number of the first entry is 5, and that of each subsequent one is the product of adding 5 to the sequence number of the proceeding entry.
	permit	Permit the access to the matching result.
	deny	Deny the access to the matching result.
	ipv6-prefix	Network address and its mask. The network address can be any valid IP address. The mask can be 0 to 32 characters.
	minimum-prefix-length	(Optional) Minimum length of the prefix (the starting length) Note: “ge” indicates the operation of “larger than” and “equivalent to”.
	maximum-prefix- length	(Optional) Maximum length of the prefix (the ending length) Note: “le” indicates the operation of “less than” and “equivalent to”.

Default configuration	No prefix list is created.

Command mode	Global configuration mode

Usage guideline	The ipv6 prefix-list command configures the prefix list, with the permit or deny keyword to determine the action in case of matching. You can execute this command to define an exact match, or use “ge” or “le” to define a range match for a prefix for flexible configuration. “ge” indicates the range of minimum-prefix-length to 128; “le” indicates the range of the mask length of the IP prefix to maximum-prefix-length; “ge” and “le” indicates the range of minimum-prefix-length to maximum-prefix-length, namely, Ipv6-prefix mask length < minimum-prefix-length < maximum-prefix-length <= 128

Examples	The following example filters the RIP routes the OSPF redistributes by the destination IP address following the rule

	defined in the associated IP prefix list, for example, redistribute the routes whose destination IP address is in the range 2222::/64. FS# configure terminal FS(config)# ipv6 prefix-list pre1 permit *2222::64* FS(config)# ipv6 router ospf FS(config-router)# distribute-list prefix pre out rip FS(config-router)# end

10.9 ipv6 prefix-list description

	Use this command to add the description of an IPv6 prefix list. Use the **no** form of this command to delete the description.
	ipv6 prefix-list *prefix-lis-name* **description** *description-text*
	no ipv6 prefix-list *prefix-lis-name* **description**

	Parameter	Description
Parameter description	*prefix-lis-name*	Name of the ipv6 prefix list
	description-text	Description of the ipv6 prefix list

Default configuration	No description is added for an IPv6 prefix list, by default.

Command mode	Global configuration mode

Examples	The example below adds the description for the prefix list: FS# configure terminal FS(config)# ipv6 prefix-list pre description Deny routes *from Net-A*

	Command	Description
Related commands	ipv6 prefix-list	Configure the IPv6 prefix list.

10.10 ipv6 prefix-list sequence-number

	Use this command to enable the sorting function for an IPv6 prefix list. Use the **no** form of this command to remove the settings.
	ipv6 prefix-list sequence-number
	no ipv6 prefix-list sequence-number

Parameter description	

Default	No sequence number is added for a prefix list, by default.

configuration	

Command mode	Global configuration mode

Examples	The example below adds a sequence number for the prefix list: FS# configure terminal FS(config)# ipv6 prefix-list pre description Deny routes *from Net-A*

Related commands	Command	Description
	ipv6 prefix-list	Configure the IPv6 prefix list.

10.11 key

	Use this command to define an encryption key and enter the encryption key chain configuration mode. Use the no form of this command to delete it.	
	key *key-id*	
	no key *key-id*	
Parameter description	**Parameter**	**Description**
	key-id	Key ID, ranging from 0 to 2147483647.
Default	No encryption key is configured.	
Command mode	Encryption key chain configuration mode.	
Usage guideline	Use this command to define an encryption key.	
Examples	The following example configures encryption key chain ripkeys and key 1. FS(config)# key chain ripkeys FS(config-keychain)# key 1	
Related command	**Command**	**Description**
	-	-
Platform description	**-**	

10.12 key chain

	Use this command to define a key chain and enter the key chain configuration mode. Use the no form of this command to delete it.
	key chain *key-chain-name*
	no key chain *key-chain-name*
Parameter description	**Parameter** / **Description** *key-chain-name* / Key chain name.
Default	No key chain is configured.
Command mode	Global configuration mode.
Usage guideline	For a key chain to take effect, you need to configure at least one key.
Examples	The following example configures key chain ripkeys and enters the key chain configuration mode. FS(config)# key chain ripkeys
Related command	**Command** / **Description** - / -
Platform description	-

10.13 key-string

	Use this command to specify a key string. Use the no form of this command to delete it.
	key-string [**0**|**7**] *text*
	no key-string
Parameter description	**Parameter** / **Description** **0** / Use plaintext. **7** / Use encryption. *text* / Authentication string.
Default	No key string is configured.
Command mode	Encryption key configuration mode.
Usage guideline	Use this command to specify a key string.

Examples	The following example configures key chain ripkeys, key 1 and the key string abc: FS(config)# key chain ripkeys FS(config-keychain)# key 1 FS(config-keychain-key)#key-string abc
Related command	**Command** / **Description** - / -
Platform description	-

10.14 match as-path

	Use this command to redistribute the routes of AS_PATH attribute permitted by the access list in the route map configuration mode. Use the **no** form of this command to remove the setting.
	match as-path *as-path-acl-list-num* [*as-path-acl-list-number.....*]
	no match as-path [*as-path-acl-list-num.....*]

Parameter description	**Parameter**	**Description**
	as-path-acl-list-num	ACL number, in the range of 1 to 500.

Default configuration	None.

Command mode	Route map configuration mode.

Usage guidelines	The match as-path can be followed by an access list number or name. One or more match or set commands can be executed to configure one route map. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples	FS(config)# route-map ROUTEMAP2IBGP FS(config-route-map)# match as-path 20 30

Related commands	**Command**	**Description**
	match community	Match the community.
	match metric	Match the metric.
	match origin	Match the source of routes.
	set as-path prepend	Set the AS_PATH attribute of redistributed routes
	set metric	Set the metric.
	set metric-type	Set the metric type.

10.15 match community

	Use this command to redistribute the routes matching the Community attribute permitted by the ACL in the route map configuration mode. Use the **no** form of this command to remove the setting.
	match community { *community-list-number* | *community-list-name*} [**exact-match**] [{*community-list-number* | *community-list-name*} [**exact-match**] …]
	no match community { *community-list-number* | *community-list-name*} [**exact-match**] [{ *community-list-number* | *community-list-name*} [**exact-match**] …]

	Parameter	Description
Parameter description	***community-list-number***	Number of the standard community list in the range 1 to 99. Number of the extended community list in the range of 100 to 199
	communitys-list-name	Name of the community list in the range of less than 80 characters
	exact-match	Match the community list exactly.

Default configuration	None.

Command mode	Route map configuration mode.

Usage guidelines	The match community can be followed by more than one community list number or name, but the total of community lists and names should not be greater than 6. Each exact-match applies to only the previous list, not all the lists. One or more match or set commands can be executed to configure one route map. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples

```
FS(config)# ip community-list 1 permit 100:2 100:30
FS(config)# route-map set_lopref
FS(config-route-map)# match community 1 exact-match
FS(config-route-map)# set local-preference 20
```

	Command	Description
Related commands	**match as-path**	Match the AS_PATH attribute.
	match metric	Match the metric.
	match origin	Match the source.
	set as-path prepend	Set the AS_PATH attribute.
	set metric	Set the metric.
	set metric-type	Set the metric type.

10.16 match extcommunity

	Use this command to define the match rule for the BGP extcommunity. Use the no form of this command to cancel the setting.
	match extcommunity { *standard-list-number* | *standard-list-name* | *expanded-list-num* | *expanded-list-name* }
	no match extcommunity { *standard-list-number* | *standard-list-name* | *expanded-list-num* | *expanded-list-name* }
Parameter description	

Parameter	Description
standard-list-number	Standard extcommunity list number, ranging from 1 to 99. An extcommunity list may contains multiple excommunity values.
standard-list-name	Standard excommunity name. An extcommunity list may contains multiple excommunity values.
expanded-list-num	Expanded extcommunity list number, ranging from 100 to 199. An extcommunity list may contains multiple excommunity values.
expanded-list-name	Expanded excommunity name. An extcommunity list may contains multiple excommunity values.

Default	The rule is not defined in the associated route map.
Command mode	Route map configuration mode.
Usage guideline	There are the following scenarios for a route map with an extcommunity: 1. The route map associated with **import map** uses the RT attribute to filter imported VRF routes**.** 2. The route maps associated with **neighbor route-map in** and **neighbor route-map out** are configured in the BGP VPNv4 address family mode and use the RT attribute to filter VPNv4 routes sent to or by BGP peers.
Examples	1. Define two extcommunity: FS(config)# ip extcommunity-list 1 permit rt 100: 1 FS(config)# ip extcommunity-list 1 permit rt 100: 2 2. Define match rules in the route map: FS(config)# route-map rt FS(config-route-map)# match extcommunity 1 3. Use the route map. FS(config)# router bgp 100 FS(config-router)# address-family vpnv4 FS(config-router-af)# neighbor 3.3.3.3 route-map rt in
Related command	

Command	Description
ip extcommunity-list	Create an extcommunity list.
show ip extcommunity-list	Show an extcommunity list.

Platform description	-

10.17 match interface

	Use **match interface** command to redistribute the routes whose next hop is the specified interface. Use the **no** form of this command to remove the setting.
	match interface *interface-type interface-number* […*interface-type interface-number*]
	no match interface *[interface-type interface-number* […*interface-type interface-number*]]

	Parameter	Description
Parameter description	*interface-type*	Interface type
	interface-number	Interface number

Default configuration	None.

Command mode	Route map configuration mode.

Usage guidelines	This command can be followed by multiple interfaces. You can redistribute the routes from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa. The mutual route redistribution can be implemented between all the IP routing protocols. For route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. One or more match or set commands can be executed to configure a route map. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples	The route map can be configured very flexibly for route redistribution and policy-based routing. No matter how the route map is used, the configuration principle is the same, except that different command sets are used. Even if it is used on the route redistribution, different routing protocols can use different commands with the route map. The following example redistributes the RIP route with the next hop of fastethernet 0/0 in the OSPF routing protocol. router ospf redistribute rip subnets route-map redrip network 192.168.12.0 0.0.0.255 area 0 route-map redrip permit 10 match interface fastethernet 0/0

	Command	Description
Related commands	**match ip address**	Match the address in the access list.
	match ip next-hop	Match the next-hop IP address in the access list.
	match ip route-source	Match the source IP address in the access list.

	match metric	Match the metric.
	match route-type	Match the route type.
	match tag	Match the tag.
	set metric	Set the metric.
	set metric-type	Set the metric type.
	set tag	Set the tag.

10.18 match ip address

	Use **match ip address** command to redistribute the routes matching the IP address permitted by the ACL or the prefix list. Use the **no** form of this command to remove the setting.
	match ip address {*access-list-number* [*access-list-number...* | *access-list-name...*] |*access-list-name* [*access-list-number...*|*access-list-name*] | **prefix-list** *prefix-list-name [prefix-list-name...*]}
	no match ip address [*access-list-number* [*access-list-number...* | *access-list-name...*] |*access-list-name* [*access-list-number...*|*access-list-name*] | **prefix-list** *prefix-list-name [prefix-list-name...*]]

	Parameter	Description
Parameter description	*access-list-number*	Number of the access list
	access-list-name	Name of the access list
	prefix-list *prefix-list-name*	Specify the prefix list to match.

Default configuration	None.

Command mode	Route map configuration mode.

Usage guidelines	Multiple access list numbers or names may follow match ip address. You can redistribute the routes from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa. The mutual route redistribution can be implemented between all the IP routing protocols. For route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. One or more match or set commands can be executed to configure a route map. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples	The route map can be configured very flexibly for route redistribution and policy-based routing. No matter how the route map is used, the configuration principle is the same, except that different command sets are used. Even if it is used on the route redistribution, different routing protocols can use different commands with the route map. The following example enables the OSPF routing protocol to redistribute RIP routes that match access list 10, with the route type being type-1 external type and the default metric being 40. router ospf redistribute rip subnets route-map redrip

```
network 192.168.12.0 0.0.0.255 area 0

access-list 10 permit 200.168.23.0 0.0.0.255

route-map redrip permit 10
match ip address 10
set metric 40
set metric-type type-1!
```

	Command	Description
Related commands	**access-list**	Set the access list.
	match interface	Match the next-hop interface of the route.
	match ip next-hop	Match the next-hop address in the access list.
	match ip route-source	Match the route source address in the access list.
	match metric	Match the metric.
	match route-type	Match the route type.
	match tag	Match the tag.
	set metric	Set the metric.
	set metric-type	Set the metric type.
	set tag	Set the tag.

10.19 match ip next-hop

	Use **match ip next-hop** command to redistribute the routes whose next-hop IP address matches the access list or the prefix list. Use the **no** form of this command to remove the setting.
	match ip next-hop {*access-list-number* [*access-list-number...* | *access-list-name...*] |*access-list-name* [*access-list-number...*|*access-list-name*] | **prefix-list** *prefix-list-name [prefix-list-name...*]}
	no match ip next-hop [*access-list-number* [*access-list-number...* | *access-list-name...*] |*access-list-name* [*access-list-number...*|*access-list-name*] | **prefix-list** *prefix-list-name [prefix-list-name...*]]

	Parameter	Description
Parameter description	*access-list-number*	Number of the access list
	access-list-name	Name of the access list
	prefix-list *prefix-list-name*	Specify the prefix list to match.

Default configuration	None.

Command mode	Route map configuration mode.

Usage guidelines	Multiple access list numbers or names may follow match ip next-hop. You can redistribute the routes from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa.

	The mutual route redistribution can be implemented between all the IP routing protocols. For route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. One or more match or set commands can be executed to configure a route map. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples	In the example below, the OSPF routing protocol redistributes the RIP routes. As long as the next hop address of the RIP route matches the access list 10 or 20, the OSPF allows for redistribution. router ospf redistribute rip subnets route-map redrip network 192.168.12.0 0.0.0.255 area 0 access-list 10 permit 192.168.100.1 access-list 20 permit 172.16.10.1 route-map redrip permit 10 match ip next-hop 10 20

	Command	Description
Related commands	**access-list**	Set the access list.
	match ip address	Match the IP address in the access list.
	match interface	Match the next-hop interface of the route.
	match ip route-source	Match the route source address in the access list.
	match metric	Match the metric.
	match route-type	Match the route type.
	match tag	Match the tag.
	set metric	Set the metric.
	set metric-type	Set the metric type.
	set tag	Set the tag.

10.20 match ip route-source

	Use **match ip route-source** command to redistribute the routes whose source IP address matches the access list. Use the **no** form of this command to remove the setting. **match ip route-source** {*access-list-number* [*access-list-number...* | *access-list-name...*] |*access-list-name* [*access-list-number...*|*access-list-name*] | **prefix-list** *prefix-list-name [prefix-list-name...*]} **no match ip route-source** [*access-list-number* [*access-list-number...* | *access-list-name...*] |*access-list-name* [*access-list-number...*|*access-list-name*] | **prefix-list** *prefix-list-name [prefix-list-name...*]]

	Parameter	Description
Parameter description	*access-list-number*	Number of the access list
	access-list-name	Name of the access list
	prefix-list *prefix-list-name*	Specify the prefix list to match.

Default configuration	None.

Command mode	Route map configuration mode.

Usage guidelines	Multiple access list numbers may follow match ip route-source. You can redistribute the routes from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa. The mutual route redistribution can be implemented between all the IP routing protocols. For route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. One or more match or set commands can be executed to configure a route map. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples

In the example below, the OSPF routing protocol redistributes the RIP routes. As long as the source IP address of the RIP route matches the access list 5, the OSPF allows for redistribution.

```
router ospf
redistribute rip subnets route-map redrip
network 192.168.12.0 0.0.0.255 area 0

access-list 5 permit 192.168.100.1

route-map redrip permit 10
 match ip route-source 5
```

Related commands

Command	Description
access-list	Set the access list.
match ip address	Match the IP address in the access list.
match interface	Match the next-hop interface of the route.
match ip next-hop	Match the next-hop IP address in the access list.
match metric	Match the metric.
match route-type	Match the route type.
match tag	Match the tag.
set metric	Set the metric.
set metric-type	Set the metric type.
set tag	Set the tag.

10.21 match ipv6 address

Use this command to redistribute the network routes permitted in the IPv6 access list or the IPv6 prefix list. Use the **no** form of this command to delete the setting.

match ipv6 address { *access-list-name*] | **prefix-list** *prefix-list-name* }

	no match ipv6 address

	Parameter	Description
Parameter description	*access-list-name*	Name of the access list.
	prefix-list *prefix-list-name*	Specify the IPv6 prefix list to match.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	You can redistribute the routing information from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa. The mutual route redistribution can be implemented between all the IP routing protocols. In the route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. In configuring one route map, one or more match or set commands can be executed. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples

The route map can be configured very flexibly to be used for route redistribution and policy-based routing. No matter how the route map is used, the configuration principle is the same, except that different command sets are used. Even if it is used on the route redistribution, different routing protocols can use different commands with the route map.

The following example enables the OSPF routing protocol to redistribute RIP routes that match access list v6acl, with the default metric being 30.

```
ipv6 router ospf
redistribute rip subnets route-map redrip
ipv6 access-list v6acl
10 permit ipv6 2620::64 any

route-map redrip permit 10
match ipv6 address v6acl
set metric 30
```

	Command	Description
Related commands	**ipv6 access-list**	Set the IPV6 access list.
	match interface	Match the next-hop interface of the route.
	match ipv6 next-hop	Match the next-hop address in the IPv6 access list.
	match ipvr route-source	Match the route source address in the IPv6 access list.
	match metric	Match the route metric.
	match route-type	Match the route type.

	match tag	Match the route tag.
	set metric	Set the metric for route redistribution.
	set metric-type	Set the type for route redistribution.
	set tag	Set the tag for route redistribution.

10.22 match ipv6 next-hop

	Use this command to redistribute the network routes whose next-hop IP address matches the IPv6 access list or the IPv6 prefix list. Use the **no** form of this command to delete the setting. **match ipv6 next-hop** { *access-list-name*] | **prefix-list** *prefix-list-name*} **no match ipv6 next hop**

	Parameter	Description
Parameter description	*access-list-name*	Name of the IPv6 access list.
	prefix-list *prefix-list-name*	Specify the IPv6 prefix list to match.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	You can redistribute the routes from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa. The mutual route redistribution can be implemented between all the IP routing protocols. For route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. One or more match or set commands can be executed to configure a route map. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples	The route map can be configured very flexibly to be used for route redistribution and policy-based routing. No matter how the route map is used, the configuration principle is the same, except that different command sets are used. Even if it is used on the route redistribution, different routing protocols can use different commands with the route map. The following example enables the OSPF routing protocol to redistribute RIP routes that only match access list v6acl, with the default metric being 40. ipv6 router ospf redistribute rip subnets route-map redrip ipv6 access-list v6acl 10 permit ipv6 2620::64 any

	route-map redrip permit 10 match ipv6 address v6acl set metric 40

	Command	Description
Related commands	**ipv6 access-list**	Set the IPV6 access list.
	match interface	Match the next-hop interface of the route.
	match ipv6 address	Match the IP address in the IPv6 access list.
	match ipv6 route-source	Match the route source address in the IPv6 access list.
	match metric	Match the route metric.
	match route-type	Match the route type.
	match tag	Match the route tag.
	set metric	Set the metric for route redistribution.
	set metric-type	Set the type for route redistribution.
	set tag	Set the tag for route redistribution.

10.23 match ipv6 route-source

	Use this command to redistribute the network routes whose next-hop IP address matches the IPv6 access list or the IPv6 prefix list. Use the **no** form of this command to delete the setting. **match ipv6 route-source** { *access-list-name*] | **prefix-list** *prefix-list-name* } **no match ipv6 route-source**

	Parameter	Description
Parameter description	*access-list-name*	Name of the IPv6 access list.
	prefix-list *prefix-list-name*	Specify the IPv6 prefix list to match.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	You can redistribute the routing information from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa. The mutual route redistribution can be implemented between all the IP routing protocols. In the route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. In configuring one route map, one or more match or set commands can be executed. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples	The route map can be configured very flexibly to be used for route redistribution and policy-based routing. No matter how the route map is used, the configuration principle is the same, except that different command sets are used. Even if it is used on the route redistribution, different routing protocols can use different commands with the route map. The following example enables the OSPF routing protocol to redistribute RIP routes that only match access list v6acl, with the default metric being 50. ipv6 router ospf redistribute rip subnets route-map redrip ipv6 access-list v6acl 10 permit ipv6 5200::64 any route-map redrip permit 10 match ipv6 address v6acl set metric 50

	Command	Description
Related commands	**ipv6 access-list**	Set the IPV6 access list.
	match interface	Match the next-hop interface of the route.
	match ipv6 address	Match the IP address in the IPv6 access list.
	match ipv6 next-hop	Match the next hop in the IPv6 access list.
	match metric	Match the route metric.
	match route-type	Match the route type.
	match tag	Match the route tag.
	set metric	Set the metric for route redistribution.
	set metric-type	Set the type for route redistribution.
	set tag	Set the tag for route redistribution.

10.24 match metric

	Use **match metric** command to redistribute the routes of the specified metric. Use the **no** form of this command to remove the setting. **match metric** *metric* **no match metric**

Parameter description	Parameter	Description
	metric	Route metric, in the range 0 to 4294967295

Default configuration	None.
Command mode	Route map configuration mode.

Usage guidelines	You can redistribute the routing information from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa. The mutual route redistribution can be implemented between all the IP routing protocols. In the route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. In configuring one route map, one or more match or set commands can be executed. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples	In the example below, the OSPF routing protocol redistributes the RIP routes of metric 10. router ospf 1 redistribute rip subnets route-map redrip network 192.168.12.0 0.0.0.255 area 0 route-map redrip permit 10 match metric 10

	Command	Description
Related commands	**access-list**	Set the access list.
	match ip address	Match the IP address.
	match interface	Match the interface.
	match ip next-hop	Match the next-hop IP address.
	match ip route-source	Match the source IP address.
	match route-type	Match the route type.
	match tag	Match the tag.
	set metric	Set the metric.
	set metric-type	Set the metric type.
	set tag	Set the tag.

10.25 match origin

	Use this command to redistribute the routes whose source IP address is permitted by the ACL in the route map configuration mode. Use the **no** form of this command to remove the setting. **match origin {egp | igp | incomplete}** **no match origin [egp | igp | incomplete]**

	Parameter	Description
Parameter description	egp	Redistribute the routes from the remote EGP.
	igp	Redistribute the routes from the local IGP.
	incomplete	Redistribute the routes from an incomplete type.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	Use this command to set the origin of the routes to be redistributed. Only one origin can be set.

Examples	FS(config)# route-map *MY_MAP 10* permit FS(config-route-map)# match origin egp FS(config-route-map)# set community *109* FS(config-route-map)# exit FS(config)# route-map *MAP20 20* permit FS(config-route-map)# match origin incomplete FS(config-route-map)# set community no-export

	Command	Description
Related commands	**match as-path**	Match the AS_PATH attribute.
	match metric	Match the metric.
	match origin	Match the source.
	set as-path prepend	Set the AS_PATH attribute.
	set metric	Set the metric.
	set origin	Set the source.

10.26 match route-type

	Use this command to redistribute the network routes of the specified type. Use the **no** form of this command to delete the setting. **match route-type** { **static** | **connect** | **rip** | **local** | **internal** | **external** [**type-1** | **type-2**] | **level-1** | **level-2** | **evpn-type-1** | **evpn-type-2** | **evpn-type-3** | **evpn-type-4** | **evpn-type-5** } **no match route-type** [**static** | **connect** | **rip** | **local** | **internal** | **external** [**type-1** | **type-2**] | **level-1** | **level-2**| **evpn-type-1** | **evpn-type-2** | **evpn-type-3** | **evpn-type-4** | **evpn-type-5**]

	Parameter	Description
Parameter description	**local**	Indicates the local route type.
	static	Indicates the static route type.
	connect	Indicates the directly connected route type.
	rip	Indicates the RIP route type.
	internal	Indicates the OSPF internal route type.
	external	Indicates the OSPF external route type.
	type-1 | type-2	Indicates the OSPF type-1 or type-2 route type.
	level-1 | level-2	Indicates the ISIS level-1 or level-2 route type.
	evpn-type-1 | evpn-type-2 | evpn-type-3 | evpn-type-4 | evpn-type-5	5 route types of BGP EVPN

Default	None

configuration	

Command mode	Route map configuration mode

Usage guideline	You can redistribute the routing information from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa. The mutual route redistribution can be implemented between all the IP routing protocols. In the route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. In configuring one route map, one or more match or set commands can be executed. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples

In the example below, the RIP routing protocol redistributes only the internal routes in the OSPF routing domain.

```
router rip
redistribute ospf route-map redrip
network 192.168.12.0

route-map redrip permit 10
match route-type internal
!
```

Related commands

Command	Description
access-list	Set the access list.
match ip address	Match the IP address.
match interface	Match the interface.
match ip next-hop	Match the next-hop IP address.
match ip route-source	Match the source IP address.
match metric	Match the metric.
match tag	Match the tag.
set metric	Set the metric.
set metric-type	Set the access list.
set tag	Match the IP address.

10.27 match tag

Use this command to redistribute the network routes with the specified tag. Use the **no** form of this command to delete the setting.

match tag *tag* [*…tag*]

no match tag [*tag* [*…tag*]]

Parameter	Parameter	Description

description	*tag*	Route tag

Default configuration	None
Command mode	Route map configuration mode

Usage guideline	Multiple tags may follow the match tag command. You can redistribute the routing information from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa. The mutual route redistribution can be implemented between all the IP routing protocols. In the route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. In configuring one route map, one or more match or set commands can be executed. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples	In the example below, the RIP routing protocol redistributes only the routes with tag 50 and 80 in the OSPF routing domain. FS(config)# router rip FS(config-router)# redistribute ospf 100 route-map redrip FS(config-router)# network 192.168.12.0 FS(config-router)# exit FS(config)# route-map redrip permit 10 FS(config-route-map)# match tag 50 80

	Command	Description
Related commands	**access-list**	Set the access list.
	match ip address	Match the IP address.
	match interface	Match the next-hop IP interface.
	match ip route-source	Match the source IP address.
	match metric	Match the metric.
	match ip next-hop	Match the next-hop IP address.
	match route-type	Match the route type.
	set metric	Set the metric.
	set metric-type	Set the metric type.
	set tag	Set the tag.

10.28 memory-lack exit-policy

	Use this command to configure a policy to preferentially exit a routing protocol when the memory reaches the lower limit. Use the **no** form of this command to restore the default policy, namely, exit the routing protocol which occupies the largest memory.

	memory-lack exit-policy { **bgp** | **ospf** | **pim-sm** | **rip** }
	no memory-lack exit-policy

Parameter description	Parameter	Description
	bgp	Preferentially exit BGP when the memory is insufficient.
	ospf	Preferentially exit OSPF when the memory is insufficient.
	pim-sm	Preferentially exit PIM-SM when the memory is insufficient.
	rip	Preferentially exit RIP when the memory is insufficient.

Default	By default, the routing protocol which occupies the largest memory exits preferentially.
Command mode	Global configuration mode
Usage guideline	When the memory reaches the lower limit, you can disable a routing protocol to release the memory to ensure the normal running of other protocols. When the system runs out of memory, disable a routing protocol which has the minimal impact on the system to ensure the operation of main services. Configuring the policy to preferentially exit the routing protocols which are disabled cannot help the system release memory. This command ensures the operation of main services to some extent when the memory is insufficient. If the memory is further consumed, all routing protocols will exit and stop running.
Examples	The following example configures a policy to preferentially exit the BGP protocol when the memory reaches the lower limit. FS(config)# memory-lack exit-policy bgp

Related command	Command	Description
	-	-

Platform description	-

10.29 route-map

	Use **route-map** to enter the route map configuration mode and define a route map. Use the **no** form of this command to remove the setting. **route-map** *route-map-name* [**permit** | **deny**] [*sequence-number*] **no route-map** *route-map-name* [{**permit** | **deny**}*sequence-number*]

Parameter	Parameter	Description

description	*route-map-name*	Name of the route map. The redistribute command references the route map according to its name. Multiple routing policies can be defined in a route map, and each policy corresponds to one sequence number.
	permit	(Optional) If the permit keyword is defined and the rule defined by match is met, The set command controls the redistributed routes. For policy-based routing, the set command controls the packet forwarding, and exits the route map operation. If the permit keyword is defined but the rule defined by match is not met, the system performs the routing policy of the second route map till the set command is executed finally.
	deny	(Optional) If the deny keyword is defined and the rule defined by match is met, no operation will be performed. Neither route redistribution nor policy-based routing is supported in the route map. The system exits the route map operation. If the deny keyword is defined but the rule defined by match is not met, the system performs the routing policy of the second route map till the set command is executed finally.
	sequence-number	Sequence number of the route map. The policy with a lower sequence number is preferred, so it's noted when setting the sequence number.

Default configuration	None.

Command mode	Global configuration mode.

Usage guidelines	At present, the FSOS software primarily uses the route map for route redistribution and policy-based routing. 1. Route redistribution control You can redistribute the routes from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa. The mutual route redistribution can be implemented between all the IP routing protocols. For route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. One or more match or set commands can be executed to configure a route map. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed. When configuring route maps, pay attention to the following when using the sequence number of a route map: When you create the first route map policy, if *sequence-number* is not specified, it is 10 by default; If only one route map policy exists and *sequence-number* is not specified, no new route map policy will be created, and the existing route map policy will be accessed for configuration; If more than one route map policy is available, the sequence number of each policy shall be specified; otherwise an error message will be displayed. 2. policy-based routing Policy-based routing refers to a routing mechanism based on user defined policies. Compared with traditional

	destination IP address-based routing, policy-based routing offers a flexibility for routing based on source IP address, length and port of IP packets. Policy-based routing can apply to the IP packets received on an interface or the IP packets sent from the local device. Policy-based routing utilizes route map to define routing and forwarding policy. The match command defines packet filtering rule and the set command defines the action for the packets matching the filtering rules. The match command used includes match ip address and match length; the set command includes set ip tos, set ip precedence, set ip dscp, set ip [default] nexthop, set ip next-hop verify-availability, set [default] interface.

Examples	The following example enables the OSPF routing protocol to redistribute the RIP routes with the hop count of 4. In the OSPF route domain, the route type is the external route type-1, the default metric is 40 and the tag is 40.
	!
	router ospf
	  redistribute rip subnets route-map redrip
	  network 192.168.12.0 0.0.0.255 area 0
	!
	!
	route-map redrip permit 10
	  match metric 4
	  set metric 40
	  set metric-type type-1
	  set tag 40

Related commands	**Command**	**Description**
	redistribute	Redistribute the routes.

10.30 send-lifetime

	Use this command in the encryption key configuration mode to specify the lifetime of an encryption key in its send direction. Use the no form of this command to restore the default value.	
	send-lifetime *start-time* {**infinite** | *end-time* | **duration** *seconds*}	
	no send-lifetime	
Parameter description	**Parameter**	**Description**
	start-time	Start time of the lifetime.
	infinite	Indicates that the encryption key is valid for ever.
	end-time	*End time of the encryption key. It must be later than the start time.*
	duration *seconds*	Duration of the encryption key after the start time. The value ranges from 1 to 2147483646.
Default	infinite	
Command mode	Encryption key configuration mode	

Usage guideline	Use this command to specify the lifetime of an encryption key in its send direction.
Examples	The following example configures the lifetime from 0:00 on September 9, 2000 to 0:00 on October 12, 2011 FS(config)# key chain ripkeys FS(config-keychain)# key 1 FS(config-keychain-key)# send-lifetime 00:00:00 Sep 9 2000 00:00:00 Dec 12 2011
Related command	**Command** / **Description** - / -
Platform description	-

10.31 set aggregator as

	Use this command to specify the AS_PATH attribute for the aggregator of the routes that match the rule in the route map configuration mode. Use the **no** form of this command to remove the setting. This command is only used to configure policy-based routing. **set aggregator as** *as-number ip_addr* **no set aggregator as** [*as-number ip_addr*]

Parameter description	**Parameter**	**Description**
	as-number	AS number of the aggregator.
	ip_address	IP address of the aggregator.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	Use this command to set the AS_PATH attribute for the matched routes in the BGP routing domain. Only one group of parameters (as-number, ip-addr) is allowed to set at a time.

Examples	FS(config)# route-map set-as-path FS(config-route-map)# match as-path *1* FS(config-route-map)# set aggregator as *3 2.2.2.2*

Related commands	**Command**	**Description**
	match as-path	Match the AS_PATH.
	match community	Match the community.
	match metric	Match the route metric.

	match origin	Match the route source.
	set community	Set the COMMUNITY attribute.
	set metric	Set the metric.
	set metric-type	Set the type.

10.32 set as-path prepend

	Use this command to specify the AS_PATH attribute for the routes that match the rule in the route map configuration mode. Use the **no** form of this command to remove the setting. This command is only used to configure policy-based routing. **set as-path prepend** *as-number* **no set as-path prepend**

	Parameter	Description
Parameter description	*as-number*	Indicates number of the AS_PATH attribute to be configured. The AS number ranges from 1 to 4294967295, and 1 to 65535.65535 in dot mode.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	Use this command to configure the AS_PATH attribute for the matched routes. Up to 10 ASs can be added into the as-path for one time.

Examples	FS(config)# route-map set-as-path FS(config-route-map)# match as-path *1* FS(config-route-map)# set as-path prepend *100 101 102*

	Command	Description
Related commands	**match as-path**	Match the AS_PATH.
	match community	Match the community.
	match metric	Match the route metric.
	match origin	Match the route source.
	set community	Set the COMMUNITY attribute.
	set metric	Set the metric.
	set metric-type	Set the type.

10.33 set atomic-aggregate

	Use this command to set the ATOMIC-AGGREGATE attribute for routes. **set atomic-aggregate**
	Use the **no** form of this command to delete existing configuration.

	no set atomic-aggregate	
Parameter Description	**Parameter**	**Description**
	N/A	N/A
Defaults	N/A	
Command Mode	Routing map configuration mode	
Default Level	14	
Usage Guide	This command is used only in the BGP protocol and is used to set the ATOMIC-AGGREGATE attribute for routes.	
Configuration Examples	N/A	

10.34 set comm-list delete

	Use this command to delete the COMMUNITY_LIST attribute for the routes that match the rule in the route map configuration mode. Use the **no** form of this command to remove the setting. This command is only used to configure policy-based routing. **set comm-list** *community-list-number* | *community-list-name* **delete** **no set comm-list** *community-list-number* | *community-list-name* **delete**

Parameter description	**Parameter**	**Description**
	community-list-number	Number of the community list. Standard community list number : 1-99. Extended community list number : 100-199.
	community-list-name	Name of the community list, which should be no more than 80 characters.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	Use this command to set the community attribute value for the matched routes that will be deleted.

Examples	FS(config)# router bgp *100*

```
FS(config-router)# neighbor 172.16.233.33 remote-as 120
FS(config-router)# neighbor 172.16.233.33 route-map ROUTEMAPIN in
FS(config-router)# neighbor 172.16.233.33 route-map ROUTEMAPOUT out
FS(config-router)# exit
FS(config)# ip community-list 500 permit 100:10
FS(config)# ip community-list 500 permit 100:20
FS(config)# ip community-list 120 deny 100:50
FS(config)# ip community-list 120 permit 100:.*
FS(config)# route-map ROUTEMAPIN permit 10
FS(config-route-map)# set comm-list 500 delete
FS(config-route-map)# exit
FS(config)# route-map ROUTEMAPOUT permit 10
FS(config-route-map)# set comm-list 120 delete
```

Related commands

Command	Description
match as-path	Match the AS_PATH attribute value.
match metric	Match the metric.
match origin	Match the source.
set as-path prepend	Set the AS_PATH attribute.
set local-preference	Set the local priority of the route to be redistributed.
set metric-type	Set the metric type.

10.35 set community

Use this command to specify the community for the routes that match the rule in the route map configuration mode. Use the **no** form of this command to remove the setting. This command is only used to configure policy-based routing.

set community {*community-number*[community-number…] [**additive | none**}

no set community

Parameter description

Parameter	Description
community-number	Community number in the form of AA:NN or a large numeral. In addition, it can be well-known community attributes like internet, local-AS, no-export and no-advertise.
additive	Increase on the original COMMUNITY attribute.
none	Set the community attribute as blank.

Default configuration

None

Command mode	Route map configuration mode

Usage guideline	Use this command to set the community attribute for the matched route.

Examples	FS(config)# route-map *SET_COMMUNITY 10* permit FS(config-route-map)# match as-path *1* FS(config-route-map)# set community *109:10* FS(config-route-map)# exit FS(config)# route-map *SET_COMMUNITY 20* permit FS(config-route-map)# match as-path *2* FS(config-route-map)# set community no-export

	Command	Description
Related commands	**match as-path**	Match the AS_PATH.
	match community	Match the community.
	match metric	Match the metric.
	match origin	Match the source.
	set as-path prepend	Set the AS_PATH attribute.
	set origin	Set the source.
	set metric-type	Set the metric type.

10.36 set dampening

	Use this command to specify the dampening parameters for the routes that match the rule in the route map configuration mode. Use the **no** form of this command to remove the setting. This command is only used to configure policy-based routing. **set dampening** *half-life reuse suppress max-suppress-time* **no set dampening**

	Parameter	Description
Parameter description	*half-life*	Half dampening life for the reachable or unreachable route in the range of 1 to 45 minutes, 15 minutes by default
	reuse	When the route penalty is lower than this value, the route suppression is released. It is in the range 1 to 20000, 750 by default
	suppress	When the route penalty is higher than this value, the route is suppressed. It is in the range 1 to 20000, 2000 by default
	max-suppress-time	Maximum duration a route can be suppressed in the range 1 to 20000 minutes, 4* half-life by default.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	Use this command to set the dampening parameter for the matched routes.

Examples	FS(config)# route-map *tag* FS(config-route-map)# match as path *10* FS(config-route-map)# set dampening *30 1500 10000 120* FS(config-route-map)# exit FS(config)# router bgp *100* FS(config-router)# neighbor *172.16.233.52* route-map *tag* in

	Command	Description
Related commands	**match as-path**	Match the AS_PATH value.
	match community	Match the community.
	match metric	Match the metric.
	match origin	Match the source.
	set as-path prepend	Set the AS_PATH attribute.
	set metric	Set the metric.
	set local-preference	Set the local priority of the route to be redistributed.

10.37 set extcomm-list delete

	Use this command to delete all extcommunity values in the extcommunity list that meet the match rules. Use the **no** form of this command to delete the configuration.
	set extcomm-list { *extcommunity-list-number* | *extcommunity-list-name* } **delete**
	no set extcomm-list { *extcommunity-list-number* | *extcommunity-list-name* } **delete**

	Parameter	Description
Parameter description	*extcommunity-list-number*	*extcommunity-list-number* Standard list: ranges from 1 to 99. Expanded list: ranges from 100 to 199.
	extcommunity-list-name	*extcommunity-list-name* It consists of a maximum of 80 characters.

Default	-
Command mode	Route map configuration mode.

Usage guideline	This command is used to delete the **extcommunity-list.** This command applies only to policy route configuration.
Examples	FS(config)# router bgp 65530 FS(config-router)# neighbor 172.16.233.33 remote-as 65531 FS(config-router)# address-family vpnv4 unicast FS(config-router-af)# neighbor 172.16.233.33 activate FS(config-router-af)# neighbor 172.16.233.33 route-map ROUTEMAPIN in FS(config-router-af)# neighbor 172.16.233.33 route-map ROUTEMAPOUT out FS(config-router)# exit FS(config)# ip extcommunity-list 10 permit rt 100:10 FS(config)# ip extcommunity-list 10 permit rt 100:20 FS(config)# ip extcommunity-list 120 deny 100:50 FS(config)# ip extcommunity-list 120 permit 100:.* FS(config)# route-map ROUTEMAPIN permit 10 FS(config-route-map)# set extcomm-list 10 delete FS(config-route-map)# exit FS(config)# route-map ROUTEMAPOUT permit 10 FS(config-route-map)# set extcomm-list 120 delete

Related command	**Command**	**Description**
	ip extcommunity-list	Configure an **extcommunity-list.**
	match as-path	Match the AS_PATH value
	match metric	Match the metric.
	match origin	Match the source.
	set as-path prepend	Set the AS_PATH attribute.
	set extcomm-list delete	Set delete **extcommunity-list.**
	set local-preference	Set local preference for a reroute.
Platform description	-	

10.38 set extcommunity

	Use this command to specify the extended COMMUNITY attribute for the routes that match the rule in the route map configuration mode. Use the **no** form of this command to remove the setting. This command is only used to configure policy-based routing.
	set extcommunity {**rt** *extend-community-value* | **soo** *extend-community-value*}
	no set extcommunity {**rt** | **soo** }

Parameter description	**Parameter**	**Description**
	rt	Specify the extended community value in the form of RT.
	soo	Specify the extended community value in the form of SOO.
	extend-community-value	Extended community value.

Default	None

Command mode	Route map configuration mode

Usage guideline	Use this command to set the extended community attribute for the matched route.

Examples	FS(config)# access-list *2* permit *192.168.78.0 255.255.255.0* FS(config)# route-map *MAP_NAME* permit *10* FS(config-route-map)# match ip-address *2* FS(config-route-map)# set extcommunity rt *100:2*

	Command	Description
Related commands	**match as-path**	Match the AS_PATH value
	match community	Match the community.
	match metric	Match the metric.
	match origin	Match the source.
	set as-path prepend	Set the AS_PATH attribute.
	set metric	Set the metric.
	set metric-type	Set the metric type.

10.39 set fast-reroute

	Use this command to specify a backup outgoing fast reroute and a backup next-hop for routes that meet the match conditions. Use the no form of this command to delete the configuration.	
	set fast-reroute backup-interface *interface-type interface-number* [**backup-nexthop** *ip-address*]	
	no set fast-reroute	
Parameter description	**Parameter**	**Description**
	interface-type interface-number	Backup outgoing interface.
	ip-address	Backup next-hop.
Default	-	
Command mode	Route map configuration mode.	
Usage guideline	Use this command to configure IP FRR backup outgoing interface and backup next-hop. The current software version supports only one backup route. This command supports only one set of the two parameters. This command is used for fast reroute configuration.	

	IP FRR backup routes must not be direct-connection or local host routes.
Examples	FS(config)# access-list 2 permit 192.168.78.0 255.255.255.0 FS(config)# route-map frr permit 10 FS(config-route-map)# match ip-address 2 FS(config-route-map)# set fast-reroute backup-interface GigabitEthernet 0/1 backup-nexthop 192.168.1.2
Related command	**Command** / **Description** **match ip-address** / Match IP address list.
Platform description	N/A

10.40 set ip default next-hop

	Use this command to specify the default next-hop IP address for the packets that match the rule in the route map configuration mode. Use the **no** form of this command to remove the setting.
	set ip default next-hop *ip-address* [*weight*] […*ip-address* [*weight*]]
	no set ip default next-hop [*ip-address* [*weight*] […*ip-address* [*weight*]]]

Parameter description	**Parameter**	**Description**
	ip-address	IP address of the next hop.
	weight	Weight of the next hop.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	This command supports two operation modes: WCMP load balancing mode and non-WCMP load balancing mode. In the former mode, the system implements WCMP load balancing according to the weight inputted. Up to 32 IP addresses may follow the set ip default next-hop command. If a weight follows ip address, up to 4 next hop IP addresses can be configured. Note: If a weight follows any next-hop, the operation mode of this command will be automatically switched to the WCMP load balancing mode. In this mode, the weight of those next hop IP addresses whose weight is not configured is 1 by default. Differences between set ip next-hop and set ip default next-hop: After the set ip next-hop command is configured, the policy-based routing takes precedence over the routing table; while after the set ip default next-hop command is configured, the routing table takes precedence over the policy-based routing. Use this command to customize a default route for a specified user. If the software fails to find the forwarding route, the packet will be forwarded to the nexthop set with this command. To use the policy-based routing, you must specify the route map for it and create the route map. A route map contains multiple policies, and each policy defines one or more match rules and the corresponding operations.

	After policy-based routing is applied to an interface, the packets received by the interface will be checked. The packets that do not match any policy in the route map will be forwarded through the usual route. The packets that match a policy in the route map will be processed according to the operation defined in the policy. A route-map policy may contain multiple set operations.

Examples	The following example forwards the packets from two different nodes through different routes. For the messages received on the synchronous interface 1 from 1.1.1.1, if the software cannot find the forwarding route, they are forwarded to device 6.6.6.6. For the messages received from 2.2.2.2, if the software cannot find the forwarding route, they are forwarded to device 7.7.7.7. The other messages will be discarded if the software cannot find the forwarding route. FS(config)#access-list 1 permit 1.1.1.1 0.0.0.0 FS(config)#access-list 2 permit 2.2.2.2 0.0.0.0 FS(config)#interface async 1 FS(config-if)#ip policy route-map equal-access FS(config)#route-map equal-access permit 10 FS(config- route-map)#match ip address 1 FS(config-route-map)#set ip default next-hop 6.6.6.6 FS(config)#route-map equal-access permit 20 FS(config-route-map)#match ip address 2 FS(config-route-map)#set ip default next-hop 7.7.7.7 FS(config)#route-map equal-access permit 30 FS(config- route-map)#set default interface null 0

	Command	Description
Related commands	**route-map**	Define a route map.
	match ip address	Match the IP address.
	set default interface	Set the default outgoing interface.
	set interface	Set the outgoing interface.
	set ip next-hop	Set the next hop of the packets.
	set ip precedence	Set the priority of the packets.

Platform description	N/A

10.41 set ip dscp

	Use this command to specify the DSCP value for the packets that match the rule in the route map configuration mode. Use the **no** form of this command to remove the setting.
	set ip dscp *dscp-value*
	no set ip dscp

Parameter	Parameter	Description

description	*dscp-value*	DSCP value

Default configuration	N/A

Command mode	Route map configuration mode

Usage guideline	N/A

Examples	N/A

Related commands	**Command**	**Description**
	route-map	Define a route map.
	match ip address	Match the IP address.
	set default interface	Set the default outgoing interface.
	set interface	Set the outgoing interface.
	set ip next-hop	Set the next hop of the packets.
	set ip precedence	Set the priority of the packets.

10.42 set ip next-hop

	Use this command to specify the next-hop IP address for the packets that meet the matching rule. Use the **no** form of this command to remove the setting. This command is only used to configure policy-based routing.
	set ip next-hop *ip-address* [*weight*] […*ip-address* [*weight*]]
	no set ip next-hop [*ip-address* [*weight*] […*ip-address* [*weight*]]]

Parameter description	**Parameter**	**Description**
	ip-address	Indicates the next-hop IP address.
	weight	Indicates the weight of this next hop.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	This command supports two operation modes: WCMP load balancing mode and non-WCMP load balancing mode. In the former mode, the system implements WCMP load balancing according to the weight entered by the user. Multiple IP addresses may follow set ip next-hop and the number of addresses should be less than 32.

	If weight follows any next-hop, the operation mode of this command will be automatically switched to the WCMP load balancing mode. In the WCMP load balancing mode, for the nexthop address without configuring the corresponding weight, the weight is 1 by default. If weight follows ip address, up to 4 next hop addresses can be configured. This command can be used to set different routes for the traffic that meets different match rule. If multiple IP addresses are configured, they can be used in turn. Policy-based routing is a packet forwarding mechanism more flexible than the routing based on the target network. After the policy-based routing is used, the device will decide how to process the packets that need be routed according to the route map, which decides the next-hop device of the packets. To use the policy-based routing, you must specify the route map for it and create the route map. A route map contains multiple policies, and each policy defines one or more match rules and the corresponding operations. After policy-based routing is applied to an interface, the packets received by the interface will be checked. The packets that do not match any policy in the route map will be forwarded to the usual route. The packets that match a policy in the route map will be processed according to the operation defined in the policy. A route-map policy may contain multiple set operations.

Examples	The following example enables policy-based routing on serial 1/0. When the interface receives the packets from 10.0.0.0/8, they will be sent to 192.168.100.1; when the interface receives the packets from 172.16.0.0/16, they will be sent to 172.16.100.1; all other packets will be discarded. FS(config)#interface serial *1/0* FS(config-if)#ip policy route-map *load-balance* FS(config)#access-list *10* permit *10.0.0.0 0.255.255.255* FS(config)#access-list *20* permit *172.16.0.0 0.0.255.255* FS(config)#route-map *load-balance* permit *10* FS(config-route-map)#match ip address *10* FS(config-route-map)#set ip next-hop *192.168.100.1* FS(config)#route-map *load-balance* permit *20* FS(config-route-map)#match ip address *20* FS(config-route-map)#set ip next-hop *172.16.100.1* FS(config)#route-map *load-balance* permit *30* FS(config-route-map)#set interface Null *0*

	Command	Description
Related commands	**route-map**	Define the route map.
	match ip address	Match the IP address.
	set default interface	Set the default outgoing interface.
	set interface	Set the outgoing interface.
	set ip default next-hop	Set the default next hop.
	set ip precedence	Set the priority of the packets.

10.43 set ip next-hop recursive

	Use this command to specify the recursive next-hop IP address for data packets that match a rule. **set ip next-hop recursive** *ip-address*
	Use the **no** form of this command to delete the configured next-hop IP address. **no set ip next-hop recursive**
Parameter Description	**Parameter** / **Description** *ip-address* / Recursive next-hop IP address
Defaults	N/A
Command Mode	Routing map configuration mode
Default Level	14
Usage Guide	This command is used only to configure PBR. Only one **set ip next-hop recursive** *ip-address* command can be configured in one routing submap policy. According to the policy, only static or dynamic routes that have an egress and next-hop IP address can be recursed. A route can be recursed to 32 next-hop IP addresses. Only one static route can be recursed to the next hop IP address.
Examples	The following example enables PBR on Interface serial 1/0. The interface sends the data packets from the source IP address of 10.0.0.0/8 to the recursive next-hop IP address 192.168.100.1, sends the traffic from the source network 172.16.0.0/16 to the recursive next-hop IP address 172.16.100.1, and forwards other data traffic via common routes. FS(config)#interface serial 1/0 FS(config-if)#ip policy route-map load-balance FS(config)#access-list 10 permit 10.0.0.0 0.255.255.255 FS(config)#access-list 20 permit 172.16.0.0 0.0.255.255 FS(config)#route-map load-balance permit 10 FS(config-route-map)#match ip address 10 FS(config-route-map)#set ip next-hop recursive 192.168.100.1 FS(config)#route-map load-balance permit 20 FS(config-route-map)#match ip address 20 FS(config-route-map)#set ip next-hop recursive 172.16.100.1

10.44 set ip next-hop verify-availability

	Use this command to verify the availability of the next hop IP address for the packets that meet the matching rule. Use the **no** form of this command to remove the setting. This command is only used to configure policy-based routing.

	set ip next-hop verify-availability *ip-address* [**track** *track-obj-number* | **bfd** *interface-type interface-number gateway*]
	no set ip next-hop verify-availability *ip-address* [**track** *track-obj-number* | **bfd** *interface-type interface-number gateway*]

	Parameter	Description
Parameter description	*ip-address*	Indicates the next-hop IP address.
	track	Judges whether the next hop is effective by using *Track*.
	track-object-num	Indicates the track object number.
	bfd	Indicates that BFD is used for neighbor detection.
	interface-type	Configures the interface type.
	interface-number	Configures the interface number.
	gateway	Configures the gateway IP address, which is the neighbor IP address of BFD. If the next hop is configured as the neighbor, BFD will be used to detect the accessibility of the forwarding path.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	None

Examples	The following example verifies the availability of the next hop IP address being 192.168.1.2 and the number of the object to be tracked to 1. FS(config)#route-map *rmap* permit *10* FS(config-route-map)#set ip next-hop verify-availability *192.168.1.2* track *1*

	Command	Description
Related commands	**route-map**	Define the route map.
	match ip address	Match the IP address.
	set default interface	Set the default outgoing interface.
	set interface	Set the outgoing interface.
	set ip default next-hop	Set the default next hop.
	set ip precedence	Set the priority of the packets.

10.45 set ip precedence

	Use this command to set the precedence of the IP head of the packet matching the rule in the route map configuration mode. Use the **no** form of this command to remove the configured precedence setting.
	set ip precedence {*<0-7>* | *critical* | *flash* | *flash-override* | *immediate* | *internet* | *network* | *priority* | *routine* }
	no set ip precedence

Parameter Description	**Parameter**	**Description**
	number	Indicates the priority of the IP header with a number, ranging from 0 to 7. 7: critical 6: flash 5: flash-override 4: immediate 3: internet 2: network 1: priority 0: routine
	critical | **flash** | **flash-override** | **immediate** | **internet** | **network** | **priority** | **routine**	Priority of an IP header.
Defaults	N/A	
Command mode	Route map configuration mode	

Usage guideline	With different precedence values for the IP packet head configured, the IP packets matching the PBR routing are sent according to the different precedence values. Multiple set ip precedence commands can be executed in the route map configuration rule, but only the last one takes effect, and the precedence will be specified for the head of the IP packet matched the PBR.

Examples	The following example sets the precedence of the packet with the source IP address 192.168.217.68 received at the interface FastEthernet 0/0 as 4: FS(config)#access-list *1* permit *192.168.217.68 0.0.0.0* FS(config)#route-map *name* FS(config-route-map)#match ip address *1* FS(config-route-map)#set ip precedence *4* FS(config)#interface FastEthernet *0/0* FS(config-if)#ip policy route-map *name*

	Command	**Description**
Related commands	**match interface**	Match the next-hop interface.
	match ip address	Match the IP address in the ACL.
	match ip next-hop	Match the next-hop IP address in the ACL.
	match ip route-source	Match the route source IP address in the ACL.

	match metric	Match the route metric value.
	match route-type	Match the route type.
	match tag	Match the route tag value.
	set metric-type	Set the type of redistributed route.
	set tag	Set the tag value of redistributed route.
	set ip tos	Set the tos for the IP packet head.

10.46 set ip tos

	Use this command to set the tos of the IP head of the packet matching the rule in the route map configuration mode. Use the **no** form of this command to remove the configured tos setting.
	set ip tos {*<0-15>* | *max-reliability* | *max-throughput* | *min-delay* | *min-monetary-cost* | *normal* }
	no set ip tos

Parameter Description	**Parameter**	**Description**
	number	Indicates the TOS value of an IP header with a number, ranging from 0 to 15.
	max-reliability | **max-throughput** | **min-delay** | **min-monetary-cost** | **normal**	Priority of an IP header.
Defaults	N/A	
Command mode	Route map configuration mode	

Usage guideline	With different TOS values for the IP packet head configured, the IP packets matching the PBR routing are transmitted with different service qualities. The TOS value will be specified for the head of the IP packet matched the PBR.

Examples	The following example sets the TOS value of the packet with the source IP address 192.168.217.68 received at the interface FastEthernet 0/0 as 4: FS(config)#access-list *1* permit *192.168.217.68 0.0.0.0* FS(config)#route-map *name* FS(config-route-map)#match ip address *1* FS(config-route-map)#set ip tos *4* FS(config)#interface FastEthernet *0/0* FS(config-if)#ip policy route-map *name*

Related	**Command**	**Description**

commands	**match interface**	Match the next-hop interface.
	match ip address	Match the IP address in the ACL.
	match ip next-hop	Match the next-hop IP address in the ACL.
	match ip route-source	Match the route source IP address in the ACL.
	match metric	Match the route metric value.
	match route-type	Match the route type.
	match tag	Match the route tag value.
	set metric-type	Set the type of redistributed route.
	set tag	Set the tag value of redistributed route.
	set ip precedence	Set the precedence for the IP packet head.

10.47 set ipv6 default next-hop

	Use this command to specify the default next-hop IPv6 address for the IPv6 packets that match the rule in the route map configuration mode. Use the **no** form of this command to remove the setting. This command is only used to configure policy-based routing.
	set ipv6 default next-hop *global-ipv6-address* [*weight*] [*global-ipv6-address* [*weight*] ...]
	no set ipv6 default next-hop global-ipv6-address [*weight*] [*global-ipv6-address* [*weight*] ...]

	Parameter	Description
Parameter description	**vrf** *vrf-name*	The next hop address belongs to the specified VRF which must be the configured IPv6 address family multi-protocol VRF.
	global	The next hop address belongs to the global.
	global-ipv6-address	Indicates the next-hop IPv6 address for packet forwarding. The next-hop router must be a neighbor router.
	weight	Indicates the weight in the load balancing mode, ranging from 1 to 8. A larger value means larger packet traffic to be shared by the next hop.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	With the policy-based routing applied to the interface, for the IPv6 packets matching the corresponding rules, if the usual route (that is the non default route) with the destination of this packet is not in the routing table, this packet will be forwarded to the next hop specified by the set ipv6 default next-hop command. Otherwise it is forwarded through the usual route. Noted that the match rule should be the IPv6 corresponded.If the **vrf** *vrf-name* parameter is specified, packets are forwarded across different VRF instances. If the **global** parameter is specified, packets are forwarded from the VRF instance to a public network. If [**vrf** *vrf-name* | **global**] is not specified, IPv6 packets are sent to the next hop of the VRF instance same as that of the current hop.

	Packets select the egress from the policy-based routing and routing table in following priority: set ipv6 next-hop; usual route (the non default route) set ipv6 default next-hop default route. For the switches, this function does not take effect if the mask length is beyond 64. If this command and the set ipv6 next-hop verify-availability are both configured ,the next hop set by the set ipv6 next-hop verify-availability command will take effect preferentially

Examples	The following examle sets the default next hop of the packet with destination address *2001:0db8:2001:1760::/64* received at the interface fastEthernet 0/0 as *2002:0db8:2003:1::95* FS(config)# ipv6 access-list *acl_for_pbr* FS(config-ipv6-acl)#permit ipv6 any *2001:0db8:2001:1760::/64* FS(config)#route-map *rm_if_0_0* FS(config-route-map)#match ipv6 address *acl_for_pbr* FS(config-route-map)# set ipv6 default next-hop *2002:0db8:2003:1::95* FS(config)#interface FastEthernet 0/0 FS(config-if)#ipv6 policy route-map *rm_if_0_0*

	Command	Description
Related commands	**match ipv6 address**	Set the matching rule of policy-based routing.
	ipv6 policy route-map	Use the policy-based routing on the interface.
	set ipv6 next-hop	Set the next hop of the policy-based routing.

Platform description	N/A

10.48 set ipv6 next-hop

	Use this command to specify the next-hop IPv6 address for the packets that meet the matching rule. Use the **no** form of this command to remove the setting. This command is only used to configure policy-based routing.
	set ipv6 next-hop *global-ipv6-address* [weight] […*global-ipv6-address* [*weight*]]
	no set ip next-hop *global-ipv6-address* [weight] […*global-ipv6-address* [*weight*]]

	Parameter	Description
Parameter description	*global-ipv6-address*	IPv6 address of the next hop. The next hop router should be the neighbor router.
	weight	Weight of the next hop in the load balancing mode, in the range of 1to 8.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	This command supports two operation modes: WCMP load balancing mode and non-WCMP load balancing mode. In the former mode, the system implements WCMP load balancing according to the weight entered by the user. Multiple IP addresses may follow set ip next-hop and the number of addresses should be less than 32. If weight follows ip address, up to 4 next hop addresses can be configured. If the parameter vrf *vrf-name* is specified, packets forwarding will be across the VRF. The packets will be forwarded from VRF to pubic network with the parameter global specified. If no [vrf *vrf-name* | global] is specified, forwarding the IPv6 packets will inherit the VRF, that is the nexthop belongs to the VRF that receives this IPv6 packets. If weight follows any next-hop, the operation mode of this command will be automatically switched to the WCMP load balancing mode. In the WCMP load balancing mode, for the nexthop address without configuring the corresponding weight, the weight is 1 by default. When the packets select the egress from the policy-based routing and routing table, the priorities are as bellows. set ipv6 next-hop; usual route (the non default route) set ipv6 default next-hop Default route.

Examples	The following examle sets the next hop of the packet with destination address *2001:0db8:2001:1760::/64* received at the interface fastEthernet 0/0 as *2002:0db8:2003:1::95* FS(config)# ipv6 access-list *acl_for_pbr* FS(config-ipv6-acl)#permit ipv6 any *2001:0db8:2001:1760::/64* FS(config)#route-map *rm_if_0_0* FS(config-route-map)#match ipv6 address *acl_for_pbr* FS(config-route-map)# set ipv6 next-hop *2002:0db8:2003:1::95* FS(config)#interface FastEthernet 0/0 FS(config-if)#ipv6 policy route-map *rm_if_0_0*

	Command	Description
Related commands	**match ipv6 address**	Set the matching rule of policy-based routing.
	ipv6 policy route-map	Use the policy-based routing on the interface.
	set ipv6 next-hop	Set the next hop of the policy-based routing.

Platform description	N/A

10.49 set ipv6 next-hop verify-availability

	Use this command to determine the availability of the next-hop IP address. **set ipv6 next-hop verify-availability** *global-ipv6-address* [**track** *track-obj-number* | **bfd** *interface-type interface-number gateway*]
	Use the **no** form of this command to delete existing configuration. **no set ip next-hop verify-availability** *global-ipv6-address* [**track** *track-obj-number* | **bfd** *interface-type interface-number gateway*]
Parameter Description	**Parameter** / **Description**
	global-ipv6-address — Specifies the next-hop IPv6 address.
	track — Detects whether the next hop is effective by using the tracking method.
	track-obj-number — Specifies the tracking object number.
	bfd — Conducts neighbor detection by using BFD.
	interface-type — Specifies the interface type.
	interface-number — Specifies the interface number.
	gateway — Specifies the gateway IPv6 address, that is, IPv6 address of the BFD neighbor. If the configured next hop is the neighbor, the availability of the forwarding path will be detected using BFD.
Defaults	N/A
Command Mode	Routing map configuration mode
Default Level	14
Usage Guide	This command is used only to configure PBR.
Examples	The following example enables the PBR support for BFD and detects the forwarding path to the neighbor 2001:1::2 via BFD. FS(config)# route-map rmap permit 10 FS(config-route-map)# set ipv6 next-hop verify-availability 2001:1::2 bfd FastEthernet 0/1 2001:1::2

10.50 set ipv6 precedence

	Use this command to set the precedence of the IPv6 head of the packet matching the rule in the route map configuration mode. Use the **no** form of this command to remove the configured precedence setting.
	set ipv6 precedence {number | *critical* | *flash* | *flash-override* | *immediate* | *internet* | *network* | *priority* | *routine* }
	no set ipv6 precedence

	Parameter	Description
Parameter description	*critical, flash, flash-override, immediate, internet , network , priority , routine*	The precedence type of the IPv6 head.
	number	The configurable precedence range.

Default configuration	N/A

Command mode	Route map configuration mode

Usage guideline	

Examples	The following example sets the precedence of IPv6 packet head as 3: Configure route-map. FS(config)#route-map *pbr-aaa* permit *10* FS(config-route-map)# set ipv6 precedence *3* Or FS(config-route-map)# set ipv6 precedence immediate

	Command	Description
Related commands	**match ipv6 address**	Configure the ACL used for matching the packet in IPv6 PBR.
	route-map	Use the route map of the policy-based routing.
	set default interface	Set the default next-hop egress.
	set interface	Set the next hop egress.
	set ipv6 default next-hop	Set the default next-hop address for forwarding packets.
	set ipv6 next-hop	Set the next-hop address for forwarding packet.
	show ipv6 policy	Show the policy-based routing
	show route-map	Show the route map configuration.

Platform description	N/A

10.51 set level

	Use this command to set the level of the area where the routes matching the rule are redistributed in the route map configuration command. Use the **no** form of this command to remove the setting.
	set level {level-1| level-2 | level-1-2 | stub-area | backbone}
	no set level

Parameter Description	Parameter	Description
	level-1	Indicates that the re-distribution route is advertised to ISIS Level 1.
	level-2	Indicates that the re-distribution route is advertised to ISIS Level 2.
	level-1-2	Indicates that the re-distribution route is advertised to ISIS Level 1 and Level 2.
	stub-area	Indicates that the re-distribution route is advertised to OSPF Stub Area.
	backbone	Indicates that the re-distribution route is advertised to the OSPF backbone area.

Default configuration	None

Command mode	Route map configuration mode

Examples	In the example below, the OSPF routing protocol redistributes the RIP protocol to the backbone area. FS(config)# router ospf FS(config-router)# redistribute rip subnets route-map *redrip* FS(config-router)# network *192.168.12.0 0.0.0.255* area *0* FS(config-router)# exit FS(config)# route-map *redrip* permit *10* FS(config-route-map)# set level backbone

	Command	Description
Related commands	**match interface**	Match the interface.
	match ip address	Match the IP address.
	match ip next-hop	Match the next-hop IP address.
	match ip route-source	Match the source IP address.
	match metric	Match the metric.
	match route-type	Match the route type.
	match tag	Match the tag.
	set metric-type	Set the metric type.
	set tag	Set the tag.

10.52 set local-preference

	Use this command to set the **LOCAL_PREFERENCE** value for the routes to be redistributed in the route map configuration mode. Use the **no** form of this command to remove the setting.
	set local-preference *number*
	no set local-preference

Parameter description	Parameter	Description
	number	Local priority metric ranging 1 to 4294967295

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	Use this command to set the local preference for the matched routes. Only one local preference can be set.

Examples	FS(config)# route-map *SET_PREF* permit *10* FS(config-route-map)# match as-path *1* FS(config-route-map)# set local-preference *6800* FS(config-route-map)# exit FS(config)# route-map *SET_PREF* permit *20* FS(config-route-map)# match as-path *2* FS(config-route-map)# set local-preference *50*

	Command	Description
Related commands	**match as-path**	Match the AS_PATH attribute.
	match metric	Match the route metric.
	match origin	Match the source.
	set as-path prepend	Set the AS_PATH attribute.
	set metric	Set the metric.
	set metric-type	Set the metric type.

10.53 set metric

	Use **set metric** to set the metric for the routes to be redistributed. Use the **no** form of this command to remove the setting.
	set metric [+ *metric-value* | **-** *metric-value* | *metric-value*]
	no set metric

	Parameter	Description
Parameter description	+	Increase based on the metric of the original route
	-	Decrease based on the metric of the original route
	metric-value	Metric for the route to be redistributed

Default configuration	The default metric for route redistribution varies with the routing protocol.

Command mode	Route map configuration mode

Usage guideline	You should set the metric according to the actual network topology, because the routing depends on the metric of routes. Attentions should be paid to the upper and lower limits of the routing protocols when you execute the set metric, + metric or – metric commands. When the RIP protocol redistributes the routes of other protocols, the range of the metric after increase or decrease is 1 to 16. You can redistribute the routes from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa. The mutual route redistribution can be implemented between all the IP routing protocols. For route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. One or more match or set commands can be executed to configure a route map. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples	The following example enables the OSPF routing protocol to redistribute the RIP routes and sets the default metric to 40. FS(config)# router ospf FS(config-router)# redistribute rip subnets route-map *redrip* FS(config-router)# network *192.168.12.0 0.0.0.255* area *0* FS(config-router)# exit FS(config)# route-map *redrip* permit *10* FS(config-route-map)# set metric *40*

Related commands

Command	Description
match interface	Match the interface.
match ip address	Match the IP address.
match ip next-hop	Match the next-hop IP address.
match ip route-source	Match the source IP address.
match metric	Match the metric.
match route-type	Match the route type.
match tag	Match the tag.
set metric-type	Set the metric type.
set tag	Set the tag.

10.54 set metric-type

	Use **set metric-type** to set the type of the routes to be redistributed. Use the **no** form of this command to remove the setting.
	set metric-type *type*
	no set metric-type

	Parameter	Description
Parameter description	*type*	Type of the routes to be redistributed. At present, you can set the type of the routes that the OSPF protocol redistributes.

Default configuration	

Command mode	Route map configuration mode

Usage guideline	You can redistribute the routing information from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa. The mutual route redistribution can be implemented between all the IP routing protocols. In the route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. In configuring one route map, one or more match or set commands can be executed. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples

The following example enables the OSPF routing protocol to redistribute the RIP route and sets the type as type-1.

```
FS(config)# router ospf
FS(config-router)# redistribute rip subnets route-map redrip
FS(config-router)# network 192.168.12.0 0.0.0.255 area 0
FS(config-router)# exit
FS(config)# route-map redrip permit 10
FS(config-route-map)# set metric-type type-1
```

Related commands

Command	Description
match interface	Match the interface.
match ip address	Match the IP address.
match ip next-hop	Match the next-hop IP address.
match ip route-source	Match the source IP address.
match metric	Match the metric.
match route-type	Match the route type.
match tag	Match the tag.
set metric	Set the metric.
set tag	Set the tag.

10.55 set next-hop

Use this command to specify the next-hop IP address for the routes that match the rule. Use the **no** form of this command to remove the setting. This command is only used to configure routing policies.

	set next-hop *ip-address*
	no set next-hop

Parameter description	**Parameter**	**Description**
	ip-address	IP address of the next hop.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	You can redistribute the routing information from one routing process to another routing process. For example, you can redistribute the route in the OSPF routing domain and then advertise it to the RIP routing domain, and vice versa. The mutual route redistribution can be implemented between all the IP routing protocols. In the route redistribution, route maps are usually used to control the mutual route redistribution between two routing domains. In configuring one route map, one or more match or set commands can be executed. If the match command is not used, all the routes will be matched. If the set command is not used, no operation will be performed.

Examples	The following example enables the OSPF routing protocol to redistribute the RIP route and sets the next-hop to 192.168.1.2. FS(config)# route-map *redrip* permit *10* FS(config-route-map)# match ip address *1* FS(config-route-map)# set next-hop *192.168.1.2*

Related commands	**Command**	**Description**
	match interface	Match the interface.
	match ip address	Match the IP address.
	match ip next-hop	Match the next-hop IP address.
	match ip route-source	Match the source IP address.
	match metric	Match the metric.
	match route-type	Match the route type.
	match tag	Match the tag.
	set metric-type	Set the metric type.
	set tag	Set the tag.

10.56 set origin

	Use this command to set the source of the routes to be redistributed in the route map configuration mode. Use the **no** form of this command to remove the setting.
	set origin {egp | igp | incomplete}

	no set origin

	Parameter	Description
Parameter description	egp	Redistribute the routes from the remote EGP.
	igp	Redistribute the routes from the local IGP.
	incomplete	Redistribute the routes from an unknown device.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	Use this command to set the source of the routes to be matched. Only one route source attribute can be set.

Examples

```
FS(config)# route-map SET_ORIGIN 10 permit
FS(config-route-map)# match as-path 1
FS(config-route-map)# set origin igp
FS(config-route-map)# exit
FS(config)# route-map SET_ORIGIN 20 permit
FS(config-route-map)# match as-path 2
FS(config-route-map)# set origin egp
```

	Command	Description
Related commands	**match as-path**	Match the AS_PATH attribute.
	match metric	Match the route metric.
	match origin	Match the source.
	set as-path prepend	Set the AS_PATH attribute.
	set metric	Set the metric.
	set local-preference	Set the local priority of redistributed routes.

10.57 set originator-id

	Use this command to set the source of the routes to be redistributed in the route map configuration mode. Use the **no** form of this command to remove the setting.
	set originator-id *ip-address*
	no set originator-id [*ip-address*]

	Parameter	Description
Parameter description	*ip-address*	IP address of the originator.

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	Use this command to set the source of the routes to be matched.

Examples	FS(config)# route-map *SET_ORIGIN 10* permit FS(config-route-map)# match as-path *1* FS(config-route-map)# set originator-id *5.5.5.5* FS(config-route-map)# exit FS(config)# route-map *SET_ORIGIN 20* permit FS(config-route-map)# match as-path *2* FS(config-route-map)# set originator-id *5.5.5.6*

	Command	Description
Related commands	**match as-path**	Match the AS_PATH attribute.
	match metric	Match the route metric.
	match origin	Match the source.
	set as-path prepend	Set the AS_PATH attribute.
	set metric	Set the metric.
	set local-preference	Set the local priority of redistributed routes.

10.58 set tag

	Use this command to set the tag for the routes to be redistributed. Use the **no** form of this command to remove the setting.
	set tag *tag*
	no set tag

	Parameter	Description
Parameter description	*tag*	Tag of the route to be redistributed

Default configuration	The original routing tag remains unchanged.

Command mode	Route map configuration mode

Usage guideline	This command can only be used for route redistribution. If this command is not configured, the default route tag is used.

Examples	The following example enables the OSPF routing protocol to redistribute the RIP route and sets the tag as 100.

	FS(config)# router ospf FS(config-router)# redistribute rip subnets route-map *redrip* FS(config-router)# network *192.168.12.0 0.0.0.255* area *0* FS(config-router)# exit FS(config)# route-map *redrip* permit *10* FS(config-route-map)# set tag *100*

	Command	Description
Related commands	**match interface**	Match the interface.
	match ip address	Match the IP address.
	match ip next-hop	Match the next-hop IP address.
	match ip route-source	Match the source IP address.
	match metric	Match the metric.
	match route-type	Match the route type.
	match tag	Match the tag.
	set metric	Set the metric.
	set metric-type	Set the metric type.

10.59 set weight

	Use this command to set the weight for the BGP routes matching filtering rules. Use the **no** form of this command to remove the setting.
	set weight *number*
	no set weight

Parameter description	Parameter	Description
	number	Weight in the range of 0 to 65535

Default configuration	None

Command mode	Route map configuration mode

Usage guideline	This command can only be used modify the weight of a BGP route. By default, the weight of the route learned from a neighbor is the one configured with the neighbor weight command. The weight of the locally generated route is fixed 32768.

Examples	The following example sets the weight for the BGP route learned from the neighbor 1.1.1.1 at the inbound direction to 100. FS(config)# router bgp *1* FS(config-router)# neighbor *1.1.1.1* route-map *nei-rmap-in* in

```
FS(config-router)# exit
FS(config)# route-map nei-rmap-in permit 10
FS(config-route-map)# set weight 100
```

Related commands

Command	Description
match as-path	Match the AS_PATH attribute.
match community	Match the route community.
match metric	Match the route metric.
match origin	Match the source.
set community	Set community of the redistributed route.
set metric	Set the metric of the redistributed route.
set metric type	Set the metric type of the redistributed route.

10.60 show ip as-path-access-list

Use this command to display the configuration of AS path access lists.

show ip as-path-access-list [*num*]

Parameter description

Parameter	Description
num	AS path access list number.

Default

N/A

Command mode

Privileged EXEC mode

Usage guideline

N/A

Examples

The following example displays the AS path access lists.

```
FS# show ip as-path-access-list
AS path access list 30
permit ^30$
```

Field	Description
AS path access list	AS path access list number
permit	Permits advertisement based on matching conditions.
^30$	Regular expression.

Related command

Command	Description
-	-

Platform description	-

10.61 show ip community-list

	Use **show ip community-list** command to display the community list.
	show ip community-list [*community-list-number* | *community-list-name*]

Parameter description	**Parameter**	**Description**
	community-list-number	Number of the community list.
	community-list-name	Name of the community list.

Default configuration	None

Command mode	Privileged EXEC mode

Usage guidelines	N/A

Examples	FS# show ip community-list Community-list standard local permit local-AS Community-list standard Red-Giant permit 0:10 deny 0:20

Related commands	**Command**	**Description**
	match community	Match the route community.
	set comm-list delete	Delete the community attribute in the BGP routes.

10.62 show ip extcommunity-list

	Use this command to display the extcommunity list.	
	show ip extcommunity-list [*extcommunity-list-num* | *extcommunity-list-name*]	
Parameter description	**Parameter**	**Description**
	extcommunity-list-num	extcommunity-list number, ranging from 1 to 199.
	extcommunity-list-name	extcommunity-list name.
Default	-	
Command	Privileged EXEC mode, global configuration mode, interface configuration mode, routing protocol configuration	

mode	mode and route map configuration mode.
Usage guideline	-
Examples	FS # show ip extcommunity-list Standard extended community-list 1 10 permit RT:1:200 20 permit RT:1:100 Standard extended community-list 2 10 permit RT:1:200 Expanded extended community-list rt_filter 13 permit 1:100
Related command	**Command** / **Description**
	ip extcommunity-list / Create an extcommunity-list.
	match extcommunity / Match an extcommunity.
	set extcommunity / Set an extcommunity.
Platform description	-

10.63 show ip prefix-list

	Use **show ip prefix-list** to display the prefix list or the entries.
	show ip prefix-list [*prefix-name*]

Parameter description	**Parameter**	**Description**
	prefix-name	Name of the prefix list.

Default configuration	The configuration information of all the prefix lists is displayed by default.

Command mode	Privileged EXEC mode, global configuration mode, interface configuration mode, routing protocol configuration mode, route map configuration mode.

Usage guidelines	If no prefix list is specified, the configurations of all the prefix lists are displayed, otherwise only the configuration of the specified prefix list is displayed.

Examples	FS# show ip prefix-list seq pre: 2 entries seq 5 permit 192.168.564.0/24

	seq 10 permit 192.2.2.0/24

10.64 show ip protocols

	Use this command to display information about the status of the currently running IPv4 routing protocol. **show ip protocols** [**vrf** *vrf-name*] { **bgp | isis | ospf | rip** }
Parameter Description	**Parameter** / **Description**
	vrf-name — Specifies the VRF instance name. If it is not specified, information about the status of routing protocols in global VRF mode is displayed.
	bgp — Displays information about the status of the BGP protocol.
	isis — Displays information about the status of the IS-IS protocol.
	ospf — Displays information about the status of the OSPF protocol.
	rip — Displays information about the status of the RIP protocol.
	- — Displays information about the status of all running routing protocols.
Command Mode	Privileged EXEC mode, global configuration mode, interface configuration mode, routing protocol configuration mode, and routing map configuration mode
Default Level	14
Usage Guide	Information about the status of only the currently running routing protocol is displayed, and the information about a routing protocol that is not running is not displayed.
Examples	The following example displays the status of routing protocols running in global VRF mode.

```
FS# show ip protocols
Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 57.57.57.57
  Memory Overflow is enabled
  Router is not in overflow state now
  It is an autonomous system boundary router
  Redistributing External Routes from,
    connected, includes subnets in redistribution
    bgp, includes subnets in redistribution
  Number of areas in this router is 2: 2 normal 0 stub 0 nssa
  Routing for Networks:
    57.57.57.57 0.0.0.0 area 0
    163.18.4.0 0.0.0.255 area 0
    163.18.57.0 0.0.0.255 area 0
    192.100.1.0 0.0.0.255 area 0
```

```
    192.101.1.0 0.0.0.255 area 1
    192.102.1.0 0.0.0.255 area 0
  Reference bandwidth unit is 100 mbps
  Distance: (default is 110)

Routing Protocol is "bgp 10"
  IGP synchronization is disabled
  Default-information originate is disabled
  Default local-preference applied to incoming route is 100
  Redistributing: connected
  Neighbor(s):
    Address          AddressFamily   FiltIn   FiltOut   DistIn   DistOut   RouteMapIn   RouteMapOut
Weight
  Distance: external 20(default) internal 200(default) local 200(default)
```

Field description:

Field	Description
Routing Protocol is "ospf 1"	Name of a routing protocol
Redistributing External Routes from	Route redistribution status of a routing protocol
Distance:	Distance information of a routing protocol

10.65 show ipv6 prefix-list

	Use this command to display the information about the IPv6 prefix list or its entries.
	show ipv6 prefix-list [*prefix-name*]

Parameter description	**Parameter**	**Description**
	prefix-name	Name of the IPv6 prefix list.

Default configuration	The configuration information of all the IPv6 prefix lists is displayed.

Command mode	Privileged EXEC mode, global configuration mode, interface configuration mode, route protocol configuration mode, route map configuration mode

Usage guideline	If no prefix list is specified, the configurations of all the prefix lists are displayed, otherwise only the configuration of the specified prefix list is displayed.

Examples

```
FS# show ipv6 prefix-list
ipv6 prefix-list p6: 2 entries
        seq 5 permit 13::/20
       seq 10 permit 14::/20
```

10.66 show key chain

	Use this command to display the key chain configuration.	
	show key chain [*key-chain-name*]	
Parameter description	**Parameter**	**Description**
	key-chain-name	(Optional) Display the configuration of the specified key chain.
Default	The configuration information of all key chains is displayed.	
Command mode	Privileged EXEC mode, global configuration mode, interface configuration mode, routing protocol configuration mode, and key chain configuration mode.	
Usage guideline	If no key chain is specified, the configuration information of all key chains is displayed.	
Examples	FS# show key chain route-map AAA, permit, sequence 10 Match clauses: ip address 2 Set clauses: metric 10 FS(config)#show key chain key chain kc key 1 -- text "FS" accept-lifetime (12:11:00 May 2 2001) - (infinite) send-lifetime (always valid) - (always valid) [valid now]	
	Field	**Description**
	key chain	Key chain name.
	key	Key ID.
	accept-lifetime	Lifetime in the accept direction.
	send-lifetime	Lifetime in the send direction.
Related command	**Command**	**Description**
	-	-
Platform description	-	

10.67 show route-map

	Use the command to display the configuration of the route map.
	show route-map [*route-map-name*]

	Parameter	Description
Parameter description	*route-map-name*	(Optional) Display the configuration information of the specified the route map.

Default configuration	The configuration information of all the route maps is displayed.

Command mode	Privileged EXEC mode, global configuration mode, interface configuration mode, routing protocol configuration mode, route map configuration mode.

Usage guidelines	If no route map is specified, the configurations of all the route maps will be displayed, otherwise only the configuration of the specified route map is displayed.

Examples

```
FS# show route-map
route-map AAA, permit, sequence 10
Match clauses:
ip address 2
Set clauses:
metric 10
```

Field	Description
route-map	Name of the route map.
Permit	The route map contains the permit keyword.
sequence 10	Sequence number of the route map.
Match clauses	Set the matching rule. Whether to perform the set operation depends on the permit or deny keyword in the route map.
Set clauses	Set the operation when the rule is matched.

Chapter 5 MPLS Configuration Commands

1. MPLS Basic Commands
2. BGP/MPLS L3 VPN Commands
3. MPLS GR Commands

1. MPLS Basic Commands

1.1 Advertise-labels

Use this command to configure the policy for distributing a label to an IP route Forwarding Equivalence Class (FEC).

advertise-labels [**for host-routes** | **for bgp-routes** [**acl** *acl_name*] | **for default-route | for acl** *prefix-access-list* [**to** *peer-access-list*]

no advertise-labels [**for host-routes** | **for bgp-routes** [**acl** *acl_name*] | **for default-route | for acl** *prefix-access-list* [**to** *peer-access-list*]

Parameter Description

Parameter	Description
for host-routes	(Optional) Distributes labels to host routes (the subnet mask is 32-bit long) only.
for bgp-routes [**acl** *acl_ame*]	(Optional) Distributes labels to BGP routes only. You can distribute labels to only the BGP routes meeting conditions by using ACL keywords.
for default-route	(Optional) Distributes non-3 labels to default routes.
for acl *prefix-access-list*	(Optional) Specifies the prefix of a route to which labels are distributed.
to *peer-access-list*	(Optional) Specifies the neighbors to which label binding information is sent.

Defaults

Labels are distributed to all LDP neighbors.

Labels are distributed to all IGP routes instead of BGP routes, for which FTN is not added either.

Implicit null label 3 is distributed to default routes.

Command Mode

config-mpls-router mode

Usage Guide

This command is effective for only the IP route FEC, other than other FECs such as PW FEC. Use the **advertise-labels for acl** *fec_acl* **to** *peer_acl* command to specify the FECs and LDP peers to which labels are distributed. For specified fec_acl, only one rule can be configured; for peer-acl, multiple rules can be configured. If this command is configured but no filtering rule is configured in the corresponding ACL, it is equivalent that this command is not configured, that is, FEC label mapping messages are sent normally. A label request received by an LDP session working in DOD mode cannot be replied with a label mapping message if the request cannot meet the lable distribution policy as a result of the configured rule. Even if the rule is cancelled afterwards, the request that has been filtered cannot be distributed with a label mapping message. In this case, you can use the **clear mpls ldp neighbor** command to reset the LDP session to normal. You can use this command to confiugre a maximum of 64 rules.

Use the **advertise-labels for bgp-routes** command to distribute labels to BGP routes. You can use this command with the **acl** option to distribute labels to BGP routes meeting conditions or use this command without the **acl** option to distribute labels to all BGP routes. Use the **no advertise-labels for bgp-routes** command to disable label distribution to BGP routes. Note that label distribution to BGP routes is still controlled by the label distribution policy of LDP. Use the **advertise-labels for host-routes** command to distribute lables only to route prifexes with 32-bit masks (namely host routes).

Use the **advertise-labels for default-route** command to distribute non-3 labels to default routes, thereby establishing an LSP for default routes.

Labels are distributed to all FECs by default. The **no advertise-labels** command must be run to disable label distribution to all FECs if you want to distribute labels to only the FECs meeting specified ACL rules. In this manner, labels are not distributed to those failing to meet ACL rules.

After the **no advertise-labels** command is configured, labels are distributed to only the FECs meeting **advertise-labels for acl** *prefix-access-list [to peer-access-list]* and instead of other FECs. If the preceding rule is not met, labels are not distributed to BGP routes and host routes even if the **advertise-labels for bgp-routes** command or **advertise-labels for host-routes** command is configured.

When the **advertise-labels for host-routes** command is configured, LDP distributes labels to add FTN for only host routes.

Configuration Examples

The following example sets the LDP instance to distribute labels to the host route FEC only.

```
FS(config)# mpls router ldp
FS(config-mpls-router)# advertise-labels for host-routes
```

The following example sets the LDP instance not to distribute any label to the LDP peer of the IP route FEC:

```
FS(config)# mpls router ldp
FS(config-mpls-router)# no advertise-labels
```

The following example sets the LDP instance to distribute labels to all LDP peers of the FEC with 192.168.0.0/16 as the route prefix.

```
FS(config)#ip access-list standard fec_acl
FS(config-std-nacl)#permit 192.168.0.0 0.0.255.255
FS(config-std-nacl)# exit
FS(config)# mpls router ldp
FS(config-mpls-router)# no advertise-labels
FS(config-mpls-router)# advertise-labels for acl fec_acl
```

The following example sets the LDP instance to distribute labels to LDP peer 6.6.6.6 and LDP peer 7.7.7.7 of the FEC with 192.168.0.0/24 as the route prefix but to all LDP peers of other FECs.

```
FS(config)#ip access-list standard fec_acl
FS(config-std-nacl)#permit 192.168.0.0 0.0.0.255
FS (config)#ip access-list standard peer_acl
FS (config-std-nacl)#permit host 6.6.6.6
FS (config-std-nacl)#permit host 7.7.7.7
FS(config)# mpls router ldp
FS(config-mpls-router)# advertise-labels for acl fec_acl to peer_acl
```

Related Commands

Command	Description

N/A	N/A

Platform Description

N/A

1.2 Backoff

Use this command to configure the LDP exponential backoff time. Use the **no** form of this command to restore the default value.

backoff *initial-backoff maximum-backoff*

no backoff

Parameter Description

Parameter	Description
initial-backoff	Indicate the initial time of exponential backoff in seconds, ranging from 5 to 2147483, with the default value 15.
maximum-backoff	Indicate the maximum time of backoff in seconds, ranging from 5 to 2147483, with the default value 120.

Defaults

By default, the initial time of exponential backoff is 15s and the maximum time is 120s.

Command Mode

config-mpls-router mode

Usage Guide

When the LSR acts as the active side, the LDP session fails be established if the negotiation parameters are found inconsistent during the establishment of the LDP session. In this case, the LSR keeps attempting to re-establish an LDP session, which wastes system resources. The exponential backoff mechanism is just to prevent the active side from attempting to re-establish an LDP session constantly. The active side attempts to re-establish an LDP session only when the backoff time times out or the CSN of the Help message from the peer changes (which means changes in the configuration of the peer).

Configuration Examples

The following example sets the initial time of exponential backoff to 20 seconds and the maximum time to 300 seconds.

```
FS(config)# mpls router ldp
FS(config-mpls-router)# backoff 20 300
```

Related Commands

Command	Description
show mpls ldp parameters	Displays the configuration parameters of the LDP instance.

Platform Description

N/A

1.3 Clear Mpls Ldp Neighbor

Use this command to forcibly disconnect an LDP session and re-establish an LDP session.

clear mpls ldp neighbor [**all** | **vrf** *vrf-name*] { * | *ip-address* }

Parameter Description

Parameter	Description
all	Forcibly disconnects LDP sessions under all virtual routing and forwarding instances (VRFs, including default global VRF) and re-establish sessions.
vrf *vrf-name*	Forcibly disconnects LDP sessions under specified VRFs and re-establish sessions.
*	Forcibly disconnects LDP sessions under specified VRFs or all VRFs and re-establish sessions.
ip-address	Forcibly disconnects LDP sessions established between specified VRFs or all VRFs and specified LDP peers, and re-establish sessions.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide If no VRF is specified in this command, LDP sessions under the default global VRF are forcibly reset.

Configuration Examples The following command forcibly resets all established LDP sessions under the default global VRF.

```
FS# clear mpls ldp neighbor *
```

The following command forcibly resets the LDP sessions established between the default global VRF and the peer 10.10.10.10.

```
FS# clear mpls ldp neighbor 10.10.10.10
```

The following command forcibly resets the LDP sessions established under all VRFs (including default global VRF.

```
FS# clear mpls ldp neighbor all *
```

Related Commands

Command	Description
show mpls ldp neighbor	Displays the state of the LDP session.

Platform Description N/A

1.4 Discovery Targeted-hello

Use this command to set the holdtime or transmission interval for the extended peer Hello packet. Use the **no** form of this command to restore the default settings.

discovery targeted-Hello { **holdtime** | **interval** } *seconds*

no discovery targeted-Hello { **holdtime** | **interval** }

Parameter Description

Parameter	Description

holdtime	Holdtime of the Hello packet for the extended mechanism.
interval	Transmission interval of the Hello packet for the extended mechanism.
seconds	Range within 1-65535.

Defaults

The holdtime of the Hello packet for the extended mechanism is 45 seconds, and the transmission interval of the Hello packet is 5 seconds, which is 1/9 of the holdtime.

Command Mode

config-mpls-router mode

Usage Guide

For the actual configuration, it is necessary to ensure that the holdtime of the target Hello is greater than the transmission interval value. Otherwise, LDP fails to function as required. Note that this command is valid for the targeted Hello used by the extended discovery mechanism only.

Configuration Examples

```
FS(config)# mpls route ldp
FS(config-mpls-router)# discovery target-Hello holdtime 90
```

Related Commands

Command	Description
show mpls ldp parameters	Displays the LDP global configuration attribute.

Platform Description

N/A

1.5 Discovery Targeted-hello Accept

Use this command to enable the device to receive all target hello packets or the target hello packets from the neighbor permitted by the ACL. All other targeted hello packets are discarded except for those from the extended LDP neighbors. Use the **no** or **default** form of this command to restore the default setting.

discovery targeted-hello accept [**from** *acl-name*]

no discovery targeted-hello accept

default discovery targeted-hello accept

Parameter Description

Parameter	Description
from	Only receives target hello packets from the neighbor permitted by the ACL.

Defaults

This function is disabled by default.

By default, the device receives the target hello packets only from the remote peer device.

Command Mode

config-mpls-router mode

Usage Guide

When you configure two devices as remote peers, configure one end as neighbor and enable this function on the other. When you delete emote peers, you only need to delete the neighbor configuration.

Configuration Examples

The following example enables the device to receive target hello packets from all devices.

```
FS(config)# mpls router ldp
FS(config-mpls-router)# discovery targeted-hello accept
```

The following example enables the device to receive target hello packets from neighbor 1.1.1.1.

```
FS(config)# ip access-list standard target_acl
FS(config-std-nacl)# permit host 1.1.1.1
FS(config-std-nacl)# exit
FS(config)# mpls router ldp
FS(config-mpls-router)# discovery targeted-hello accept from target_acl
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.6 Explicit-null

Use this command to configure the distribution of explicit null labels to direct routes or direct route prefixes meeting specified ACL rules, or the distribution of explicit null labels to only the neighbors meeting rules and of implicit null labels to other neighbors. Use the **no** form of this command to restore the default setting.

explicit-null [**for** *prefix-acl*] [**to** *peer-acl*]

no explicit-null

Parameter Description

Parameter	Description
for *prefix-ac*	(Optional) Specify the prefixes of direct routes whose implicit null labels are replaced with explicit null labels.
to *peer-acl*	(Optional) Specify the LDP peers whose implicit null labels are replaced by explicit null labels.

Defaults

Implicit null labels are distributed to direct routes for all peers by default.

Command Mode

config-mpls-router mode

Usage Guide

1. If a command to distribute explicit null labels is configured but no filtering rule is configured in the corresponding ACL, it is equivalent that the command is not configured, that is, implicit null labels are distributed to direct routes for all neighbors.
2. This command can be configured only for global LDP instances, and VRFs do not support this command.

Configuration

The following example distributes explicit null labels to all directly connected routes through LDP.

Examples

```
FS(config)# mpls router ldp
FS(config-mpls-router)# explicit-null
```

The following example configures LDP to distribute explicit null labels to LDP peer 1.1.1.1 for direct routes with 192.168.0.0/16 as the prefix. Otherwise, the LDP distributes implicit null labels.

```
FS(config)#ip access-list standard fec_acl
FS(config-std-nacl)#permit 192.168.0.0 0.0.255.255
FS(config-std-nacl)#exit
FS(config)#ip access-list standard peer_acl
FS(config-std-nacl)#permit host 1.1.1.1
FS(config-std-nacl)#exit
FS(config)# mpls router ldp
FS(config-mpls-router)# explicit-null for fec_acl to peer_acl
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.7 Inter-area-lsp

Use this command to configure inter-area LSP function for LDP. Use the **no** form of this command to restore the default setting.

inter-area-lsp [**for acl** *acl_name*]

no inter-area-lsp

Parameter Description

Parameter	Description
for acl *acl_name*	(Optional) Configures ACL rules and sets up inter-area LSP only for converged host routings (the mask length is 32 bits) that comply with specified ACL rules.

Defaults

By default, inter-area LSP is disabled.

Command Mode

config-mpls-router mode

Usage Guide

Use this command to enable the inter-area LSP function of LDP. The command usage is described as follows:

- The inter-area LSP function of LDP takes effect only on converged host routings.
- When an autonomous system (AS) is planned into multiple IGP areas and the convergence of host routings is enabled on an area border router (ABR), you can enable the inter-area LSP function of LDP if label switched paths across multiple IGP areas need to be set up for converged routings.

- It is recommended to enable the inter-area LSP function of LDP on all devices running LDP.
- After the inter-area LSP function of LDP is enabled, when LDP receives a label mapping message sent from a downstream device, if there is a longest matched routing in the routing platform corresponding to the message and the LDP neighbor sending the label mapping message is the next-hop of this longest matched routing, a forwarding entry is added and the message is distributed to all LDP neighbors.
- If you require setting up inter-area LSP of LDP only on specific host routings, you can specify ACL parameters to control the routings. (A better way is to use the **advertise-labels** command on ABRs to filter the routings that do not need to set up inter-area LSP of LDP).

Only the latest configuration command is saved. That is, the subsequent configuration will override the preceding one.

Since the inter-area LSP function of LDP takes effect only on converged host routings, if you perform the longest match extension on converged non-host routings by using an ACL rule, this ACL rule is invalid.

The inter-area LSP function of LDP takes effect in scenarios where the liberal label retention mode is configured instead of scenarios where the conservative label retention mode is configured.

The inter-area LSP function of LDP does not apply to the DOD label distribution mode.

Configuration Examples

The following example enables the inter-area LSP function of LDP.

```
FS(config)# mpls router ldp
FS(config-mpls-router)# inter-area-lsp
```

The following example enables the inter-area LSP function of LDP under the VRF instance vpna.

```
FS(config)# mpls router ldp vpna
FS(config-mpls-router)# inter-area-lsp
```

The following example configures that the inter-area LSP function of LDP takes effect only on the converged host routing 192.166.1.1/32.

```
FS(config)# ip access-list standard acl_1
FS(config-std-nacl)# permit host 192.166.1.1
FS(config-std-nacl)# exit
FS(config)# mpls router ldp
FS(config-mpls-router)# inter-area-lsp for acl acl_1
```

Related Commands

Command	Description
show mpls ldp parameters	Displays configuration parameters of an LDP instance and view whether the inter-area LSP function of LDP is enabled.

Platform Description

N/A

1.8 Label-merge

Use this command to enable global label merging. Use the **no** form of this command to disable this function.

label-merge

no label-merge

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Label merging is enabled by default.

Command Mode

config-mpls-router mode

Usage Guide

Enable global label merging. The command usage is as follows:

The command is valid only in the Downstream On Demand (DoD) label advertisement mode.

For LDP sessions in the Downstream Unsolicited (DU) label advertisement mode, label merging is always enabled.

When label merging is enabled or disabled, all LDP sessions are reset.

Configuration Examples

The following example enables global label merging.

```
FS(config)# mpls route ldp
FS(config-mpls-router)# label-merge
```

Related Commands

Command	Description
show mpls ldp parameters	Show Displays the LDP global configuration parameter.

Platform Description

N/A

1.9 Label-retention-mode

Use this command to set the label retention mode. Use the **no** form of this command to restore the default setting.

label-retention-mode { **liberal** | **conservative** }

no label-retention-mode

Parameter Description

Parameter	Description
liberal	Uses the liberal label retention mode.
conservative	Uses the conservative label retention mode.

Defaults The default mode is liberal label retention mode.

Command Mode **config-mpls-router** mode

Usage Guide Use this command to process newly received label mapping messages. This command is invalid for former FEC label mapping messages from neighbors.

Configuration Examples The following example sets the label retention mode to liberal.

```
FS(config)# mpls route ldp
FS(config-mpls-router)# label-retention-mode liberal
```

Related Commands

Command	Description
show mpls ldp parameters	Displays the LDP global configuration parameters.

Platform Description N/A

1.10 Label-switching

Use this command to enable an interface to forward MPLS label packets. Use the no or default form of this command to restore the default setting.

label-switching

no label-switching

default label-switching

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode.

Usage Guide This command must be configured on the interface to enable MPLS packet forwarding on it.

Configuration Examples The following example enables MPLS packet forwarding on the interface.

```
FS(config)# interface Gi4/1
FS(config-if)# label-switching
```

Related Commands

Command	Description
show mpls summary	Displays interfaces with the label forwarding capability

	enabled.

Platform Description N/A

1.11 Ldp Router-id

Use this command to set the router ID of the LDP. Use the **no** form of this command to restore the default setting, which does not take effect immediately.

ldp router-id { *ip-address* | **interface** *interface-name* [**force**] }

no ldp router-id

Parameter Description

Parameter	Description
ip-address	Specifies a static IP address as the router ID of LDP. It takes effect immediately after being configured.
interface-name [**force**]	Configures the primary address of a specified interface as the router ID of LDP. If the **force** keyword is specified, the new router ID is forced to take effect immediately. Otherwise, the new router ID will not take effect immediately.

Defaults The default LDP router ID is the system router ID.

Command Mode **config-mpls-router** mode

Usage Guide If a static IP address is specified as the router ID of LDP and the address takes effect immediately after being configured, the established session is disconnected and that a new router ID is used to re-establish a session.

If the IP address of a specified interface is specified as the router ID of LDP and the **force** keyword is not carried, the primary address of the currently configured interface is used as the new router ID only when the currently used router ID is unavailable. To use the address of an interface as the router ID, the following conditions must be met:

The VRF to which the interface belongs must be the same as that to which LDP belongs.

The interface must be in the Up state.

Otherwise, the router ID cannot take effect even if the **force** keyword is specified. The router ID takes effect only when the preceding conditions are met (in the case that the **force** keyword is specified).

If a configured static IP address replaces a configured interface address to act as the router ID of LDP or vice versa, the router ID takes effect immediately. In this case, the LDP sessions established under the LDP instance are disconnected automatically and then re-established.

It is recommended to use an interface address as the router ID of LDP. The purpose of using a static address is mainly to be compatible with commands of earlier versions.

Configuration Examples

```
FS(config)# mpls router ldp
FS(config-mpls-router)# ldp router-id interface vlan 10 force
```

Related Commands

Command	Description
show mpls ldp parameter	Displays LDP configuration parameters under all or specified VRFs.

Platform Description N/A

1.12 Loop-detection

Use this command to enable loop detection. Use the **no** form of this command to restore the default setting.

loop-detection

no loop-detection

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode **config-mpls-router** mode

Usage Guide This command affects newly created LDP sessions, but not existing LDP sessions under an LDP instance.

Configuration Examples The following example enables loop detection.

```
FS(config)# mpls router ldp
FS(config-mpls-router)# loop-detection
```

Related Commands

Command	Description
show mpls ldp parameters	Displays the LDP configuration parameters in all or specified VRFs.

Platform Description N/A

1.13 Lsp-control-mode

Use this command to set the LDP control mode globally. Use the **no** form of this command to restore the default setting.

lsp-control-mode [**independent** | **ordered**]

no lsp-control-mode

Parameter Description

Parameter	Description
independent	Uses the independent control mode.
ordered	Uses the ordered control mode.

Defaults

Independent control mode

Command Mode

config-mpls-router mode

Usage Guide

This command affects the transmission of new label mapping messages, but does not affect label mapping messages that have been distributed for existing LDP sessions.

Configuration Examples

The following example sets the LDP control mode to ordered.

```
FS(config)# mpls router ldp
FS(config-mpls-router)# lsp-control-mode ordered
```

Related Commands

Command	Description
show mpls ldp parameters	Displays the LDP configuration parameters in all or specified VRFs.

Platform Description

N/A

1.14 Mpls Ip Fragment

Use this command to set the processing if the MPLS MTU is exceeded after an IP packet is encapsulated with the MPLS label

mpls ip fragment

no mpls ip fragment

Parameter Description

Parameter	Description
N/A	N/A

Defaults

After the entered IP packet is encapsulated with the MPLS label, if its size exceeds the defined size of the MPLS MTU, it will carry out the fragment to the original IP packet before the MPLS label is encapsulated to send.

Command Mode

Global configuration mode

Usage Guide

This command is valid only for process forwarding. Use the **no mpls ip fragment** command to disable the fragment function for process forwarding. Namely, it will be discarded directly if its size exceeds the defined size

of the MPLS MTU after the entered IP packet is encapsulated with the MPLS label.

Configuration Examples

The following example disables MPLS packet fragmentation.

```
FS(config)# no mpls ip fragment
```

Related Commands

Command	Description
mpls ip	Enables MPLS globally.

Platform Description

N/A

1.15 Mpls Ip Icmp-error Pop

Use this command to set the processing mode for Internet Control Message Protocol (ICMP) error packets generated during the forwarding of MPLS packets. Use the **no** form of this command to restore the default setting.

mpls ip icmp-error pop *labels*

no mpls ip icmp-error pop

Parameter Description

Parameter	Description
labels	Number of packet labels to be processed

Defaults

The generated ICMP error packet continues to be forwarded along the original LSP after being labeled with the original tag.

Command Mode

Global configuration mode

Usage Guide

By default, the generated ICMP error packet continues to be forwarded along the original LSP until to the LSP egress. At the egress, the packet is rerouted and forwarded according to the inner IP address after its label stack is removed. You can use this command to change this default action by configuring packets with different numbers of labels to be processed differently. When the number of labels of a forwarded packet is less than or equal to the configured value, the ICMP error packet directly uses the IP route forwarding table of the FEC to which the top label corresponds.

Configuration Examples

```
FS(config)# mpls ip icmp-error pop 2
```

Related Commands

Command	Description
mpls ip	Enables MPLS globally.

Platform Description N/A

1.16 Mpls Ip Ttl Propagate

Use this command to enable or disable the IP TTL copy function of MPLS. Use the **no** form of this function to restore the default setting.

mpls ip ttl propagate { **public** | **vpn** }

no mpls ip ttl propagate { **public** | **vpn** }

Parameter Description

Parameter	Description
public	Specifies whether to enable TTL propagate function for the sending messages.
vpn	Specifies whether to enable TTL propagate function for the forwarded messages.

Defaults The TTL copy function is enabled for both the sending and forwarded messages.

Command Mode Global configuration mode

Usage Guide The following are two modes of MPLS TTL:

- TTL copy mode: it is the default working mode. In this mode, the pushed label TTL is copied from the TTL of the existed header of the IP packet or the MPLS packet when Pushing the label. The TTL of the inner IP packet or the MPLS packet is copied from the TTL of the outer label when Popping the label.
- TTL non-copy mode: in this mode, set the value of pushed label TTL to 255 when Pushing the label and keep the value of the TTL of the inner IP packet or the MPLS packet when Popping the label.

After the TTL copy is enabled, the TTL of the inner header is not copied but retained if it is smaller than the TTL of the outer header.

Configuration Examples The following example disables the TTL copy function of for sending messages:

```
FS(config)# mpls ip ttl propagate public
```

Related Commands

Command	Description
mpls ip	Enables MPLS globally.

Platform Description N/A

1.17 Mpls Ip (Interface Configuration Mode)

Use this command to enable LDP functions for an interface. Use the **no** form of this command to restore the

default setting.

mpls ip

no mpls ip

default mpls ip

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

It only allows enable the MPLS function on the L3 interface.

Note that you must run the **label-switching** command to enable interface MPLS forwarding after interface LDP is enabled.

For tunnel interfaces, LDP can be enabled only in GRE tunnels.

Configuration Examples

The following example enables the LDP function for an interface.

```
FS(config)# interface Gi4/1
FS(config-if)# mpls ip
```

Related Commands

Command	Description
mpls ldp Hello-interval	Configures the transmission interval of Hello packets.
label-switching	Enables the MPLS forwarding function of an interface.
mpls ldp Hello-holdtime	Configures the Hello packet holdtime.

Platform Description

N/A

1.18 Mpls Ip (Global Configuration Mode)

Use this command to enable MPLS forwarding in the global configuration mode. Use the **no** form of this command to restore the default setting.

mpls ip

no mpls ip

default mpls ip

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide To implement MPLS forwarding, MPLS must be enabled globally at first.
After MPLS forwarding is enabled, label forwarding rather than IP forwarding is performed for packets. When label forwarding fails, IP forwarding is attempted.
For some devices, enabling the LDP related commands when global MPLS forwarding is disabled may cause failure of IP packets forwarding. It is recommended to disable MPLS commands when MPLS forwarding is not required.

Configuration Examples The following example enables MPLS forwarding globally.

```
FS(config)# mpls ip
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.19 Mpls Ldp Distribution-mode

Use this command to configure the label distribution mode used by LDP on each interface. Use the **no** form of this command to restore the default setting.

mpls ldp distribution-mode { **dod** | **du** }

no mpls ldp distribution-mode

Parameter Description

Parameter	Description
dod	Uses the downstream on-demand distribution mode
du	Uses the Downstream Unsolicited (DU) distribution mode

Defaults The default label distribution mode is DU.

Command Mode Interface configuration mode

Usage Guide If the interconnected LDP sessions use different distribution modes, the **du** mode will be used forcibly for both of them.
The command configuration does not affect existing LDP sessions of the interface.

Configuration Examples The following example configures LDP working in DOD mode on this interface.

```
FS(config)# interface vlan 10
```

```
FS(config-if)# mpls ldp distribution-mode dod
```

Related Commands

Command	Description
Loop-detection	Configures loop detection.

Platform Description N/A

1.20 Mpls Ldp Hello-holdtime

Use this command to configure the holdtime in seconds for LDP Hello packets on each interface. Use the **no** form of this command to restore the default setting.

mpls ldp hello-holdtime *seconds*

no mpls ldp hello-holdtime

Parameter Description

Parameter	Description
seconds	Holdtime of Hello packets, ranging from 1 to 65535 in the unit of seconds. Holdtime 65535 indicates that the Hello packet will never time out.

Defaults The default is 15.

Command Mode Interface configuration mode

Usage Guide This command is valid only for the LDP Link Hello packets for the basic discovery mechanism and may change the transmission interval of Hello messages, with the same rule of configuring the transmission interval of Hello packets on an interface.

Use the **discovery targeted-Hello** command to set the Hello interval for the extended discovery mechanism.

Configuration Examples The following command configures the Link Hello holdtime of LDP on an interface as 30 seconds:

```
FS(config)# interface vlan 10
FS(config-if)# mpls ldp Hello-holdtime 30
```

Related Commands

Command	Description
mpls ldp Hello-interval	Configures the transmission interval of Hello packets.
discovery targeted-Hello	Configures the interval and timeout time of sending Hello packets for the extended discovery mechanism.

Platform Description N/A

1.21 Mpls Ldp Hello-interval

Use this command to configure the holdtime in seconds for LDP Hello packets on each interface. Use the **no** form of this command to restore the default setting.

mpls ldp Hello-interval *seconds*

no mpls ldp Hello-interval

Parameter Description

Parameter	Description
seconds	Transmission interval of Hello packets, ranging from 1s to 65535 in the unit of seconds.

Defaults

The default is 5.

Command Mode

Interface configuration mode

Usage Guide

The interval for sending Link Hello packets on an interface may be inconsistent with that configured by this command.

The specific algorithm is as follows:

By default, if the minimum holdtime among all holdtime intervals negotiated with neighbors an interface is less than 15s, the actually used interval for sending Hello packets is 1/3 of the minimum holdtime and 1s minimum.

By default, if the minimum holdtime among all holdtime intervals negotiated with neighbors of an interface is greater than or equal to 15s, the actually used interval for sending Hello packets is 5s.

If the configured interval is greater than 1/3 of the minimum value among all holdtime intervals negotiated with neighbors of an interface, the actually used interval for sending Hello packets is 1/3 of the minimum holdtime and 1s minimum.

If the configured interval is less than 1/3 of the minimum value among all holdtime intervals negotiated with neighbors of an interface, the configured interval for sending Hello packets is used.

In the actual configuration, this value must be less than the value of Hello-holdtime. This command is valid only for the LDP Link Hello packets for the basic discovery mechanism. Use the **discovery targeted-Hello** command to set the Hello holdtime for the extended discovery mechanism.

Configuration Examples

The following example configures the transmission interval of Hello packets as 10 seconds:

```
FS(config)# interface vlan 10
FS(config-if)# mpls ldp Hello-interval 10
```

Related Commands

Command	Description
mpls ldp hello-holdtime	Configures the Hello packet holdtime in seconds.
discovery targeted-hello	Configures the transmission interval and timeout interval Hello packets for the extended discovery mechanism.

Platform Description

N/A

1.22 Mpls Ldp Keepalive-holdtime

Use this command to configure the holdtime for keepalive packets on each interface. Use the **no** form of this command to restore the default setting.

mpls ldp keepalive-holdtime *seconds*

no mpls ldp keepalive-holdtime

Parameter Description

Parameter	Description
seconds	Holdtime of keepalive packets, ranging from 15 to 65535 in the unit of seconds.

Defaults

The default is 45.

Command Mode

Interface configuration mode

Usage Guide

This command is valid for the LDP sessions to be created instead of former created LDP sessions. This command has no influence on the LDP session set up by the extended discovery mechanism. Use the **targeted-session holdtime** command to modify the Keepalive Holdtime of the LDP session set up by the extended discovery mechanism.

Configuration Examples

The following command configures the holdtime of the Keepalive packet of LDP on an interface as 90 seconds:

```
FS(config)# interface vlan 10
FS(config-if)# mpls ldp keepalive-holdtime 90
```

Related Commands

Command	Description
targeted-session holdtime	Sets the holdtime of Keepalive packets for the extended mechanism.

Platform Description

N/A

1.23 Mpls Ldp Max-hop-count

Use this command to configure the maximum hop count allowed for loop detection on each interface. Use the **no** form of this command to restore the default setting.

mpls ldp max-hop-count *number*

no mpls ldp max-hop-count

Parameter Description

Parameter	Description
number	Maximum hop count allowed for loop detection, ranging from 1 to 255.

Defaults The default is 254.

Command Mode Interface configuration mode

Usage Guide The value configured by this command is valid only after loop detection is configured. If the hop count value in the label mapping message or the label request message of LDP is greater than the configured value, it is deemed that a loop occurs. This command is invalid for the previously received label mapping message and label request message, but valid for those received later.

Configuration Examples The following example configures the LDP hop count of the interface as 30:

```
FS(config)# interface vlan 10
FS(config-if)# mpls ldp max-hop-count 30
```

Related Commands

Command	Description
loop-detection	Configures LDP loop detection.

Platform Description N/A

1.24 Mpls Ldp Max-label-requests

Use this command to configure the maximum label requests allowed on each interface. Use the **no** form of this command to restore the default setting.

mpls ldp max-label-requests *times*

no mpls ldp max-label-requests

Parameter Description

Parameter	Description
times	Maximum request times, ranging from 0 to 255.

Defaults There is no limit by default, indicating that label requests are retransmitted until a label mapping message is received.

Command Mode Interface configuration mode.

Usage Guide This command is invalid for the label request times in the created LDP session on the interface, and valid for newly-created LDP sessions. The value 0 means that the label request will not be retransmitted.

Configuration Examples The following command configures the maximum number of label requests of LDP allowed on an interface as 5.

```
FS(config)# interface vlan 10
FS(config-if)# mpls ldp max-label-requests 5
```

Related Commands

Command	Description
mpls ldp distribution-mode	Configures the label distribution mode.

Platform Description N/A

1.25 Mpls Ldp Max-path-vector

Use this command to configure the maximum path vector value allowed for loop detection on each interface. Use the **no** form of this command to restore the default setting.

mpls ldp max-path-vector *number*

no mpls ldp max-path-vector

Parameter Description

Parameter	Description
number	Maximum path vector value, ranging from 0 to 255.

Defaults 254

Command Mode Interface configuration mode

Usage Guide The configured path vector value takes effect only after the LDP instance enables loop detection. If the number of LDR IDs contained in the path vector list of the label mapping message or the label request message of LDP is greater than the configured maximum path sector value, it is deemed that a loop occurs. This command is invalid for the created LDP sessions, but influences the LDP sessions to be created.

Configuration Examples The following command configures the maximum path vector value of LDP on an interface as 10:

```
FS(config)# interface vlan 10
FS(config-if)# mpls ldp max-path-vector 10
```

Related Commands

Command	Description
loop-detection	Configures LDP loop detection.

Platform Description N/A

1.26 Mpls Ldp Max-pdu

Use this command to configure the maximum PDU value. Use the **no** form of this command to restore the default setting.

mpls ldp max-pdu *max-pdu*

no mpls ldp max-pdu

Parameter Description

Parameter	Description
max-pdu	The maximum PDU value in exchanging the LDP messages, ranging from 256 to 4096 in the unit of bytes.

Defaults The default is 4096.

Command Mode Interface configuration mode

Usage Guide This command does not influence former created LDP sessions on the interface, but influence newly created LDP sessions.

Configuration Examples The following command configures the maximum length of LDP messages as 256.

```
FS(config)# interface vlan 10
FS(config-if)# mpls ldp max-pdu 256
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.27 Mpls Ldp Transport-address

Use this command to set the transport address used by basic LDP sessions. Use the **no** form of this command to restore the default setting.

mpls ldp transport-address { **interface** | *ip-address* }

no mpls ldp transport-address

Parameter Description

Parameter	Description
interface	The LDP session uses the main address of an interface.
ip-address	The LDP session uses an IP address specified by this parameter.

Defaults The default transport address is the LSR ID of LDP.

Command Mode Interface configuration mode

Usage Guide This command is invalid to LDP sessions created by the extended discovery mechanism, but effective only for LDP sessions created by the basic discovery mechanism. When this interface transport address is configured, this command is invalid for the LDP sessions that have been created by basic discovery mechanism, and effective to newly created sessions.

Configuration Examples

The following example configures basic LDP sessions to use the main address of an interface as the transport address.

```
FS(config)# interface vlan 10
FS(config-if)#mpls ldp transport-address interface
```

Related Commands

Command	Description
show mpls ldp parameters	Displays the LDP parameters under all or specified VRFs.
transport-address	Globally configures the transport address used by basic LDP sessions.

Platform Description

N/A

1.28 Mpls Mtu

Use this command to configure the MTU value when the MPLS messages are forwarded.

Use the **no** form of the command to restore the default setting.

mpls mtu *mtu*

no mpls mtu

Parameter Description

Parameter	Description
mtu	Length of label packets supported by the interface, ranging from 64 to 1500 in the unit of bytes.

Defaults

The MPLS MTU value is equal to the interface MTU.

Command Mode

Interface configuration mode

Usage Guide

Use this command to configure the MTU value. By default, the MTU of the transmittable MPLS label packet on an interface is equal to default the interface mtu. The MPLS mtu determines whether to fragment the MPLS packet during the message sending. The length of the MPLS MTU includes the total length of the MPLS encapsulating and encapsulated (IP) layers. The MPLS MTU on the interface must not exceed the actual transmission capability of the interface.

This command is valid only for process forwarding and router fast forwarding instead of switches adopting ASIC forwarding. The switch forwards the packets according to the actually configured MTU on the interface and discards the packets that exceed the configured MTU. Use the **mtu** command in interface configuration mode to adjust the MTU on the interface.

In actual forwarding, you should try to prevent forwarding performance from degrading due to fragmenting by adjusting the MTU value.

Configuration Examples

The following example configures MPLS MTU in the range from 64 to 1500 when the interface MTU is 1500.

```
FS(config)# interface GigabitEthernet 4/1
FS(config-if)# mpls mtu 1496
```

The following example configures MPLS MTU in the range from 64 to 1516 when the interface MTU is 1516.

```
FS(config)# interface Gi4/1
FS(config-if)# mpls mtu 1510
```

Related Commands

Command	Description
mpls ip	Enables MPLS globally.

Platform Description

N/A

1.29 Mpls Router Ldp

Use this command to enable LDP, and use the **no** form of this command to restore the default setting.

mpls router ldp [*vrf*-name]

no mpls router ldp [*vrf-name*]

default mpls router ldp[*vrf-name*]

Parameter Description

Parameter	Description
vrf-name	Enables or disables LDP for specified VRF instance.

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

The number of LDP instances is limited by the number of VRFs on a device. Each VRF can start one LDP instance. If no VRF is specified, LDP of the global VRF is enabled or disabled by default.

Configuration Examples

The following example enables LDP of the global VRF and enters the LDP configuration mode.

```
FS(config)# mpls router ldp
FS(config-mpls-router)# ldp router-id interface vlan 10 force
```

The following example enables LDP of VPNA and enters the LDP configuration mode.

```
FS(config)# mpls router ldp vpna
FS(config-mpls-router)# ldp router-id interface vlan 10 force
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.30 Mpls Static Ftn

Use this command to add one FTN entry to the global FTN table. Use the **no** form of this command to restore the default setting.

mpls static ftn *ip-address/mask* **out-label** *label* **nexthop** *interface-name nexthop-ip*

no mpls static ftn *ip-address//mask*

Parameter Description

Parameter	Description
ip-address//mask	Corresponding FEC, namely the destination address.
out-label *label*	Corresponding outgoing label of this FEC.
nexthop *interface-name nexthop-ip*	Next hop of an FEC, including the egress interface and the IP address of the next hop.

Defaults N/A

Command Mode Global configuration mode

Usage Guide Use this command to add an FTN entry to the global FTN table. After the router with MPLS enabled receives an IP packet, it looks up for the next hop in the FTN table according to the destination address of the IP packet by maximum match. If the next hop is found, it performs label forwarding to the IP packet. For the FTN whose destination address and mask are both 0, it is valid only when this default route exists in the IP route forwarding table.

Configuration Examples The following example adds FTN of FEC 192.168.0.0/16 to the global FTN table. The outgoing label of the entry is 100, the outgoing interface GigabitEthernet 4/1 and the next hop 10.10.10.1.

```
FS(config)# mpls static ftn 192.168.0.0/16 out-label 100    nexthop gi4/1 10.10.10.1
```

Related Commands

Command	Description
show mpls forwarding-table	Displays the overview information of the global FTN table.

Platform Description N/A

1.31 Mpls Static ilm in-Label

Use this command to add one ILM entry to the ILM table. Use the **no** form of this command to restore the default setting.

mpls static ilm in-label *in-label* **forward-action swap-label** *label* **nexthop** *interface-name nexthop-ip* **fec** *ip-address/mask*

mpls static ilm in-label *in-label* **forward-action pop-l3vpn-nexthop** *vrf-name* **nexthop** *interface-name nexthop-ip* **fec** *ip-address/mask*

mpls static ilm in-label *in-label* **forward-action pop-l2vc-destport vc-id** *vc-peer-addr*

no mpls static ilm in-label *in-label*

default mpls static ilm in-label *in_label*

Parameter Description

Parameter	Description
in-label	Ingress label value of this ILM entry.
forward-action	Specifies the forward behavior of this ILM entry. **swap-label:** applies to the ILM entry of the public network, to indicate the label switching and forwarding. **pop-l3vpn-nexthop:** applies to the ILM entry of the L3 VPN, to indicate the pop-up label, and forward it to the next hop of the specified VRF. **pop-l2vc-destport:** applies to the ILM entry of the L2 VPN, to indicate the pop-up label, and forward the message from the specified interface.
label	For the **swap-label** forward behavior, it will specify the egress label value of the switched label value.
vrf-name	For the **pop-l3vpn-nexthop** forward behavior, it will specify the VPN of the specified ILM, namely VRF.
Interface-name	For the **pop-l2vc-destport** forward behavior, it will specify the forwarded egress interface.
nexthop *interface-name nexthop-ip*	Specifies the next hop, including the egress interface and the IP address of the next hop.
fec	Indicates the FEC for which an ILM is created.
ip-address/mask	Corresponds to the fec format of the global or **l3 vpn** application, and indicate one destination network.
vc-id	Corresponds to the fec format of the **l2vpn** application, and indicates the VC instance.
vc-peer-addr	Address of the VC peer.

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

Use this command to add an ILM entry to the ILM table. After the router with MPLS enabled receives an IP packet with label, it looks up for the next hop in the ILM table according to the label of the IP packet according to maximum match. If the next hop is found, it swaps, pops up the label of the IP packet or performs VPN forwarding after pop-up.

Configuration Examples

```
FS (config)# mpls static ilm in-label 20 forward-action swap-label 30 nexthop gi4/2 10.10.10.1 fec 172.16.0.0/26
```

Related Commands

Command	Description
show mpls forwarding-table	Displays the information of the MPLS forwarding table.

Platform Description N/A

1.32 Neighbor

Use this command to create an LDP extended peer. Use the **no** form of this command to restore the default setting.

neighbor *ip-address*

no neighbor *ip-address*

Parameter Description

Parameter	Description
ip-address	Router ID of the peer LSR.

Defaults There is no LDP extended peer by default.

Command Mode **config-mpls-router** mode

Usage Guide To set up an extended LDP session, you must configure LSRs at both ends of the session. It fails to set up the extended LDP session if the extended peer is configured at only one end.

Configuration Examples The following command configures 10.10.10.1 as an extended peer of the LSR:

```
FS(config)# mpls router ldp
FS(config-mpls-router)# neighbor 10.10.10.1
```

Related Commands

Command	Description
show mpls ldp discovery	Displays the information of neighbors discovered by the LDP.
show mpls ldp neighbor	Displays the LDP session status.

Platform Description N/A

1.33 Neighbor Labels Accept

Use this command to configure the LSR to filter label mapping messages for the LDP peer according to a specified ACL rule. Use the **no** form of this command to restore the default setting.

neighbor *ip-address* **labels accept** *acl-name*

no neighbor *ip-address* **labels accept**

Parameter Description

Parameter	Description
ip-address	Router ID of the peer LSR.
acl-name	Name of the specified ACL rule.

Defaults

No filtering rule is configured by default.

Command Mode

config-mpls-router mode

Usage Guide

This command is effective to only the IP route FEC instead of other FECs such as PW FEC. If this command is used to configure a flitering rule for incoming label mapping messages, label mapping messages of the FEC from a specified neighbor meeting the ACL rule can be received and those of other FECs from this neighbor are discarded. However, label mapping messages sent by other neighbors are not affected and are still received. If this command is configured for a neighbor but no filtering rule is configured for the corresponding ACL, label mapping messages of all FECs sent by this neighbor are discarded. When the rule is cancelled by using the **no** form of this command, label mapping messages that have been filtered are not affected (that is, messages that have been discarded cannot be recovered) and only label mapping messages received thereafter are affected. In this case, the **clear mpls ldp neighbor** command needs to be used to reset the LDP session. Only one rule can be configured for one neighbor. Each LDP instance can be used to configure filtering rules for a maximum of 64 neighbors.

Configuration Examples

In the following example, only label mapping messages of the FEC with 192.168.0.0/16 as the route prefix and sent from the neighbor 10.10.10.1 are received, and those of other FECs sent from this neighbor are denied.

```
FS(config) #ip access-list standard fec_acl
FS(config-std-nacl)#permit 192.168.0.0 0.0.255.255
FS(config-std-nacl)# exit
FS(config)# mpls router ldp
FS(config-mpls-router)# neighbor 10.10.10.1 labels accept fec_acl
```

Related Commands

Command	Description
clear mpls ldp neighbor	Forcibly disconnects the LDP session
show mpls ldp neighbor	Displays the LDP session status.

Platform Description

N/A

1.34 Neighbor Password

Use this command to enable MD5 authentication of LDP. Use the **no** form of this command to restore the default setting.

neighbor *ip-address* **password** [**0** | **7**] *pwd-string*

no neighbor *ip-address* **password**

Parameter Description

Parameter	Description
ip-address	Transport address of the peer LSR.
[**0** | **7**]	(Optional) 0 means typing a key in plain text and 7 means typing a key in encrypted text. A key is typed in plain text by default.
pwd-string	Password string, which is case-sensitive. If the password string is entered in plain text mode, it contains 1 to 25 characters. If the password string is entered in encrypted text mode, it contains 1 to 52 characters.

Defaults The function is disabled by default.

Command Mode **config-mpls-router** mode.

Usage Guide A key can be typed in either plain text or encrypted text. In the former case, if the **service password-encryption** command is used to enable the encryption service in global configuration mode, the key is saved in encrypted text when the current configuration is saved or viewed.

To enable LDP authentication function, the keys configured on both ends of the LDP peer need to be the same. The change to the key will cause disconnection of established LDP sessions and re-attempt to establish them.

Configuration Examples The following example configures MD5 authentication to be adopted for sessions with 10.10.10.1, with the plain text key being 123456:

```
FS(config)# mpls router ldp
FS(config-mpls-router)# neighbor 10.10.10.1 password 123456
```

Related Commands

Command	Description
show mpls ldp discovery	Displays the information about neighbors discovered by LDP.
show mpls ldp neighbor	Displays the LDP session status.
neighbor *ip-address*	Creates an LDP extended peer.

Platform Description N/A

1.35 Ping Mpls Ipv4

Use this command to detect the connectivity of an MPLS LSP.

ping mpls ipv4 *ip-address/mask* [**repeat** *repeat*] [**ttl** *time-to-live*] [**timeout** *timeout*] [**size** *size*] [**interval**

mseconds] [**source** *ip-address*] [**destination** *ip-address*] [**force-explicit-null**] [**pad** *pattern*] [**reply mode** { **ipv4** | **router-alert** }] [**dsmap**] [**flags fec**] [**verbose**]

Parameter Description

Parameter	Description
ip-address/mask	IPv4 address and subnet mask length of the destination FEC to be tested
repeat *repeat*	(Optional) Number of times to resend an Echo Request packet, ranging from 1 to 2147483647, 5 by default
ttl *time-to-live*	(Optional) Specifies the initial MPLS TTL value for sending packets, ranging from 1 to 255, 255 by default.
timeout *timeout*	(Optional) Specifies the timeout time for packets, ranging from 0 to 3600, 2 by default.
size *size*	(Optional) Specifies the size of packets, ranging from 84 to 18024, 84 by default.
interval *mseconds*	(Optional) Specifies the minimum interval time (in milliseconds) between two consecutive Echo Request packets sent, ranging from 0 to 3600000, 0 by default
source *ip-address*	(Optional) Source address. It is the destination address when the peer sends an Echo Reply packet.
destination *ip-address*	(Optional) Specifies 127/8 segment address. It is used to fill the IP header, 127.0.0.1 by default.
force-explicit-null	(Optional) Whether to forcibly add an explicit null label to the MPLS label. By default, it is not added.
pad *pattern*	(Optional) Pad pattern of packets, 0xABCD by default
reply mode { **ipv4** | **router-alert** }	(Optional) Specifies the reply mode of the Echo Request packet: **ipv4**: replies with an IPv4 UDP packet (default) **router-alert**: replies with an IPv4 UDP packet with the Router Alert option
dsmap	(Optional) Requires returning downstream information.
flags fec	(Optional) Sets forcible FEC stack check.
verbose	(Optional) Displays details about Echo Reply packets. By default, the information is not displayed.

Defaults

See the parameter description.

Command Mode

Privileged EXEC mode

Usage Guide

Use this command to detect the connectivity of an MPLS LSP. You can change some default parameter values by specifying optional parameters. In addition to the directly typed command, interactive typing mode is provided. You can enter the interactive typing mode by pressing **Enter** after typing the **ping mpls** command

Configuration Examples

The following example detects the connectivity from the local device to the LSP of 10.10.10.10/32.

```
FS# ping mpls ipv4 10.10.10.10/32 verbose
```

```
Sending 5, 84-byte MPLS Echoes to 10.10.10.10/32,
     timeout is 2 seconds, send interval is 0 msec:
          < press Ctrl+C to break >
Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L'-labeled output interface,'B'-unlabeled output interface,
  'D'-DS Map mismatch,'F'-no FEC mapping,'f'-FEC mismatch,
  'M'-malformed request,'m'-unsupported tlvs,'N'-no label entry,
  'P'-no rx intf label prot,'p'-premature termination of LSP,
  'R'-transit router,'I'-unknown upstream index,
  'X'-unknown return code,'x'-return code 0
Type escape sequence to abort.
!       size 84, reply addr 192.168.201.208, return code 3
!       size 84, reply addr 192.168.201.208, return code 3
!       size 84, reply addr 192.168.201.208, return code 3
!       size 84, reply addr 192.168.201.208, return code 3
!       size 84, reply addr 192.168.201.208, return code 3
Success rate is 100 percent(5/5),round-trip min/avg/max=20/36/60 ms
```

The following example uses the *dsmap* parameter and the *ttl* parameter together to return downstream information (because if the egress LSR is reached, downstream information is not returned).

```
FS# ping mpls ipv4 10.40.10.10/32 dsmap ttl 1
Sending 5, 84-byte MPLS Echoes to 10.4(2)0.10.10/32,
         timeout is 2 seconds, send interval is 0 msec:
              < press Ctrl+C to break >
Codes: '!' - success, 'Q' - request not sent, '.' - timeout,
  'L'-labeled output interface,'B'-unlabeled output interface,
  'D'-DS Map mismatch,'F'-no FEC mapping,'f'-FEC mismatch,
  'M'-malformed request,'m'-unsupported tlvs,'N'-no label entry,
  'P'-no rx intf label prot,'p'-premature termination of LSP,
  'R'-transit router,'I'-unknown upstream index,
  'X'-unknown return code,'x'-return code 0
Type escape sequence to abort.
L
Echo Reply received from 192.168.201.208
   DSMAP 0,DS Router Addr 192.168.198.2,DS Intf Addr 192.168.198.2
       Depth Limit 0, MRU 1508 [Labels: implicit-null Exp: 0]
L
Echo Reply received from 192.168.201.208
   DSMAP 0,DS Router Addr 192.168.198.2,DS Intf Addr 192.168.198.2
       Depth Limit 0, MRU 1508 [Labels: implicit-null Exp: 0]
L
Echo Reply received from 192.168.201.208
   DSMAP 0,DS Router Addr 192.168.198.2,DS Intf Addr 192.168.198.2
       Depth Limit 0, MRU 1508 [Labels: implicit-null Exp: 0]
```

```
L
Echo Reply received from 192.168.201.208
   DSMAP 0,DS Router Addr 192.168.198.2,DS Intf Addr 192.168.198.2
      Depth Limit 0, MRU 1508 [Labels: implicit-null Exp: 0]
L
Echo Reply received from 192.168.201.208
   DSMAP 0,DS Router Addr 192.168.198.2,DS Intf Addr 192.168.198.2
      Depth Limit 0, MRU 1508 [Labels: implicit-null Exp: 0]
Success rate is 0 percent (0/5)
```

Field	Description
!	A correct Reply packet is received, indicating that the LSP is connected.
Q	The Request packet is not sent, indicating that there is no LSP corresponding to the destination FEC on the local device.
.	Receiving a Reply packet times out, indicating that no Reply packet is received within a specified period.
L	There is an outgoing label corresponding to the FEC on the router that returns a Reply packet, indicating that the router that returns a Reply packet is an intermediate router of the LSP.
B	There is no outgoing label corresponding to the FEC on the router that returns a Reply packet, indicating that the LSP is interrupted.
D	Validation information carried in Downstream Mapping TLV does not match the information on the router that returns a Reply packet.
F	There is no FEC mapping carried in the corresponding TargetFec on the router that returns a Reply packet.
f	The label of the current label stack in the router that returns a Reply packet is inconsistent with the label of FEC mapping carried in TargetFec.
M	The format of the Request packet received by the router that returns a Reply packet is incorrect.
m	The Request packet received by the router that returns a Reply packet has TLVs that are not supported.
N	The router that returns a Reply packet does not have an instance corresponding to the incoming label, indicating that the labels are not synchronous.
P	The protocol for transmitting packets in the router that returns a Reply packet is inconsistent with that recorded in TargetFec stack.
p	Premature termination of packet transmission
R	Return the reserved value.
I	Upstream interface index unknown
X	Unknown return value
x	The return value is 0.

Related Commands

Command	Description
traceroute mpls	Displays the LSRs that the MPLS LSP passes.

Platform Description N/A

1.36 Propagate-release

Use this command to enable label release. Use the **no** form of this command to restore the default setting, and then no label release messages are transmitted.

propagate-release

no propagate-release

Parameter Description

Parameter	Description
N/A	N/A

Defaults The function is disabled by default.

Command Mode **config-mpls-router** mode.

Usage Guide The command execution does not influence the label release messages previously received from the LDP instance, only the ones received later.

Configuration Examples The following command enables label release of the LDP instance:

```
FS(config)# mpls router ldp
FS(config-mpls-router)# propagate-release
```

Related Commands

Command	Description
show mpls ldp parameters	Dsiplays the LDP configuration parameters under all or specified VRFs.

Platform Description N/A

1.37 Route Wait Label-mapping

Use this command to set the label mapping delay for route update. Use the **no** or **default** form of this command to restore the default setting.

route wait label-mapping *seconds*

no route wait label-mapping

default route wait label-mapping

Parameter Description

Parameter	Description
seconds	Label mapping delay for route update, in the range from 0 to 65535 seconds.

Defaults The default is 120 seconds.

Command Mode Global configuration mode

Usage Guide When IP routes update, LDP will delete the LSP corresponding to the next hop even though the LSP may not be created. The traffic is interrupted and will not recover until the new LSP is created. With this command configured, if the new LSP corresponding to the next hop is not created, LDP will delete the old LSP after a delay. If the new LSP is created during this time, traffic is switched to this LSP. Otherwise, the old LSP is deleted.

Configuration Examples The following example sets the label mapping delay for route update to 100 seconds.

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)# mpls router ldp
FS(config-mpls-router)#route wait label-mapping 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.38 Session Protection

Use this command to configure session protection for LDP. Use the **no** form of this command to restore the default setting.

session protection [**for acl** *acl_name*] [**duration** { **infinite** | *seconds* }]

no session protection [**for acl**] [**duration**]

Parameter Description

Parameter	Description
-	Enable or disable session protection for an LDP instance if no parameter is carried.
for acl *acl_name*	(Optional) Configure ACL rules. Only the LDP sessions whose neighbors' LSR IDs comply with the specified ACL rules are protected.
duration	(Optional) Configure the session protection period. When link failure cause that there is no Hello adjacency of the associated interface, the session protection is performed. The LDP extended Hello adjacency maintains the LDP session within the protection period.
infinite	During the session protection period, the LDP extended Hello adjacency maintains the LDP session all the time.
seconds	Configure the session protection period, which ranges from 30 to 2147483 in seconds.

Defaults

Session protection of an LDP instance is disabled.

No ACL rule is specified and all LDP sessions under the LDP instance are protected.

The default session protection period is 86400s (24 hours).

Command Mode

config-mpls-router mode

Usage Guide

Use this command to enable or disable session protection of an LDP instance or modify the parameters of session protection. The command usage is as follows:

Use the **session protection** command to enable session protection for an LDP instance and use the **no session protection** command to disable this function.

Add the ACL parameter if you need to protect only specified LDP sessions whose neighbors' LSR IDs comply with the ACL rule are protected.

The session protection processes only standard ACL rules, that is only the ACL rules created by the **ip access-list standard** command are processed.

If no ACL rule is specified, all LDP sessions under the LDP instance will be protected.

If ACL rules are specified, only the LDP sessions with permitted neighbors' LSR IDs are protected.

The ACL rule name is specified when session protection is configured. However, if you have not created the ACL rule, that is the ACL rule does not exist, the system will deny all LDP sessions. That is the system will protect no LDP session under this LDP instance.

- Configure the ACL rule by using the key word **for acl** or modify the default period of session protection by using the key word **duration**. The parameters take effect immediately after modification. Use the **no** form of the command to restore specified parameters to the default values. Only the latest configuration is saved.
- When link failure caused that no Hello adjacency exists for the associated interface, the session protection is performed. The LDP extended Hello adjacency maintains the LDP session within the protection period. However, if the holdtime of the extended Hello adjacency or the keepalive of the session is timeout during the period, the session restoration will fail.
- Enable this feature on LSRs at both ends, so that the LDP session protection function works normally. You can enable this feature on a supported LSR and configure another LSR to receive and respond to the extended Hello packet if an LSR does not support this feature (configure the **neighbor** *ip-address* command to specify extended peers or configure the **discovery targeted-hello accept** command to receive and respond to the extended Hello packet).

The command used to enable or disable session protection of an LDP instance is mutually independent with the command used to configure session protection parameters.

For example, after session protection of an LDP instance is enabled by the **session protection** command, you can protect sessions that comply with the rule acl_1 by configuring the **session protection for acl** *acl_1* command.

Type the **no session protection for acl** command to remove the session protection related to ACL rule configurations without affecting session protection of an LDP instance. Similarly, you can enter the **no session protection** command to disable session protection of an LDP instance without affecting the configuration of ACL rules of session protection (the configuration of ACL rules is saved but does not take effect because session protection of an LDP instance is disabled).

The configuration of the time parameter of session protection is similar.

The configurations of different parameters of session protection will combine while the configurations of the same parameter will override. That is, only the latest configuration of the same parameter is saved, without affecting the configurations of other parameters.

Configure the **session protection for acl** *acl_1* command to only protect sessions that comply with the rule acl_1.

At this time, you can enter the **session protection duration** *100* command to configure the session protection period as 100s. Because the configuration of different parameters will combine instead of overriding the previous specified ACL filtering rules, the **session protection duration** *100* command is equal to entering the **session protection for acl** *acl_1* **duration** *100* command.

Enter the **session protection for acl** *acl_2* command to only protect sessions that comply with the rule acl_2. The previous ACL rules are overridden without affecting the time configuration of session protection. The configuration is equal to entering the **session protection for acl** *acl_2* **duration** *100* command.

Use the **no** form of the commands to restore corresponding parameters to the default values. Similarly, restoring a parameter to the default value does not affect the configuration of other parameters.

After entering the session protection status because a link between sessions fails, use the **clear mpls ldp neighbor** command to disconnect the current LDP session if it is unnecessary to continue to protect this session.

The modification of session protection time can take effect immediately. If a session is being protected, the protection timer is adjusted in the following ways:

From time1 to time2 (note that time1 and time2 are non-infinite and similarly hereinafter), the current protection timer is ended and a new protection timer is started. The time is time2 minus the current protected time. If the current protected time is greater than time2, enable a one-second timer.

From time1 to infinite, and the protection timer is ended.

From **infinite** to time2, and the protection timer is enabled and the time is time2.

Configuration Examples

The following example enables session protection of an LDP instance.

```
FS(config)# mpls router ldp
FS(config-mpls-router)# session protection
```

The following example enables session protection of an LDP instance under the VRF instance vpna.

```
FS(config)# mpls router ldp vpna
FS(config-mpls-router)# session protection
```

The following example configures to protect only the LDP sessions whose LSR IDs are 10.10.10.10.

```
FS(config)# ip access-list standard acl_1
FS(config-std-nacl)# permit host 10.10.10.10
FS(config-std-nacl)# exit
FS(config)# mpls router ldp
FS(config-mpls-router)# session protection for acl acl_1
```

The following example configures the ACL rule acl_1 for LDP session protection.

```
FS(config)# mpls router ldp
FS(config-mpls-router)# no session protection for acl acl_1
```

The following example disables session protection of the LDP instance.

```
FS(config)# mpls router ldp
FS(config-mpls-router)# no session protection
```

Related Commands

Command	Description
clear mpls ldp neighbor	Disconnects the specified LDP session forcibly and rebuild a new LDP session.
show mpls ldp neighbor	Displays information about LDP sessions under all or specified VRFs, and check whether an LDP session has the extended LDP adjacency.
show mpls ldp neighbor detail	Displays information about LDP sessions under all or specified VRFs, and check whether an LDP session has session protection.
show mpls ldp parametes	Displays configuration parameters of an LDP instance and whether the LDP session protection function is enabled.

Platform Description

1.39 Show Mpls Forwarding-table

Use this command to display the MPLS forwarding table.

show mpls forwarding-table [**summary** | [[*ip-address/mask* | **label** *label* | **interface** *interface-name* | **next-hop** *ip-address*] | [**ftn** [**ip** | **vc**] | **ilm** [**ip** | **vc**]] | { **vrf** *vrf-name* | **global** } [**ftn** | **ilm**]] [**frr**] [**detail**]]

Parameter Description

Parameter	Description
-	Displays the whole MPLS forwarding table.
summary	Displays the statistics information of MPLS process forwarding.
ip-address/mask	Displays ILM and FTN entries of a specified FEC.
label *label*	Displays the ILM entry of a specified label.
interface *interface-name*	Displays the MPLS forwarding entry (ILM and FTN) of a specified egress.
next-hop *ip-address*	Displays the MPLS forwarding entry (ILM and FTN) of a specified next-hop address.
ftn	Displays an FEC mapping entry.
ilm	Displays a label forwarding entry.
ip	Displays the MPLS forwarding entry of an IP application (including unicast route and L3 VPN).
vc	Displays the MPLS forwarding entry added by the VC.
vrf *vrf-name*	Displays the MPLS forwarding entry related to a VRF.
detail	Displays the details about the MPLS forwarding entry.
global	Displays global non-VRF MPLS forwarding entries, excluding FTN and ILM

	entries of VC.

Defaults No parameter is carried, indicating that all MPLS forwarding entries are displayed.

Command Mode Privileged EXEC mode

Usage Guide Use the **show mpls forwarding-table** command to show information about all MPLS forwarding entries (including ILM and FTN entries).

Use the **show mpls forwarding-table** *ip-address/mask* command to show information about specified MPLS forwarding entries (including ILM and FTN entries).

Use the **show mpls forwarding-table label** *label* command to show the ILM forwarding entries of a specified label.

Use the **show mpls forwarding-table interface** *interface-name* command to show the MPLS forwarding entries of a specified egress (including FTN and ILM entries).

Use the **show mpls forwarding-table next-hop** *ip-address* command to show the MPLS forwarding entries of a specified next hop (including FTN and ILM entries).

Use the **show mpls forwarding-table detail** command to show details about all MPLS forwarding entries (including ILM and FTN entries).

Use the **show mpls forwarding-table vrf** command to show all MPLS forwarding entries (including ILM and FTN entries) which belong to a VRF.

Use the **show mpls forwarding-table vrf** *vrf-name* **ftn** command to show information about all FTN entries which belong to a VRF.

Use the **show mpls forwarding-table vrf** *vrf-name* **ilm** command to show information about all ILM entries which belong to a VRF.

Use the **show mpls forwarding-table ftn ip** command to show FTN entries of unicast routes and L3 VPN application.

Use the **show mpls forwarding-table ilm ip** command to show ILM entries of unicast routes and L3 VPN application.

Use the **show mpls forwarding-table ftn** command to show all FTN entries.

Use the **show mpls forwarding-table ilm** command to show all ILM entries.

Use the **show mpls forwarding-table ftn detail** command to show details about all FTN entries.

Use the **show mpls forwarding-table ilm detail** command to show details about all ILM entries.

Configuration Examples The following example displays all MPLS forwarding entries.

```
FS#showmpls forwarding-table
Label Operation Code:
PH--PUSH label
PP--POP label
SW--SWAP label
SP--SWAP topmost label and push new label
DP--DROP packet
PC--POP label and continue lookup by IP or Label
PI--POP label and do ip lookup forward
```

```
PN--POP label and forward to nexthop
PM--POP label and do MAC lookup forward
PV--POP label and output to VC attach interface
IP--IP lookup forward
labellabelinterface
--      1025            PH 119.1.1.0/24(V)    Gi3/19          10.0.10.1
--      1026            PH 120.1.1.0/24    Gi3/18             10.0.2.1
--      imp-null      PH 130.1.1.0/24    Gi3/18             10.0.2.1
--       3000          PH    2010::1/128        Gi1/0           ::FFFF:3.3.3.3
1025      1027            SP 100.1.1.0/24            Vl8                     192.1.2.1
10261028            SW 120.1.2.0/24Gi3/19               10.0.2.1
1027imp-null      PP 121.1.1.0/24          Fa3/1               11.0.0.1
-- --                    IP 167.168.195.0/24 Fa3/2120.1.1.1
1028      --                  PC 167.168.196.0/24 --                        --
1029      --                  PN 167.168.197.0/24(V) Vl4                1.0.0.1
1030      --                  PI VRF(vpna)                  --                      --
1031      --                  PV VC(20,1.1.1.1)      Vl5                      --
--         1029               PH VC(20,1.1.1.1)        Vl10                    192.1.2.1
1032      --                  PI 192.1.1.0/24(V)    Vl101            172.2.1.2
1033      1030                SW 193.1.1.0/24(V)    Vl10210.2.1.2
```

Local label: It is the label distributed by this forwarding equivalence class device to other devices, namely the incoming label of an ILM entry. If there is no incoming label for an FTN entry, "--" is displayed.

Outgoing label: It is the outgoing label of an ILM or FTN label. "--" indicates that an ILM or FTN label has no outgoing label. If impl-null is shown, it indicates an implicit null label 3 and that this label is not carried in the forwarding of packets.

OP: indicates an operation behavior that a packet hits the incoming label and outgoing label of a forwarding entry (ILM or FTN), and the behavior includes the following:

Field	Description
PH	An IP packet needs to be added with labels (perhaps one to three labels) and then forwarded to the next hop after hitting the entry. Use the **show mpls forwarding-table detail** command to view the labels and the number of labels added. If *imp-null* is displayed for an outgoing label, the imp-null label is not added in the actual forwarding process.
PP	An MPLS packet needs to remove the label and be forwarded to the next hop directly after hitting the entry, that is, perform forwarding of the last but one hop.
SW	An MPLS packet needs to exchange labels and be forwarded to the next hop directly after hitting the entry.

SP	An MPLS packet needs to exchange top labels, added with a label, and be forwarded to the next hop after hitting the entry. Exchanged labels are displayed for the outgoing label field. Use the **show mpls forwarding-table detail** command to the labels added and the number of labels. One or two layers of labels may be added.
PN	An MPLS packet needs to remove the label and be forwarded to the next hop directly after hitting the entry.
PI	An MPLS packet needs to remove all labels and be forwarded according to the destination IP address after hitting the entry.
PC	An MPLS packet removes the top label and is forwarded according to the query result in the label forwarding table after hitting the entry. An IP packet is forwarded according to the destination IP address.
PM	An MPLS packet needs to remove the label and is forwarded according to the destination MAC address of the inner packet (VPLS application) after hitting the entry.
PV	An MPLS packet needs to remove the label and is forwarded from a specified egress (VPWS application) after hitting the entry.
IP	An MPLS packet needs to be forwarded across VRFs after hitting the entry. This type of entry is the forwarding entry across VRFs of one VPN.
DP	A packet is discarded after hitting the entry.

FEC: Two situations are involved:

For an FTN entry ("--" is displayed if it has no incoming label), the IP address and mask are displayed for the FEC field if the FTN is for IP route. If (V) is carried behind, the FTN belongs to a VRF. For a VC FTN, VC ID and VC peer IP are displayed for the FEC field.

For an ILM entry (it has an incoming label), if the label is for IP route, the IP address and mask are displayed for the FEC field. If (V) is carried behind, the ILM belongs to a VRF. If the label is for a VRF of a L3 VPN (that is, each VRF of a VPN is allocated with a label), the VRF name is displayed for the FEC field, such as VRF (vpna) in the preceding example. If the label is for VC, VC ID and VC peer IP are displayed for the FEC field, such as VC (20,1.1.1.1) in the preceding example.

Outgoing interface: indicates the outgoing interface for packet forwarding and uses the abbreviated name of the interface.

Nexthop: indicates the next hop for packet forwarding. "--" is displayed for a forwarding entry with an ineffective next hop address.

The following example displays statistics information of the process forwarding module.

```
FS# show mpls forwarding-table summary
FS# show mpls forwarding-table summary

MPLS forwarding is ON
 ILM changes:120
 ILM failed changes :0
 IPv4 FTN changes:27
 IPv4 FTN failed changes:0
 IPv6 FTN changes:0
```

```
 IPv6 FTN failed changes:0
 L2 FTN changes:0
 L2 FTN failed changes:0

MPLSREF Packet Forwarding Statistics:
 label in:                          71
 label to label:                    0
 label to frag:                     0
 label frag unsupport drop:         0
 label global unsupport drop: 0
 label ttl expire drop:             0
 label invalid label drop:          0
 label invalid payload type:        0
 label invalid ilm drop:            0
 label invalid intf drop:           0
 label intf unsupport mpls drop: 0
 frag in:                           0
 frag out:                          0
 frag drop:                         0
 label to ip:                       26
 label adjv4 exception:             0
 ip local in:                       0
 ip in:                             157
 ip to mpls:                        157
 ip to frag:                        0
 ip frag unsupport drop:            0
 ip global unsupport drop:          0
 ip ttl expire drop:                0
 ip invalid nhlfe drop:             0
 ip invalid intf drop:              0
 ip intf unsupport mpls drop: 0
 ip adj except:                     0
 label to ipv6:                     0
 label adjv6 exception:             0
 ip6 in:                            0
 ip6 local in:                      0
 ip6 to mpls:                       0
 ip6 to frag:                       0
 ip6 frag unsupport drop:           0
 ip6 global unsupport drop:         0
 ip6 ttl expire drop:               0
 ip6 invalid nhlfe drop:            0
 ip6 invalid intf drop:             0
 ip6 intf unsupport mpls drop: 0
```

```
ip6 adj except:                0
vc ftn in:                     0
vc ftn drop:                   0
label to vpws:                 0
vpws ac in:                    0
vpws ac to vc ftn:             0
vpws ac to arp:                0
vpws ac drop:                  0
vpws ac arp drop:              0
vpws vc in:                    0
vpws vc to ac:                 0
vpws vc invalid drop:          0
vpws vc invalid adjv4 drop:    0
vpws vc invalid intf drop:     0
label to vpls:                 0
vpls ac in:                    0
vpls ac drop:                  0
vpls in:                       0
vpls to ac:                    0
vpls to vc ftn:                0
vpls to broadcast:             0
vpls same vc drop:             0
vpls mac learning drop:        0
vpls broadcast drop:           0
vpls other drop:               0
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.40 Show Mpls Label-pool

Use this command to show the usage of the label pool in various label spaces. You can show the data of all the label spaces, or that of a specific label space by specifying a label space number.

show mpls label-pool [*label_space*]

Parameter Description

Parameter	Description
label_space	Specifies the label space whose label pool is to be shown.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to show the usage of the label pools of all label spaces or a specific label space, including label pool size, maximum/minimum label value, and allocation of each label pool. At present, only the global label space is supported.

Configuration Examples

```
FS# show mpls label-pool
label space: 0
label pool bucket size 512
min label 16, max label 1048575
label block used 2, free 2046
status codes: (s) – stale
CLI: 0      , 1          (Include label [16,1023], reserved)
LDP: 3      , 4 (s)
```

Related Commands

Command	Description
label-switching	Enables label switching.

Platform Description N/A

1.41 Show Mpls Ldp Bindings

Use this command to show the LDP label binding information, which can be filtered according to VRF, FEC prefix, label value, remote binding, or local binding.

show mpls ldp bindings [**all** | **vrf** *vrf-name*] [*ip-address* | *mask* | **label** *label*] [**remote** | **local**]

Parameter Description

Parameter	Shows
all	Label binding information under all VRFs.
vrf *vrf-name*	Label binding information under specified VRFs.
ip-address | *mask*	Label binding information of specified FECs.
label *label*	Label binding information of specified label values, ranging from 0 to 1048575.
remote	Remote label binding information received from the LDP peer.
local	Label binding information sent locally.

Defaults No parameter is carried, indicating that all label binding information under the global VRF is shown.

Command Mode Privileged EXEC mode

Usage Guide

Display the FEC and label binding information.

Use this command to display:

Working status of the LDP;

Whether the LDP has normally bound a label to an FEC

Specific label value of bound to an FEC

Whether the binding is local binding or remote binding.

If no VRF is specified, label binding information under the global VRF is displayed.

Configuration Examples

The following example displays label database informaiton under the global VRF:

```
FS# show mpls ldp bindings
Default VRF:
  lib entry: 2.2.2.2/32
      local binding:    to lsr:10.20.10.10:0,label: imp-null
      remote binding: from lsr:10.20.10.10:0,label: 16 (not in FIB)
  lib entry: 3.3.3.3/32, (IA)
      local binding:    to lsr:      10.20.10.10:0,label: 1028
      remote binding: from lsr: 10.20.10.10:0,label: 1026
```

Field	Description
IA	Identifies the LDP entry added by the longest matched routing.
local binding	Label binding information distributed by an LSR for an FEC. *not in FIB* indicates that the information is not added to the FIB.
remote binding	Remote label binding information received from the LDP peer. *not in FIB* indicates that the information is not added to the FIB.

Related Commands

Command	Description
show mpls ldp neighbor	Displays the LDP session status.

Platform Description

N/A

1.42 Show Mpls Ldp Discovery

Use this command to show information of the neighbor discovered by LDP under all or specified VRFs.

show mpls ldp discovery [**all** | **vrf** *vrf-name*] [**detail**]

Parameter Description

Parameter	Shows
all	Information of the neighbor discovered by LDP under all VRFs.
vrf *vrf-name*	Information of the neighbor discovered by LDP under specified VRFs.
detail	Details of the neighbor discovered by LDP.

Defaults

N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to show the interfaces on which LDP neighbors are discovered, the LDP neighbors discovered, the Hello packet source address of the LDP neighbor, and Hello packet keepalive time. If no VRF is specified, the command shows information of all neighbors discovered by LDP under the global VRF.

Configuration Examples The following example displays information of the neighbor discovered by LDP under the global VRF.

```
FS# show mpls ldp discovery
Default VRF:
 Local LDP Identifier:
     8.8.8.8:0
     Discovery Sources:
     Interfaces:
         GigabitEthernet 2/1 (ldp): xmit/recv
             LDP Ident: 10.30.10.10:0
         GigabitEthernet 2/2 (ldp): xmit
     Targeted Hellos:
         8.8.8.8 -> 10.5.0.1 (ldp): active, xmit
         8.8.8.8 -> 10.30.10.10 (ldp): active/passive, xmit
         2.2.2.2 -> 10.30.10.10 (ldp): passive, xmit/recv
             LDP Ident: 10.30.10.10:0
```

Field	Description
Local LDP Identifier	LDP identifier for the local router.
Interfaces	Interface information lists discovered by the active LDP.
xmit	**Hello packets were sent on an interface.**
recv	**Hello packets are received on an interface.**
Targeted Hellos	The sending path list of all targeted Hello packets.
active	The local LSR actively sends targeted Hello packets.
passive	The neighbor LSR actively sends targeted Hello packets. The local LSR is configured to respond to the targeted Hello packet sent by the neighbor LSR.

Related Commands

Command	Description
show mpls ldp interface	Displays the LDP-enabled interface information.
neighbor *ip-address*	Creates an LDP extended peer.

Platform Description N/A

1.43 Show Mpls Ldp Interface

Use this command to display information about interfaces enabled with LDP under all or specific VRFs.

show mpls ldp interface [**all** | **vrf** *vrf-name* | *interface-name*]

Parameter Description

Parameter	Description
all	Displays information about interfaces enabled with LDP under all VRFs.
vrf *vrf-name*	Displays information about interfaces enabled with LDP under specified VRFs.
interface-name	Displays information about specified interfaces.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

Use this command to show the device's interfaces enabled with LDP and the Up/Down state. If no VRF is specified, information of all interfaces under the global VRF is displayed.

Configuration Examples

The following example displays information about the interfaces enabled with LDP under the global VRF.

```
FS# show mpls ldp interface
Default VRF:
Interface                    Operational    Status
GigabitEthernet 2/1          Yes            UP
GigabitEthernet 2/2          No             DOWN
GigabitEthernet 2/3          Yes            UP
```

Field	Description
Operational	Whether an interface is enabled with LDP.
Status	Interface status.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.44 Show Mpls Ldp Neighbor

Use this command to display LDP session information under all or specified VRFs.

show mpls ldp neighbor [**all** | **vrf** *vrf-name*] [*ip-address*] [**detail**]

Parameter Description

Parameter	Description
all	Displays LDP session information under all VRFs.

vrf *vrf-name*	Displays LDP session information under specified VRFs.
ip-address	Displays LDP session information of specified LDP peers under specified or all VRFs.
detail	Displays detailed LDP session information.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to display all LDP neighbors, such as the TCP connection port between the local LDP and peer LDP, LDP status, and received/sent message counts.

Configuration Examples The following example displays LDP neighbor information under the global VRF.

```
FS# show mpls ldp neighbor
Default VRF:
 Peer LDP Ident: 10.20.10.10:0; Local LDP Ident: 8.8.8.8:0
        TCP connection: 10.20.10.10.62488 - 8.8.8.8.646
        State: OPERATIONAL; Msgs sent/recv: 42/45; UNSOLICITED
        Up time: 00:33:49
        Graceful Restart enabled; Peer reconnect time (msecs): 300000
    Down Neighbor Information:
        Status: recovering (115 seconds left)
        LDP discovery sources:
   Link Peer on GigabitEthernet 2/1,Src IP addr:192.168.201.220
        Targeted Hello 8.8.8.8 -> 10.20.10.10
        Addresses bound to peer LDP Ident:
            10.20.10.10      192.168.201.220 192.168.198.1      10.5.0.1
```

The following example displays details about the LDP session under the global VRF.

```
FS# show mpls ldp neighbor detail
Default VRF:
      Peer LDP Ident: 10.20.10.10:0; Local LDP Ident: 8.8.8.8:0
      TCP connection: 10.20.10.10.62488 - 8.8.8.8.646
State: OPERATIONAL; Msgs sent/recv: 6/7; UNSOLICITED
      Up time: 00:35:15
      Graceful Restart enabled; Peer reconnect time (msecs): 300000
      Down Neighbor Information:
      Status: recovering (115 seconds left)
      LDP discovery sources:
      Targeted Hello 8.8.8.8 -> 10.20.10.10, active, passive;
      Hold time: 45 sec, hello interval: 5 sec
      Addresses bound to peer LDP Ident:
      1.1.10.2          1.1.20.2          20.20.20.20
      Our is PASSIVE
```

```
KA hold time: 45 sec; Proposed local/peer: 45/45 sec
Peer distribute label mode: UNSOLICITED
Peer loop detection: Disabled
Peer Path Vector Limit: 0; Max PDU Length: 4096
LDP Session Protection enabled, state: Protecting
acl: acl_1, duration: 300 seconds
holdup time remaining: 60 seconds
```

Field	Description
Peer LDP Ident	Peer LDP identifier of an LDP session
Local LDP Identifier	LDP identifier of the local router
TCP connection	TCP connection that supports the LDP session
State	LDP session state
Msgs sent/recv	Count of LDP messages which are sent to and received from the session peer.
UNSOLICITED&ONDEMAND	Label distribution mode
Up time	Time when an LDP session is established
Graceful Restart enabled	Indicates that Graceful Restart is enabled.
Peer reconnect time (msecs)	Reconnect time of the peer LDP session
Down Neighbor Information	Neighbor Down information
Status	Indicates that the neighbor is recovering (with 115 seconds to go).
LDP Session Protection enabled	Enable LDP session protection. The LDP sessions that are enabled with session protection have three states: **Incomplete, Ready and Protecting**. **Incomplete** indicates that the extended Hello adjacency of session protection is not set up. **Ready** indicates that the session protection is ready. **Protecting** indicates that the link is disconnected and the session is being protected.
Acl	ACL rule specified by the session protection.
duration	Configured session protection time.
Holdup time remaining	Remaining time of the session protection timer.

Related Commands

Command	Description
show mpls ldp discovery	Displays the information of the neighbor discovered by LDP.

Platform Description N/A

1.45 Show Mpls Ldp Parameters

Use this command to display the LDP configuration parameters under all or specified VRFs.

show mpls ldp parameter [**all** | **vrf** *vrf-name*]

Parameter Description

Parameter	Description
all	Displays LDP configuration parameters under all VRFs.
vrf *vrf-name*	Displays LDP configuration parameters under specified VRFs.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

Use this command to show various attribute information of LDP, including the LSR ID, transport address, loop detection mechanism, label distribution and control mode, label retention mode, interval and holdtime of the Hello packet for the extended mechanism, as well as the interval and holdtime of the Keepalive packet. If no VRF is specified, LDP configuration parameters under the global VRF are displayed.

Configuration Examples

The following example displays the configuration parameters of LDP under the global VRF.

```
FS# show mpls ldp parameters
Default VRF:
  Protocol version: 1
    Ldp Router ID: 1.1.1.1
    Control Mode: INDEPENDENT
    Propogate Release: FALSE
    Label Merge: TRUE
    Label Retention Mode: LIBERAL
    Loop Detection Mode: off
Inter Area Lsp: TRUE
Session Protection: TRUE
Targeted Session Keepalive HoldTime/Interval: 180/60 sec
    Targeted Hello HoldTime/Interval: 45/5 sec
    LDP initial/maximum backoff: 15/120 sec
```

Related Commands

Command	Description
ldp router-id	Configures the LDP router ID.
ldp-control-mode	Configures the LDP control mode.
ldp-label-retention -mode	Configures the label retention mode.
propagate-release	Configures the label propagate release switch.
label-merge	Configures the label merge switch.
loop-detection-mode	Configures loop detection.
Inter-area-lsp	Configures inter-area LSP for LDP.
session protection	Configures LDP session protection.

Platform Description N/A

1.46 Show Mpls Ref

Use this command to display information about IPv4 FTN of MPLS REF.

show mpls ref ftn-ipv4 [**global** | **vrf** *vrf_name*] [*ip_address / mask* [**detail**]]

Use this command to display information about IPv6 FTN of MPLS REF.

show mpls ref ftn-ipv6 [**global** | **vrf** *vrf_name*] [*ipv6_address / mask* [**detail**]]

Use this command to display information about ILM of MPLS REF.

show mpls ref ilm [**in-label** *label* [**detail**] | **summary**]

Use this command to display information about the next hop of MPLS REF.

show mpls ref nhlfe [[*nhlfe_id* [**detail**]] | **summary**]

Use this command to display the global information about MPLS REF.

show mpls ref summary

Parameter Description

Parameter	Description
global	Displays MPLS REF information in the global VRF.
vrf *vrf-name*	Displays MPLS REF information in the specified VRF.
ip-address / mask	Displays information about the specified IPv4 FEC.
ipv6-address / mask	Displays information about the specified IPv6 FEC.
in-label *label*	Performs filtering according to the in-label, in the range from 16 to 1048575.
nhlfe_id	ID of next hop label forwarding entry (NHLFE), in the range from 1 to 4294967295.
detail	Displays MPLS REF table details
summary	Displays global information

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to display information about the MPLS REF table, including IPv4 FTN, IPv6 FTN, ILM, next hop and global information.

Configuration Examples The following example displays information about IPv4 FTN of MPLS REF.

```
FS# show mpls ref ftn-ipv4
VRF     FEC                                NHLFE ID     NHLFE Type
0       2.2.2.2/32                         32767        single path
```

Field	Description
VRF	VRF that the FTN belongs to.
FEC	Forwarding equivalence class
NHLFE ID	ID of the next hop label forwarding entry

NHLFE TYPE	Type of the next hop label forwarding entry, either uni-path or multi-path.

The following example displays information about ILM of MPLS REF.

```
FS# show mpls ref ilm
In Intf In Label Type     Pathnum Opcode          VRF     VC ID       Out Intf Nexthop
0        112     single 1       pop              0       0           3        10.1.1.1
```

Field	Description
In intf	Incoming interface value, The label is globe-based label space, so the incoming interface value is 0 constantly.
In label	Incoming label.
Pathnum	The number of paths.
Opcode	Label operation type.
VRF	VRF value.
VC_ID	VC ID, used for L2 VPN forwarding.
Out Intf	Outgoing interface ID.
Nexthop	Next hop IP address.

The following example displays NHLFE information.

```
FS# show mpls ref nhlfe
ID      Type      Pathnum    Opcode          Intf    ADJ ID    Nexthop
32767   single    1          push            1       20        172.18.1.2
```

Field	Description
ID	ID of the next hop label forwarding entry.
TYPE	Type of the next hop label forwarding entry, either uni-path or multi-path.
Pathnum	The number of paths.
Opcode	Label operation type.
Intf	Outgoing interface.
ADJ_ID	Adjacent list ID.
Nexthop	Next hop IP address.

The following example displays global information about MPLS REF.

```
FS# show mpls ref summary
MPLSREF Summary:
 ctrl pid: 4294963185
 ctrl sn: 0
 global enable: false
 vpn ttl propagate: true
 public ttl propagate: true
 # of labels popped before icmp reply: 0
 fragment enable: true
 loadbalance scheme: per-flow
```

Field	Description
ctrl pid	ID of MPLS process.
ctrl sn	Serial number of MPLS process.

global enable	Whether to enable MPLS forwarding globally.
vpn ttl propagate	Whether to enable the TTL propagate function on VPN packets.
public ttl propagate	Whether to enable the TTL propagate function globally.
of labels popped before icmp reply	The number of labels popping up before ICMP replies.
loadbalance scheme	Load balance scheme.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.47 Show Mpls Rib

Use this command to display MPLS RIB information.

show mpls rib [**all** | **vrf** *vrf-name*]

Parameter Description

Parameter	Description
all	Displays MPLS routing information under all VRFs.
vrf *vrf-name*	Displays MPLS routing information under specified VRFs.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to display MPLS routing information as follows:

If no parameter is specified in this command, MPLS routing information under the global VRF is displayed.

Configuration Examples The following example displays MPLS routing information under the global VRF.

```
FS#show mpls rib
Status codes: m – main entry, b – backup entry, * – active, s – stale.
Default VRF:
LSP Information        Total
STATIC LSP               0
LDP LSP                  3
RSVP LSP                 0
BGP LSP                  0
L3VPN LSP                0
LDP LSP:
-----------------------------------------------------------------
FEC                    In/Out Label        In/Out IF          Nexthop
119.1.1.0/24        -/1025                 -/Gi3/19           10.0.10.1
```

```
m* 120.1.1.0/24      -/1026              -/Gi3/18          10.0.2.1
b    120.1.1.0/24      -/1031              -/Gi3/19          10.0.10.1
m* 120.1.2.0/24      1027/1032           Gi3/10/Gi3/18     10.0.2.1
b    120.1.2.0/24      1027/1033           Gi3/10/Gi3/19     10.0.10.1
-----------------------------------------------------------------------
```

Field	Description
LSP Information	● STATIC LSP: This type of LSP is configured manually. ● LDP LSP: This type of LSP is established through LDP. ● RSVP LSP: This type of LSP is an MPLS TE tunnel established through RSVP-TE. ● BGP LSP: This type of LSP is established through BGP for IPv4 private network BGP routes or IPv4 public network BGP routes. ● L3VPN LSP: This type of LSP is established for received VPNv4 routes through BGP.
Total	Displays the total amount of LSP information related to a VRF.
FEC	Its value is usually the destination address of an LSP.
In/Out Label	Value of the incoming/outgoing label
In/Out IF	Name of the incoming/outgoing interface
Nexthop	Next hop

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.48 Show Mpls Summary

Use this command to display MPLS global configuration information.

show mpls summary

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to view the basic information about MPLS, including maximum/minimum available labels, information about each label space, label space used by each interface, and total number of interfaces with MPLS enabled.

Configuration Examples

The following example displays MPLS global configuration information.

```
FS# show mpls summary
Per label-space information://Show information about each label space, with only label space 0 supported at present.
Label-space 0 is using minimum label:16 and maximum label:1048575//Label scope allowed by this label space
Label-switching Interface://Display the interface enabled with label switching
Interface                    Label space
GigabitEthernet 4/1          0
GigabitEthernet 4/2          0
Total number of mpls interface is 2
```

Related Commands

Command	Description
label-switching	Enables label switching.

Platform Description

N/A

1.49 Snmp-server Enable Traps Mpls

Use this command to enable Trap transmission of MPLS. Use the **no** form of this command to restore the default setting.

snmp-server enable traps mpls { **xc** | **ldp** | **vpn** }

snmp-server enable traps mpls xc [**xc-up**] [**xc-down**]

snmp-server enable traps mpls ldp [**pv-limit**] [**session-down**] [**session-up**]

no snmp-server enable traps mpls xc [**xc-up**] [**xc-down**]

no snmp-server enable traps mpls ldp [**pv-limit**] [**session-down**] [**session-up**]

no snmp-server enable traps mpls l3vpn [**max-threshold**] [**mid-threshold**] [**max-thresh-cleared**] [**vrf-up**] [**vrf-down**]

Parameter Description

Parameter	Description
xc	Trap transmission switch for MPLS route change
ldp	Trap transmission switch for LDP
l3vpn	Trap transmission switch for L3 VPN
xc-up	Trap transmission switch for MPLS route change XC Up
xc-down	Trap transmission switch for MPLS route change XC Down
pv-limit	Trap transmission switch for mismatch of path vectors
session-down	Trap transmission switch for LDP sessions disconnected
session-up	Trap transmission switch for LDP sessions created
max-threshold	Trap transmission switch for VRF maximum route threshold
mid-threshold	Trap transmission switch for VRF middle route threshold
max-thresh-cleared	Trap transmission switch for cleared VRF maximum route threshold

vrf-up	Trap transmission switch for VRF Up
vrf-down	Trap transmission switch for VRF Down

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

There are two types of XC traps:

XC Up trap, indicating that an effective ILM or FTN entry is generated.

XC Down trap, indicating that an ILM or FTN entry is deleted.

The user can enable the preceding two types of traps at the same time by using the **snmp-server enables mpls xc** command or enable either type by using the **snmp server enables mpls xc** [**xc-up**] [**xc-down**] command.

There are three types of LDP traps:

LDP session Up trap, which is sent when an LDP session is established.

LDP session Down trap, which is sent when an LDP session is disconnected.

When initialization messages (INIT) are exchanged after an LDP session is established, a trap is sent if the value of the path vector list length used in loop detection does not match that advertised by the neighbor.

The user can enable the preceding three types of traps at the same time by using the **snmp-server enables mpls ldp** command or enable any of them by using the **snmp server enables mpls ldp** [**pv-limit**] [**session-up**] [**session-down**] command.

There are the following types of L3 VPN traps:

Trap identifying VRF Up or Down: When an VRF instance has an associated interface Up, the VRF instance is considered to be in the Up state. In this case, a VRF Up trap needs to be sent. When a VRF instance has all its associated interfaces Down or has no associated interface, a VRF Down trap needs to be sent.

Trap of VRF route pre-alert: When the number of VRF routes exceeds the middle route capacity threshold, a VRF MidThreshExceed trap is sent. When the number of VRF routes exceeds the maximum route capacity threshold, a VRF MaxThreshExceed trap is sent. In this case, a VRF MaxThreshCleared trap needs to be sent after the number of VRF routes becomes below the maximum route capacity threshold, indicating that the number of VRF routes returns to normal.

The user can enable all trap switches for L3 VPN at the same time by using the **snmp-server enables mpls l3vpn** command or any of them by using the **snmp server enables mpls l3vpn** [**max-threshold**] [**mid-threshold**] [**max-thresh-cleared**] [**vrf-up**] [**vrf-down**] command.

After MPLS Trap Transmission is enabled, to capture a trap on a host, you must use the **snmp-server host** command to specify the host to receive the trap.

Configuration Examples

The following example enables LDP Trap Transmission.

```
FS(config)#snmp-server host 192.168.10.1
FS(config)#snmp-server enable traps mpls ldp
```

Related Commands

Command	Description
snmp-server host	Sets a host for receiving traps.

Platform Description N/A

1.50 Targeted-session Holdtime

Use this command to set the keepalive holdtime for the extended mechanism. Use the **no** form of this command to restore the default setting.

target-session holdtime *seconds*

no targeted-session holdtime

Parameter Description

Parameter	Description
seconds	Sets the holdtime, in the range from *15* to 65535 in the unit of seconds.

Defaults By default, the holdtime of the LDP session built in the extended discovery mechanism is 180 seconds. The sending interval of the keepalive message is 60 seconds, which is 1/3 of the session holdtime.

Command Mode **config-mpls-router** mode

Usage Guide This command is valid for the LDP session only built in the extended discovery mechanism, not for the LDP session already set up.

Configuration Examples The following example sets the keepalive holdtime to 90 seconds for LDP sessions established by the extended mechanism:

```
FS(config)#mpls router ldp
FS(config-mpls-router)# target-session holdtime 90
```

Related Commands

Command	Description
show mpls ldp parameters	Displays the LDP global configuration parameters under all or specified VRFs.

Platform Description N/A

1.51 Traceroute Mpls

Use this command to detect an MPLS LSP hop by hop and trace the LSRs that the LSP passes.

traceroute mpls ipv4 *ip-address/mask* [**timeout** *timeout*] [**ttl** *time-to-live*] [**source** *ip-address*] [**destination** *ip-address*] [**force-explicit-null**] [**reply mode** { **ipv4 | router-alert** }] [**flags fec**] [**verbose**]

Parameter Description

Parameter	Description
ip-address/mask	IPv4 address and subnet mask length of the destination FEC to be tested

timeout *timeout*	(Optional) Specifies the timeout time for packets, ranging from 0 to 3600, 2 by default
ttl *time-to-live*	(Optional) Specifies the maximum TTL value for sending packets, ranging from 1 to 255, 30 by default
source *ip-address*	(Optional) Source address. It is the destination address when the peer sends an Echo Reply packet.
destination *ip-address*	(Optional) Specified 127/8 segment address. It is used to fill the IP header, 127.0.0.1 by default.
force-explicit-null	(Optional) Whether to forcibly add an explicit null label to the MPLS label. By default, it is not added.
reply mode { **ipv4** | **router-alert** }	(Optional) Specifies the reply mode of the Echo Request packet: **ipv4**: reply with an IPv4 UDP packet (default) **router-alert**: reply with an IPv4 UDP packet with the Router Alert option
flags fec	(Optional) Sets forcible FEC stack check.
verbose	(Optional) Displays details about Echo Reply packets. By default, the details are not displayed.

Defaults

See the preceding parameter description.

Command Mode

Privileged EXEC mode

Usage Guide

Use this command to detect an MPLS LSP hop by hop and trace the LSRs that the LSP passes. You can change some default parameter values by specifying optional parameters. In addition to the directly typed command, interactive typing mode is provided. You can enter the interactive typing mode by pressing **Enter** after typing the **traceroute mpls** command.

Configuration Examples

The following example displays the LSRs that the LSP of the FEC corresponding to 10.10.10.10/32 passes.

```
FS# traceroute mpls ipv4 10.10.10.10/32
Tracing MPLS Label Switched Path to 10.10.10.10/32, timeout is 2 seconds
            < press Ctrl+C to break >
Codes:'!' - success,'Q' - request not sent,'.'-timeout,
  'L'-labeled output interface,'B'-unlabeled output interface,
  'D'-DS Map mismatch,'F'-no FEC mapping,'f'-FEC mismatch,
  'M'-malformed request,'m'-unsupported tlvs,'N'-no label entry,
  'P'-no rx intf label prot,'p'-premature termination of LSP,
  'R'-transit router,'I'-unknown upstream index,
  'X'-unknown return code,'x'-return code 0
Type escape sequence to abort.
  0 10.3.0.8 MRU 1500 [Labels: 17 Exp: 0]
L 1 10.3.0.1 MRU 1504 [Labels: implicit-null Exp: 0] 624 ms
! 2 10.2.0.1 708 ms
```

See the **ping mpls** command for descriptions of fields.

Related Commands

Command	Description
ping mpls	Detects the connectivity of an MPLS LSP.

Platform Description

N/A

1.52 Transport-address

Use this command to configure globally the transport address used by basic LDP sessions. Use the **no** form of this command to restore the default setting.

transport-address { **interface** | *ip-address* | *interface-name* }

no transport-address

Parameter Description

Parameter	Description
interface	The primary IP address of an interface is used as the transport address for basic LDP sessions created on each interface.
ip-address	The specified IP address is used as the transport address for all basic LDP sessions.
Interface-name	The primary IP address of the specified interface is used as the transport address for all basic LDP sessions.

Defaults

The default transport address is the LSR ID of LDP.

Command Mode

config-mpls-router mode.

Usage Guide

This command is invalid for LDP sessions created by the extended discovery mechanism. The command is valid only for LDP sessions created by the basic discovery mechanism. LDP sessions created by the extended discovery mechanism always use the LSR ID of LDP as the transport address. If both an interface transport address and a global transport address are configured, the interface transport address has priority over the global transport address to take effect.

Configuration Examples

The following example configures the primary IP address of each interface as the transport address.

```
FS(config)# mpls router ldp
FS(config-mpls-router)# transport-address interface
```

Related Commands

Command	Description
mpls ldp transport-address	Configures the transport address used by basic LDP sessions created on an interface.

Platform Description

N/A

2. BGP/MPLS L3 VPN Commands

2.1 Alloc-label

Use this command to allocate label per VPN. Use the **no** or **default f**orm of this command to restore the default setting,

alloc-label { **per-vrf** | **per-route** }

no alloc-label

default alloc-label

Parameter Description

Parameter	Description
per-vrf	Allocates a label per VPN.
per-route	Allocates a label per VPN route.

Defaults

By default, a label is allocated per VRF.

Command Mode

VRF configuration mode

Usage Guide

RFC4364 outlines two label assignment methods for L3VPN: per route and per VRF. The former method rapidly forwards packets to the next hop by label by searching the ILM table, but it requires a large ILM table. For the latter method, all routes of a VRF share the label that significantly reduces the size of the ILM table, but its forwarding efficiency is lower for it searches the ILM table two times. First it searches the VRF of a packet from the ILM table, and then forwards the packet according to the destination IP address of the routing table of the VRF.

Configuration Examples

The following example configures label assignment per route for VPNA.

```
FS(config)# ip vrf VPNA
FS(config-vrf)# alloc-label per-route
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.2 Area Sham-link

Use this command to configure a sham link. Use the **no** or **default** command to restore the default setting.

area *area-id* **sham-link** *source-address destination-address* [**cost** *number*] [**dead-interval** *seconds*] [**hello-interval** *seconds*] [**retransmit-interval** *seconds*] [**transmit-delay** *seconds*] [**authentication** [**message-digest | null**]] [[**authentication-key** *key*] | [**message-digest-key** *key-id* **md5** *key*]]

no area *area-id* **sham-link** *source-address destination-address* [**cost**] [**dead-interval**] [**hello-interval**] [**retransmit-interval**] [**transmit-delay**] [**authentication**] [[**authentication-key**] **|** [**message-digest-key** *key-id*]]

default area *area-id* **sham-link** *source-address destination-address* [**cost**] [**dead-interval**] [**hello-interval**] [**retransmit-interval**] [**transmit-delay**] [**authentication**] [**authentication-key | message-digest-key** *key-id*]

Parameter Description

Parameter	Description
area-id	It indicates the OSPF area ID of the sham link that can be a decimal integer ranging from 0 to 4294967295 or an IP address.
source-address	Sham link source address
destination-address	Sham link destination address
cost *number*	(Optional) It indicates the COST value for OSPF to send packets on the sham link. It ranges from 0 to 65535 with the default value of 1.
dead-interval *seconds*	(Optional) It indicates the time interval when the neighbor of the sham link dies. It ranges from 0 to 2147483647 with the default value of 40s.
hello-interval *seconds*	(Optional) It indicates the time interval for sending the Hello packet on the sham link. It ranges from 1 to 65535 with the default value of 10s.
retransmit-interval *seconds*	(Optional) It indicates the retransmission time interval for sending packets on the sham link. It ranges from 0 to 65535 with the default value of 5s.
transmit-delay *seconds*	(Optional) It indicates the delay for transmitting the LSU packet on the sham link. It ranges from 0 to 65535 with the default value of 1s.
authentication-key [**0** | **7**] *key*	(Optional) It defines the key for OSPF plain text authentication. The keys for plain text authentication between neighbors must be consistent. The **service password-encryption** command can make the key to be displayed in an encrypted way. 0 Specify the key to be displayed in plain text. 7 Specify the key to be displayed in encrypted text.
message-digest-key *key-id* **md5** [**0** | **7**] *key*	(Optional) It defines the key identifier and key for OSPF MD5 authentication. The key identifier and key for MD5 authentication between neighbors must be consistent. The **service password-encryption** command can make the key to be displayed in an encrypted way. 0 Specify the key to be displayed in plain text. 7 Specify the key to be displayed in encrypted text.
authentication	Sets the authentication type: plain text authentication.
message-digest	Sets the authentication type to MD5 authentication.
null	Sets authentication not to be carried out.

Defaults

By default, no sham link is configured.

Command Mode

OSPF Router mode

Usage Guide

This command is valid only to the OSPF instance that associates the VRF.

To configure a sham link, configure the two PEs that set up the sham link. If you configure only one PE, the sham link cannot be set up.

The two PEs that establish the sham link must meet the following configuration requirements:

The sham link area-id of two PEs must be the same.

The source address of the sham link configured on one PE must be equal to the destination address of the sham link configured on the other PE.

The source address of the sham link configured on the PE must be a 32-bit loopback address, and this address must be bound to the corresponding VRF instance.

As the OSPF route announced through the sham link lacks a VPN tag, this route cannot be used for forwarding, and the actual forwarding still needs to use the BGP VPNv4 route. Therefore, during the actual configuration, the route announced through the sham link must announce the VPNv4 route to the related BGP neighbor through the MP-BGP protocol.

The source address for setting up a sham link must participate in the BGP VPNv4 route announcement, but cannot participate in the calculation of the VRF OSPF instance.

Configuration Examples

The following example configures a sham link for an OSPF instance. The sham link belongs to the area 0, the source address is 1.1.1.1, the destination address is 2.2.2.2, and the COST value for transmitting packets on the sham link by the OSPF protocol is 10.

```
FS(config)# router ospf 10 vrf vpn1
FS(config-router)# area 0 sham-link 1.1.1.1 2.2.2.2 cost 10
```

Related Commands

Command	Description
show ip ospf sham-links	Displays all sham-link information of the OSPF instance.

Platform Description

N/A

2.3 Capability Vrf-lite

Use this command to control the loop inspection of the OSPF instance. Use the **no** form of this command to enable loop inspection. Use the **default** form of this command to restore the default setting.

capability vrf-lite [**auto**]

no capability vrf-lite [**auto**]

[**default**] **capability vrf-lite** [**auto**]

Parameter Description

Parameter	Description
auto	The OSPF instance associated with the VRF automatically determines whether to support loop inspection.

Defaults

By default, the OSPF instance associated with the VRF supports loop inspection.

Command Mode

OSPF Router mode

Usage Guide

This command is valid only for the OSPF instance associated with the VRF.

By default, the OSPF instance associated with the VRF supports loop inspection and the PE-CE OSPF feature (the so-called PE-CE OSPF feature is to convert different OSPF LSAs to CE based on the BGP extension attribute). Configuring the **capability vrf-lite** command will disable the function above. Loop inspection of the OSPF instance is to prevent the possible loop during transmission through the VPN route. The OSPF instance associated with the VRF will deal with the received LSAs according to the following rules:

LSA Type	Implementation Process
Types 3, 5, 7 LSA	Inspect the DN bit. If the received LSA has a DN bit, the LSA will not participate in the OSPF calculation.
Types 5, 7 LSA	Inspect the VPN domain-tag. If the VPN domain-tag of the received LSA and the VPN domain-tag of the local OSPF instance are the same, the LSA will not participate in the OSPF calculation.

After receiving the LSA packet, the OSPF protocol will not inspect the DN bit and the VPN domain-tag in the LSA packet, and let the LSA participate in the OSPF calculation. Disabling the PE-CE OSPF feature (for the introduction to "PE-CE OSPF Feature", please see the *MPLS Configuration Guide*) means that different OSPF LSAs are not converted based on the BGP attribute.

By default, the OSPF instance associated with the VRF supports loop inspection.

The purpose of loop inspection is expected to disable the loop inspection of the VRF OSPF instance in some scenarios. For example, assume that a VPN user uses an MCE device exchange VPN routes with a PE. If the OSPF protocol runs for VPN route exchange between the MCE and PE and the MCE and VPN site exchange VPN routes through the EBGP, the OSPF and BGP in the MCE should be set to redistribute each other. To enable the BGP to completely redistribute OSPF routes, it is required to disable loop inspection of the VRF OSPF instance in the MCE by using the **capability vrf-lite** command.

Configuration Examples

The following example disables loop inspection of the OSPF instance.

```
FS(config)# router ospf 10 vrf vpn1
FS(config-router)# capability vrf-lite
```

Related Commands

Command	Description
domain-tag	Configures domain-tag information of the OSPF instance.

Platform Description

N/A

2.4 Domain-id

Use this command to configure the domain ID of the OSPF instance. Use the **no** or **default** form of this command to restore the default setting.

domain-id [***ip-address*** [**secondary**] | **null** | **type** { **0005** | **0105** | **0205** | **8005** } **value** *hex-value* [**secondary**]]

no domain-id [***ip-address*** [**secondary**] | **null** | **type** { **0005** | **0105** | **0205** | **8005** } **value** *hex-value* [**secondary**]]

default domain-id

Parameter

Parameter	Description

Description

ip-address	Sets the domain ID to the IP address.
secondary	The configured domain ID serves as the secondary identifier.
null	The OSPF instance has no domain ID.
type { **0005** | **0105** | **0205** | **8005** }	Sets the domain ID type of the OSPF instance. It has the following four values: 0x0005, 0x0105, 0x0205, 0x8005, and the default type is 0x0005.
value *hex-value*	Sets the domain ID of the OSPF instance which is a hexadecimal numeral containing six bytes.
secondary	The configured domain ID serves as the secondary identifier.

Defaults

By default, the domain-id value of the OSPF instance is NULL, and the type is 0005.

Command Mode

OSPF Router mode

Usage Guide

This command is valid only for the OSPF instance associated with the VRF.

Assume that the OSPF instance is configured with a domain ID. When an OSPF route changes into a VPN route after redistributed to BGP, the domain ID is also redistributed to the BGP, and is finally announced to other PEs as a part of the extended community attribute of the VPN route.

The OSPF instance can be configured with multiple domain IDs by using the **domain-id secondary** command, but there is only one primary domain ID, and others are secondary domain IDs. When the conversion from the OSPF route to the VPN route is announced, the related extended community attribute also carries the primary domain ID information only.

Generally, the OSPF protocol runs between PE and CE to exchange VPN routes. After receiving the VPN route and redistributing it to the OSPF instance, PE announces this to the VPN site as type 5 LSA. However, for different sites that belong to one OSPF domain, the route should be announced as type 3 LSA. Therefore, after the same domain ID is configured for the related VRF OSPF instance on the PE, the route inside the domain can be announced as type 3 LSA.

In one PE, domain IDs of different VRF OSPF instances do not affect each other. They can be the same or different. The VRF OSPF instances that belong to one VPN should be configured with the same domain ID to ensure correct route announcement.

Configuration Examples

The following example configures the domain ID of the VRF OSPF instance.

```
FS(config)# router ospf 10 vrf vpn1
FS(config-router)# domain-id type 0005 value 000000000001
```

Related Commands

Command	Description
show ip ospf	Displays the summary information of the OSPF instance.

Platform Description

N/A

2.5 Domain-tag

Use this command to configure the VPN domain-tag of the OSPF instance associated with the VRF. Use the **no** or **default** form of command to restore the default setting.

domain-tag *tag*

no domain-tag

default domain-tag

Parameter Description

Parameter	Description
tag	The domain-tag value of the OSPF instance, in the range from 1 to 4294967295

Defaults

The default value of the VRF OSPF instance is the AS number of the local BGP protocol.

Command Mode

OSPF Router mode

Usage Guide

This command is valid only for the OSPF instance associated with the VRF, and only for the BGP redistributed route.

If a VPN site connects multiple PEs, the VPN site learns the VPN route through MP-BGP from PEs. If the VPN route is announced to the VPN site through type 5 or type 7 LSA which may be learned by other PE routers connected to the VPN site and advertised, a loop may come into being. To prevent such a loop, configure the same VPN domain-tag for the VRF OSPF instances connected to the same VPN site on a PE. When the VRF OSPF instance sends type 5 or type 7 LSA to the VPN site, the LSA is attached with the VPN domain-tag information. When other PE sites receive type 5 or type 7 LSA, if the VPN domain-tag in the LSA is identical to the VPN domain-tag of the local OSPF instance, the LSA does not participate in OSPF calculation.

Generally, the OSPF instances that belong to the same VPN should be configured with the same tag value.

The VPN domain-tag contains four bytes in the OSPF packet. If this command is not configured for the VRF OSPF instance, by default, when the OSPF instance announces type 5 or type 7 LSA, the former two bytes of the VPN domain-tag are set to 0xD000, and the latter two bytes are set to the AS number of the local BGP. For example, if the AS number of the local BGP is 1, the hexadecimal value of the VPN domain-tag is 0xD0000001.

Configuration Examples

The following example sets the domain-tag value of the OSPF instance to 10.

```
FS(config)# router ospf 10 vrf vpn1
FS(config-router)# domain-tag 10
```

Related Commands

Command	Description
capability vrf-lite	Enables/Disables loop inspection.

Platform Description

N/A

2.6 Export Map

Use this command to define the policy rule of exporting extended community attribute from local VRF to remote

VPN route. Use the **no** or **default** form of this command to resotre the default setting.

export map *routemap-name*

no export map

default export map

Parameter Description

Parameter	Description
routemap-name	Associated route map policy rule.

Defaults

By default, no policy rule of extended community attribute is exported.

Command Mode

VPN configuration mode

Usage Guide

This command allows you to more precisely control the extended group attribute of an exported route. You are allowed to add or modify the extended community attribute defined by the **route-target export** command. The route map associated by this command supports two rules only: match IP address and set extcommunity.

Configuration Examples

The following example configures the extended group attribute associated with rma on VPNA, use the following command:

```
FS(config)# ip vrf VPNA
FS(config-vrf)# export map rma
```

Related Commands

Command	Description
route-target	Defines the import and export RT policy of VRF.

Platform Description

N/A

2.7 Extcommunity-type

Use this command to configure router-id or route-type of the OSPF instance associated with the VRF. Use the **no** or **default** form of command restores the default value.

extcommunity-type { **router-id** { **0107 | 8001** } **| route-type** { **0306 | 8000** } }

no extcommunity-type { **router-id | route-type** }

default extcommunity-type { **router-id | route-type** }

Parameter Description

Parameter	Description
router-id { **0107** | **8001** }	Sets the router-id type of the OSPF instance. The value can be 0107 or 8001.
route-type { **0306** | **8000** }	Sets the route-type type of the OSPF instance. The value can be 0306 or 8000.

Defaults

By default, the router-id type is 0107, and the route-type type is 0306.

Command Mode OSPF Router mode

Usage Guide The command is valid only for the OSPF instance associated with the VRF, and not valid for the global VRF instance.

When the OSPF route of VRF forms the VPN route, the extended community attribute of the VPN route also carries the router-id information of the OSPF instance. The type field value of the extended community attribute can be set to 0x0107 or 0x8001 by running the **extcommunity-type router-id** command.

When the OSPF route of VRF forms the VPN route, the extended community attribute of the VPN route can also carry the router-type information of the OSPF instance. The type field value of the extended community attribute can be set to 0x0306 or 0x8000 by running the **extcommunity-type router-type** command.

Configuration Examples The following example sets router-id of the OSPF instance to 8001.

```
FS(config)# router ospf 10 vrf vpn1
FS(config-router)# extcommunity-type router-id 8001
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.8 Import Map

Use this command to define the policy rule of importing remote VPN routes to local VRF. Use the **no** or **default** form of this command to restore the default setting.

import map *routemap-name*

no import map *routemap-name*

Parameter Description

Parameter	Description
routemap-name	Associated route map policy rule.

Defaults By default, no import policy rule is defined.

Command Mode VPN configuration mode

Usage Guide This command allows you to more precisely control the import of remote VPN route to local VRF . The rule defineddefined by the **import map** command takes effect after the import of extended community attribute defined in the VRF. Namely, the rule defined by this command filters the received remote VPN routes only when they match the extended community attribute defined by the **route-target import** command in the VRF. The route map associated by this command supports two rules only: match IP address and match extcommunity.

Configuration Examples

The following example configures the extended group attribute associated with rma on VPNA.

```
FS(config)# ip vrf VPNA
FS(config-vrf)# import map rma
```

Related Commands

Command	Description
route-target	Defines the import and export RT policy of VRF.

Platform Description

N/A

2.9 Mpls Static L3vpn-ftn

Use this command to add a FTN to L3 VPN FTN table. Use the **no** or **default** form of this command to restore the default setting.

mpls static l3vpn-ftn *vrf-name ip-address/mask* **out-label** *label* **remote-pe** *ip-addr*

mpls static l3vpn-ftn *vrf-name ip-address/mask* **local-forward nexthop** *interface-name nexthop-ip*

no mpls static l3vpn-ftn *vrf-name ip-address/mask*

default mpls static l3vpn-ftn *vrf-name ip-address/mask*

Parameter Description

Parameter	Description
vrf-name	Specifies the VRF FTN table where the FTN is added.
ip-address/mask	FEC, the destination network.
out-label *label*	The FTN is forwarded to other PEs through the LSP tunnel , with the private network label set.
remote-pe *ip-addr*	Egress PE address.
local-forward nexthop *interface-name nexthop-ip*	The FTN is directly forwarded to the next hop from local PE. The egress port and the next hop IP address are set.

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

This command is used to add an FTN to the secified VRF FTN table. After receiving a packet containing an IP address in this VRF, the device enabled with MPLS uses the longest match to search the VRF FTN table for the next hop according to the destination address. If the next hop is found, label forwarding is performed on this IP packet. The FTN whose destination address and mask are both 0 takes effect only when this route is also in the route forwarding table.

Configuration Examples

The following example configures an L3 VPN FTN with FEC 192.168.0.0/16, out label 100, and egress PE address 10.10.10.1.

```
FS(config)# mpls static l3vpn-ftn 192.168.0.0/16 out-label 100 remote-pe 10.10.10.1
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.10 Recursive-route Lookup Lsp

Use this command to enable the capability of resolving the next hop of the BGP route to the LSP tunnel, Use the **no** or **default** form of this command to restore the default setting.

recursive-route lookup lsp

no recursive-route lookup lsp

default recursive-route lookup lsp

Parameter Description

Parameter	Description
N/A	N/A

Defaults

By default, the function is disabled.

Command Mode

Global configuration mode

Usage Guide

By default, the next hop of the BGP route without a tag is not resolved to the LSP tunnel. In a CSC application scenario, for the model where level 2 carriers provide Internet services based on the IP core, the next hop of the BGP route must be resolved to the LSP tunnel in the CSC CE by running this command.

Configuration Examples

The following example enables the capability of resolving next hop of the BGP route to the LSP tunnel.

```
FS(config)# recursive-route lookup lsp
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.11 Show IP OSPF Sham-links

Use this command to display the OSPF sham-link information.

show ip ospf [*process-id*] **sham-links** [**area** *area-id*]

Parameter Description

Parameter	Description
process-id	OSPF process-id

area *area-id*	The OSPF area-id of the sham-link can be a decimal integer ranging from 0 to 4294967295 or an IP address.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to display the sham-link information of the OSPF instance.

Configuration Examples

```
FS#show ip ospf sham-links
Sham Link SLINK1 to address 8.8.8.8 is up
  Area 0.0.0.0 source address 7.7.7.7, Cost: 10
  Output interface is GigabitEthernet 0/8
  Nexthop address 192.168.1.2
  Transmit Delay is 1 sec, State Point-To-Point,
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:07
    Adjacency state Full
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3. MPLS GR Commands

3.56 Bfd Bind Backward-lsp-with-ip

Use this command to configure BFD to detect whether the LSP backward link uses an IP address. Use the **no** form of this command to disable this detection function.

bfd bind backward-lsp-with-ip peer-ip *ip-address* [**vrf** *vrf-name*] **interface** *interface-type interface-number* [**source-ip** *ip-address*] **local-discriminator** *discr-value* **remote-discriminator** *discr-value*

no bfd bind backward-lsp-with-ip peer-ip *ip-address* [**vrf** *vrf-name*]

Parameter Description

Parameter	Description
peer-ip *ip-address*	Peer IP address bound by the BFD session
vrf *vrf-name*	VRF name bound by the BFD session
interface *interface-type interface-number*	Configures the interface type and interface number.
source-ip *ip-address*	Sets the source IP address carried by the BDF session
local-discriminator *discr-value*	Configures the local identifier of the current BFD session, ranging from 1 to 8191.
remote-discriminator *discr-value*	Configures the remote identifier of the current BFD session, ranging from 1 to 8191.

Defaults

This function is disabled by default.

Command mode

Global configuration mode

Usage Guide

Use this command to configure BFD to detect whether the LSP backward link uses an IP address as follows:

- If the LSP backward link uses an IP address, the forward LSP must be configured with a local identifier and a remote identifier, that is, manual configuration mode must be adopted.
- The peer IP address needs to be configured, and the source IP address is optional.
- In the case of having no specified source IP address, the source IP address in the BFD packet is not updated if the IP address of the outgoing interface is changed after the BFD session is configured successfully. In the case of having a specified source IP address, the source IP address in the BFD packet is not updated if the source IP address is changed after the BFD session is configured successfully. After the BFD session is established successfully, the identifier cannot be modified.
- The system regularly queries the BFD configuration items that sessions have been submitted but not been established and attempts to establish BFD sessions.
- The system has a limit on the number of BFD sessions. If the number of BFD sessions submitted and established by a user exceeds the upper limit allowed by the system, the system will generate log information to prompt the user.

Configuration Examples

In global configuration mode on the switch, the following example configures BFD to detect whether the LSP backward link uses an IP address. The source IP address is 20.20.20.20, and the destination IP address is 10.10.10.10. The outgoing interface is GigabitEthernet 0/2. The local identifier is 1, and the remote identifier is 2.

The configuration is as follows:

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#interface gigabitEthernet 0/2
FS(config-if-GigabitEthernet 0/2)#no switchport
FS(config-if-GigabitEthernet 0/2)#bfd interval 100 min_rx 100 multiplier 3
FS(config-if-GigabitEthernet 0/2)#exit
FS(config)#bfd bind backward-lsp-with-ip peer-ip 10.10.10.10 interface gigabitEthernet 0/2 source-ip 20.20.20.20
local-discriminator 1 remote-discriminator 2
```

Related Commands

Command	Description
bfd	Configures the parameters of the LDP session.

Platform Description

N/A

3.57 Bfd Bind Bgp-lsp

Use this command to bind BFD to BGP LSP. Use the **no** form of this command to restore the default setting.

bfd bind bgp-lsp peer-ip *ip-address* **source-ip** *ip-address* [**local-discriminator** *discr-value* **remote-discriminator** *discr-value*]

no bfd bind bgp-lsp peer-ip *ip-address*

Parameter Description

Parameter	Description
peer-ip *ip-address*	Sets the peer IP address of the BFD session.
source-ip *ip-address*	Sets the source IP address of the BFD session.
local-discriminator *discr-value*	Sets the local description of the BFD session, in the range from 1 to 8191.
remote-discriminator *discr-value*	Sets the remote description of the BFD session, in the range from 1 to 8191.
no	Disables this function.

Defaults

This function is disabled by default.

Command mode

Global configuration mode

Usage Guide

- This command is executed on the LSP egress node.
- With BFD enabled, you can create the BFD session after configuring BGP LSP.
- If BGP LSP is deleted, the BFD session bound with it is deleted as well but the BFD session configuration remains. Once BGP LSP is configured, the BFD session is created.
- The BFD session can be configured with local and remote identification. If the local identification is not configured, the system selects one automatically. If the reverse LSP is an IP link, the LSP must be configured with local and remote identification manually.

- Once the BFD session is created, the identification cannot be changed.
- The system checks the submitted BFD configuration which creates no session and attempts to create BFD sessions periodically.
- The number of BFD sessions is limited. If the number of submitted BFD sessions exceeds the maximum, log messages are produced.

This function applies to BGP LSP initiated by the host routing.

One LSP can be configured with one BFD session.

Configuration Examples

The following example binds BFD with BGP LSP whose source IP address is 20.20.20.20 and destination IP address is 10.10.10.10.

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#mpls ip
FS(config)#interface gigabitEthernet 0/2
FS(config-if-GigabitEthernet 0/2)#no switchport
FS(config-if-GigabitEthernet 0/2)#mpls ip
FS(config-if-GigabitEthernet 0/2)#label-switching
FS(config-if-GigabitEthernet 0/2)#bfd interval 100 min_rx 100 multiplier 3
FS(config-if-GigabitEthernet 0/2)#exit
FS(config)#bfd bind bgp-lsp peer-ip 10.10.10.10 source-ip 20.20.20.20
```

The following example binds BFD with BGP LSP whose source IP address is 20.20.20.20 and destination IP address is 10.10.10.10. The local identification is 1 and the remote 2.

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#mpls ip
FS(config)#interface gigabitEthernet 0/2
FS(config-if-GigabitEthernet 0/2)#no switchport
FS(config-if-GigabitEthernet 0/2)#mpls ip
FS(config-if-GigabitEthernet 0/2)#label-switching
FS(config-if-GigabitEthernet 0/2)#bfd interval 100 min_rx 100 multiplier 3
FS(config-if-GigabitEthernet 0/2)#exit
FS(config)#bfd bind bgp-lsp peer-ip 10.10.10.10 source-ip 20.20.20.20
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.58 Bfd Bind Ldp-lsp

Use this command to configure BFD to detect LDP LSP. Use the **no** form of this command to restore the default

setting.

bfd bind ldp-lsp peer-ip *ip-address* [**vrf** *vrf-name*] **nexthop** *ip-address* [**interface** *interface-type interface-number*] **source-ip** *ip-address* [**local-discriminator** *discr-value* **remote-discriminator** *discr-value*] [**process-state**

no bfd bind ldp-lsp peer-ip *ip-address*

Parameter Description

Parameter	Description
peer-ip *ip-address*	Binds the sink IP address of the LDP LSP by the BFD session.
vrf *vrf-name*	Sets the name of VRF bound with the BFD session.
nexthop *ip-address*	Sets the next-hop IP address of LDP LSP.
interface *interface-type interface-number*	Configures the interface type and interface number.
source-ip *ip-address*	Source IP address carried by the BFD packet
local-discriminator *discr-value*	Configures the local identifier of the current BFD session, ranging from 1 to 8191.
remote-discriminator *discr-value*	Configures the remote identifier of the current BFD session, ranging from 1 to 8191.
process-state	Processes the state of the current BFD session. For some applications requiring BFD to detect faults such as deployments based on the cooperation BFD and LSP, this parameter is mandatory.
no	Disables this function.

Defaults

This function is disabled by default.

Command mode

Global configuration mode

Usage Guide

Use this command to configure BFD to detect an LDP LSP as follows:

- This command can only be executed on ingress nodes of an LSP.
- When BFD configuration has existed, the BFD configuration item cannot be established. After BFD is configured, a BFD session starts being established immediately if the LDP LSP exists. If the LDP LSP does not exist, a BFD session starts being established when the LDP LSP exists.
- When the LDP LSP is deleted, the BFD session bound to it is deleted. However, the system reserves the configuration item of this BFD session. When the LDP LSP exists, the system re-creates a BFD session.
- The local identifier and remote identifier can be configured in a BFD session. If the local identifier is not configured, the system elects the local identifier automatically. If the LSP backward link adopts an IP address, the forward LSP must be configured with the local identifier and remote identifier manually.
- When the address of the egress of the detected LSP is borrowed or lent, the egress must be specified. Otherwise, the egress does not need to be specified.
- After a BFD session is established successfully, the identifier cannot be modified.
- The system queries regularly BFD configuration items that sessions have been submitted but not been established and attempts to establish BFD sessions.
- The system has a limitation on the number of BFD sessions. If the number of requests for establishing BFD

sessions submitted by a user exceeds the limitation, the system prompts the user through log information.

Only LDP LSP detection established by host routes is supported.

One LSP can be configured with only one BFD session.

Configuration Examples

The following example auto-negotiates an identifier.

In LDP configuration mode on the switch, configure BFD to detect LDP LSP. The source IP address is 20.20.20.20, the sink IP address is 10.10.10.10, and the next-hop address is 1.1.1.2. The configuration is as follows:

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#mpls ip
FS(config)#interface gigabitEthernet 0/2
FS(config-if-GigabitEthernet 0/2)#no switchport
FS(config-if-GigabitEthernet 0/2)#mpls ip
FS(config-if-GigabitEthernet 0/2)#label-switching
FS(config-if-GigabitEthernet 0/2)#bfd interval 100 min_rx 100 multiplier 3
FS(config-if-GigabitEthernet 0/2)#exit
FS(config)#mpls router ldp
FS(config-mpls-router)#ldp router-id interface loopback 0 force
FS(config-mpls-router)#bfd bind ldp-lsp peer-ip 10.10.10.10 nexthop 1.1.1.2 source-ip 20.20.20.20
```

The following example sets an identifier manually.

In LDP configuration mode on the switch, configure BFD to detect LDP LSP. The source IP address is 20.20.20.20, the sink IP address is 10.10.10.10, and the next-hop address is 1.1.1.2. The local identifier is 1, and the remote identifier is 2. The BFD session status is processed. The configuration is as follows:

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#mpls ip
FS(config)#interface gigabitEthernet 0/2
FS(config-if-GigabitEthernet 0/2)#no switchport
FS(config-if-GigabitEthernet 0/2)#mpls ip
FS(config-if-GigabitEthernet 0/2)#label-switching
FS(config-if-GigabitEthernet 0/2)#bfd interval 100 min_rx 100 multiplier 3
FS(config-if-GigabitEthernet 0/2)#exit
FS(config)#mpls router ldp
FS(config-mpls-router)#ldp router-id interface loopback 0 force
FS(config-mpls-router)#bfd bind ldp-lsp peer-ip 10.10.10.10 nexthop 1.1.1.2 source-ip 20.20.20.20
local-discriminator 1 remote-discriminator 2 process-state
```

Related Commands

Command	Description
bfd	Configures the parameters for the BFD session.

Platform Description N/A

3.59 Bfd Bind Static-lsp

Use this command to configure BFD to detect a static LSP. Use the **no** form of this command to disable this function.

bfd bind static-lsp peer-ip *ip-address* **source-ip** *ip-address* [**local-discriminator** *discr-value* **remote-discriminator** *discr-value*] [**process-state**]

no bfd bind static-lsp peer-ip *ip-address*

Parameter Description

Parameter	Description
peer-ip *ip-address*	Sink IP address of the static LSP bound by the BFD session
source-ip *ip-address*	Source IP address carried by the BDF packet
local-discriminator *discr-value*	Configures the local identifier of the current BFD session, ranging from 1 to 8191.
remote-discriminator *discr-value*	Configures the remote identifier of the current BFD session, ranging from 1 to 8191.
process-state	Processes the state of the current BFD session. For some applications requiring BFD to detect faults such as deployments based on the cooperation BFD and LSP, this parameter is mandatory.

Defaults This function is disabled by default.

Command mode Global configuration mode

Usage Guide Use this command to configure BFD to detect a static LSP as follows:

- This command can only be executed on ingress nodes of an LSP.
- When the BFD configuration has existed, the BFD configuration item cannot be established. After BFD is configured, a BFD session starts being established immediately if the static LSP exists. If the static LSP does not exist, a BFD session starts being established when the static LSP exists.
- When the static LSP is deleted, the BFD session bound to it is deleted. However, the system reserves the configuration item of this BFD session. When the static LSP exists, the system re-creates a BFD session.
- The local identifier and remote identifier can be configured in a BFD session. If the local identifier is not configured, the system elects the local identifier automatically. If the LSP backward link adopts an IP address, the forward LSP must be configured with the local identifier and remote identifier manually.
- When the address of the egress of the detected LSP is borrowed or lent, the egress must be specified. Otherwise, the egress does not need to be specified.
- After a BFD session is established successfully, the identifier cannot be modified.
- The system queries regularly BFD configuration items that sessions have been submitted but not been established and attempts to establish BFD sessions.
- The system has a limitation on the number of BFD sessions. If the number of requests for establishing BFD sessions submitted by a user exceeds the limitation, the system prompts the user through log information.

Only static LSP detection established by host routes is supported.

One LSP can be configured with only one BFD session.

Configuration Examples

The following example autonegotiates an identifier.

In global configuration mode on the switch, configure BFD to detect static LSP. The source IP address is 20.20.20.20, the sink IP address is 10.10.10.10. The configuration is as follows:

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#mpls ip
FS(config)#interface GigabitEthernet 0/2
FS(config-if-GigabitEthernet 0/2)#no switchport
FS(config-if-GigabitEthernet 0/2)#label-switching
FS(config-if-GigabitEthernet 0/2)#bfd interval 100 min_rx 100 multiplier 3
FS(config-if-GigabitEthernet 0/2)#exit
FS(config)#bfd bind static-lsp peer-ip 10.10.10.10 source-ip 20.20.20.20
```

The following example sets an identifier manually.

In global configuration mode on the switch, configure BFD to detect static LSP. The source IP address is 20.20.20.20, the sink IP address is 10.10.10.10. The local identifier is 1, and the remote identifier is 2. The BFD session state is processed. The configuration is as follows:

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#mpls ip
FS(config)#interface GigabitEthernet 0/2
FS(config-if-GigabitEthernet 0/2)#no switchport
FS(config-if-GigabitEthernet 0/2)#label-switching
FS(config-if-GigabitEthernet 0/2)#bfd interval 100 min_rx 100 multiplier 3
FS(config-if-GigabitEthernet 0/2)#exit
FS(config)#bfd bind static-lsp peer-ip 10.10.10.10 source-ip 20.20.20.20 local-discriminator 1 remote-discriminator
2 process-state
```

Related Commands

Command	Description
bfd	Configures the parameters for the BFD session.

Platform Description

N/A

3.60 Graceful-restart

Use this command to enable the graceful restart (GR) capability of LDP. Use the **no** form of this command to disable the GR capability of LDP.

graceful-restart

no graceful-restart

default graceful-restart

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The GR capability of LDP is enabled by default.

Command mode

config-mpls-router mode

Usage Guide

Use this command to enable the GR capability of LDP as follows:

- If a dual-engine device is enabled with the GR capability of LDP, traffic can be forwarded uninterruptedly and MPLS forwarding state can be consistent before and after restart when the master management board of the device becomes faulty or master/slave switchover is performed manually.
- By default, the GR capability is disabled on either of devices acting as GR-Restarter and GR-Helper.

The LDP session must be restarted to make the GR capability of LDP take effect.

Configuration Examples

The following example enables the GR capability of LDP:

```
FS#configure terminal
Enter configuration commands, one per line.   End with CNTL/Z.
FS(config)#mpls router ldp
FS(config-mpls-router)#graceful-restart
```

Related Commands

Command	Description
show mpls ldp graceful-restart	Displays the LDP GR session and its parameters.

Platform Description

N/A

3.61 Graceful-restart Timer Neighbor-liveness

Use this command to configure the survival time for an LDP neighbor. Use the **no** form of this command to restore the default setting.

graceful-restart timer neighbor-liveness *seconds*

no graceful-restart timer neighbor-liveness

default graceful-restart timer neighbor-liveness

Parameter Description

Parameter	Description
seconds	Configures the survival time for an LDP neighbor, ranging from 5 to 300 in the unit of seconds.

Defaults The default is 120.

Command mode config-mpls-router mode

Usage Guide Use this command to configure the survival time for an LDP neighbor as follows:

- The device uses this value only when it acts as a GR-Helper.
- When a device acts as a GR-Helper, it selects the smaller value of the configured neighbor-liveness time and the received reconnect time to enable the survival timer and keeps "old" entries before the survival timer times out.

The LDP session must be restarted to make the survival time for an LDP neighbor take effect.

Configuration Examples The following example configures the survival time for an LDP neighbor as 200 seconds:

```
FS#configure terminal
Enter configuration commands, one per line.   End with CNTL/Z.
FS(config)#mpls router ldp
FS(config-mpls-router)#graceful-restart
FS(config-mpls-router)#graceful-restart timer neighbor-liveness 200
```

Related Commands

Command	Description
show mpls ldp graceful-restart	Displays the LDP GR session and its parameters.

Platform Description N/A

3.62 Graceful-restart Timer Reconnect

Use this command to configure the LDP session reconnect time. Use the **no** form of this command to restore the default setting.

graceful-restart timer reconnect *seconds*

no graceful-restart timer reconnect

default graceful-restart timer reconnect

Parameter Description

Parameter	Description
seconds	Configures the LDP session reconnect time, ranging from 30 to 600 in the unit of seconds.

Defaults The default is 300.

Command mode config-mpls-router mode

Usage Guide

Use this command to configure the LDP session reconnect time as follows:

- During GR, both of devices acting as GR-Restarter and GR-Helper use the LDP session reconnect time.
- For the GR-Restarter, the LDP session reconnect time is used to keep "old" entries time.
- The GR-Helper selects the smaller value of the configured neighbor-liveness time and the received reconnect time to enable the survival timer and keeps "old" entries before the survival timer times out.

The LDP session must be restarted to make the LDP session reconnect time take effect.

Configuration Examples

The following example configures the LDP neighbor reconnect time as 400 seconds:

```
FS#configure terminal
Enter configuration commands, one per line.   End with CNTL/Z.
FS(config)#mpls router ldp
FS(config-mpls-router)#graceful-restart
FS(config-mpls-router)#graceful-restart timer reconnect 400
```

Related Commands

Command	Description
show mpls ldp graceful-restart	Displays the LDP GR session and its parameters.

Platform Description

N/A

3.63 Graceful-restart Timer Recovery

Use this command to configure the LDP session recovery time. Use the **no** form of this command to restore the default setting.

graceful-restart timer recovery *seconds*

no graceful-restart timer recovery

default graceful-restart timer recovery

Parameter Description

Parameter	Description
seconds	Configures the LDP session recovery time, ranging from 15 to 600 seconds.

Defaults

The default is 120.

Command mode

config-mpls-router mode

Usage Guide

Use this command to configure the LDP session recovery time as follows:

- The device uses this value only when it acts as a GR-Helper.
- When a device acts as a GR-Helper, it selects the smaller value of the configured recovery time and the received recovery time to enable the recovery timer and keeps "old" entries before the recovery timer times out.

The LDP session must be restarted to make the LDP session recovery time take effect.

Configuration Examples

The following example configures the LDP session recovery time as 200 seconds:

```
FS#configure terminal
Enter configuration commands, one per line.   End with CNTL/Z.
FS(config)#mpls router ldp
FS(config-mpls-router)#graceful-restart
FS(config-mpls-router)#graceful-restart timer recovery 200
```

Related Commands

Command	Description
show mpls ldp graceful-restart	Displays the LDP GR session and its parameters.

Platform Description

N/A

3.64 Show Mpls Ldp Graceful-restart

Use this command to display the LDP GR session and its parameters.

show mpls ldp graceful-restart [**all** | **vrf** *vrf-name*]

Parameter Description

Parameter	Description
all	Displays LDP GR sessions and session parameters of all VRFs (including VRF).
vrf *vrf-name*	Displays LDP GR sessions and session parameters of specified VRFs.

Defaults

N/A

Command mode

Privileged EXEC mode

Usage Guide

Use this command to display the LDP GR session and session parameter as follows:

If there is no parameter in this command, it indicates that the LDP GR sessions and session parameters of the global VRF are displayed.

Configuration Examples

The following example displays the LDP GR sessions and session parameters:

```
FS# show mpls ldp graceful-restart
Default VRF:
  LDP Graceful Restart is enabled
  Neighbor Liveness Timer: 120 seconds
  Max Recovery Time: 120 seconds
  Forwarding State Holding Time: 300 seconds
  Down Neighbor Database (1 records):
    Peer LDP Ident: 20.20.20.20:0; Local LDP Ident: 10.10.10.10:0
```

```
        Status: recovering (86 seconds left)
        Address list contains 3 addresses:
          192.168.202.3     20.20.20.20       192.168.201.37
  Graceful Restart-enabled Sessions:
Peer LDP Ident: 20.20.20.20:0, State: estab
```

Field	Description
Default VRF	Global VRF information
LDP Graceful Restart is enabled	The GR capability of LDP is enabled for a VRF.
Neighbor Liveness Timer	Survival time of the neighbor timer in the unit of second
Max Recovery Time	Maximum recovery time in the unit of second
Forwarding State Holding Time	Forwarding state holding time (reconnect time) in the unit of second
Down Neighbor Database	Down database information of an LDP neighbor
Graceful Restart-enabled Sessions	Enable LDP session information of LDP GR.
Peer LDP Ident	Peer LDP ID
State	LDP session state of an LDP neighbor

Related Commands

Command	Description
graceful-restart	Enables the GR capability of LDP.
graceful-restart timer reconnect *seconds*	Configures the reconnect time of an LDP session.
graceful-restart timer neighbor-liveness *seconds*	Configures the survival time of an LDP neighbor.
graceful-restart timer recovery *seconds*	Configures the recovery time of an LDP session.

Platform Description

N/A

Chapter 6 Multicast Commands

1. IPv4 Multicast Routing Commands
2. IPv6 Multicast Routing Commands
3. IGMP Commands
4. MLD Commands
5. PIM-DM Commands
6. PIM-SM Commands
7. PIM-SMv6 Commands
8. IGMP Snooping Commands
9. MLD Snooping Commands

1 IPv4 Multicast Routing Configuration Commands

1.1 clear ip mroute

Use this command to remove the forwarding information of the IP multicast routes.

clear ip mroute {* | *group-address* [*source -address*] }

Parameter Description

Parameter	Description
*	Remove all the forwarding information in the IP multicast route table.
group-address	Group IP address of IP multicast routes.
source-address	Source IP address of multicast routess.

Command Mode

Privileged EXEC mode.

Examples

The following example removes the entry whose group IP address is 230.0.0.1 from the multicast routing table:

FS# clear ip mroute *230.0.0.1*

Related Commands

Command	Description
show ip mroute	Show the forwarding information of multicast routes.

1.2 clear ip mroute statistics

this command to remove the statistics of IP multicast routes.

clear ip mroute statistics {* | *group-address* [*source -address*]}

Parameter Description

Parameter	Description
*	Remove all the forwarding entries in the multicast route table.
group-address	Group IP address of IP multicast routes
source-address	Source IP address of multicast route.

Command Mode

Privileged EXEC mode.

Usage Guide

N/A

Examples

The following example clears the statistics of entry with the group IP address 230.0.0.1 from the multicast routing table.

FS# clear ip mroute statistics *230.0.0.1*

Related

Command	Description

Commands		

show ip mroute	Show the multicast route forwarding information.
clear ip mroute	Clear the multicast route forwarding information.

1.3 ip mroute

Use this command to configure static multicast routes. Use the **no** or **default** form of this command to delete the configured routes.

ip mroute *source-address mask*{ [*protocol*] {*rpf-addrress* | *interface-type interface-number*} [*distance*]

no ip mroute *source-address mask* [*protocol*]

default ip mroute *source-address mask* [*protocol*]

Parameter Description

Parameter	Description
source-address	Source IP address of the multicast route
mask	Mask of the source IP address
protocol	(Optional) The unicast routing protocol being used.
rpf-address	Incoming interface of the multicast route
interface-type interface-number	Interface type and interface ID.
distance	Management distance used to determine whether to use the route for RPF routing, ranging from 1 to 255. The default value is 0.

Default

distance: 0.

Command Mode

Privileged EXEC mode.

Usage Guide

This command is used to configure the route for the purpose of RFF check. Note that the configured route is prior to the route learned in the unicast form.

Examples

The following example allows the multicast routes of all the sources in a network to pass 172.30.10.13:

```
FS(config)# ip mroute 172.16.0.0 255.255.0.0
172.30.10.13
```

1.4 ip multicast-routing

Use this command to enable multicast routing forwarding. The **no** form of this command disables multicast routing forwarding.

ip multicast-routing [**vrf** *vrf-name*]

no ip multicast-routing [**vrf** *vrf-name*]

Parameter Description

Parameter	Description
vrf vrf-name	Specify the VRF instance.

Default

Disabled.

Command Mode Privileged EXEC mode.

Usage Guide This command allows you to enable IPv4 multicast routing forwarding. The multicast protocol will not be enabled with IPv4 multicast routing forwarding disabled.

It is not recommended to configure different v4 multicast routing protocols on different interfaces of a device.

Examples This command enables multicast routing forwarding.

```
FS(config)# ip multicast-routing
```

1.5 ip multicast-boundary

Use this command to configure the boundary of an IP multicast group. Use the **no or default** form of this command to remove the configured boundary.

ip multicast boundary *access-list* [**in** | **out**]

no ip multicast boundary *access-list* [**in** | **out**]

default ip multicast boundary *access-list* [**in** | **out**]

Parameter Description

Parameter	Description
access-list	Access list associated with the multicast boundary.
in	Inbound direction.
out	Outbound direction.

Default The boundary of a specified IP multicast group is defined by default.

Command Mode Interface configuration mode

Usage Guide Note that the ACL associated with the multicast boundary is either standard ACL or extended ACL. But the extended ACL only match the destination IP address.

Note:

This command filters IGMP and PIMSM packets of the specified IP address range. Multicast packets will not be received and sent through the interface of the boundary.

Examples The following example configures svi1 as the boundary of all IP multicast groups.

```
FS(config)# ip access-list mul-boun
FS(config-std-nacl)# permit ip 233.3.3.0 0.0.0.255
FS(config-std-nacl)#exit
FS(config)# interface vlan 1
FS(config-if)# ip multicast boundary mul-boun
```

1.6 ip multicast route-limit

Use this command to limit the number of the entries that can be added to the multicast routing table. Use the **no** or **default** form of this command to remove the configuration.

ip multicast route-limit *limit* [*threshold*]

no ip multicast route-limit *limit*

default ip multicast route-limit

Parameter Description

Parameter	Description
limit	The number of the entries that can be added to the multicast routing table is 1 to 2147483647. The default value is 1024.
threshold	(Optional) Number of multicast routes at which alarms will be triggered. The default value is 2147483647.

Default

The default value of *limit* is 1024.

The default value of *threshold* is 2147483647.

Command Mode

Global configuration mode.

Usage Guide

Note that the hardware resources of different devices are limited. The routes exceeding the hardware resource will be forwarded by software, which leads to lower product performance.

Examples

The following example sets the route limit to 500.

```
FS(config)# ip multicast route-limit 500
```

1.7 ip multicast longest-match

Select the multicast static routing, MBGP routing and unicast routing that could be used for the RPF check from the multicast static routing table, MBGP routing table and unicast routing table respectively by following the RPF rules.

Use this command to select the one with the mask longest-matched from the three routings. If the routings are in the same priority, select the routing in order of multicast static routing, MBGP routing, unicast routing.

Use the **no** or **default** form of this command restores it to the default setting. By default, select one routing of the highest priority from the three routings. If the routings are in the same priority, select the routing in order of multicast static routing, MBGP routing, unicast routing.

ip multicast rpf longest-match

no ip multicast rpf longest-match

default ip multicast rpf longest-match

Parameter Description

Parameter	Description
N/A	N/A

Default

Use the RPF rule to select the optimal routing for RPF check from the multicast static routing, MBGP routing and unicast routing that are used for the RPF check from the multicast static routing table, MBGP routing table and

unicast routing table respectively by following the RPF rules. Then select one routing of the highest priority from the three routings. If the routings are in the same priority, select the routing in order of multicast static routing, MBGP routing, unicast routing.

Command Mode Global configuration mode.

Examples The following example configures to select the routing with the longest-match.

```
FS(config)# ip multicast rpf longest-match
```

1.8 ip multicast static

Use this command to enable flow control for multicast packets on the Layer 2 interface. Use the **no** or **default** form of this command removes the setting.

ip multicast static *source-address group-address interface-type interface-number*

no ip multicast static *source-address group-address interface-type interface-number*

default ip multicast static source-address group-address interface-type interface-number

Parameter Description

Parameter	Description
source-address	Source IP address
group-address	IP address of the multicast group
interface-type interface number	*Layer 2 interface on which multicast packets are allowed to forward*

Default This function is disabled by default.

Command Mode Global configuration mode.

Usage Guide You can configure more than one command (or more than one interface) for a multicast flow. With flow control enabled, the multicast flow can only be forwarded through these configured interfaces.

This command controls the forwarding of multicast flows on an interface without any direct influence on the packet processing of multicast protocols. However, the action of a multicast protocol (for instance, PIM-DM or PIM-SM) may be affected because some features of the multicast protocol are driven by multicast flows.

Examples The following example configures forwarding multicast flows (192.168.43.4 and 255.1.1.5) through GigabitEthernet 2/6 and FastEthernet 3/2.

```
FS(config)# ip multicast static 192.168.43.4 225.1.1.5 G2/6
FS(config)# ip multicast static 192.168.43.4 225.1.1.5 F3/2
```

1.9 ip multicast ttl-threshold

Use this command to configure TTL (time-to-live) threshold on the interface. Use the **no** or **default** form of the command to restore it to the default value.

ip multicast ttl-threshold *ttl-value*

ip multicast ttl-threshold

default ip multicast ttl-threshold

Parameter Description

Parameter	Description
ttl-value	TTL threshold on the interface, within the range of 0 to 255.

Default

The default *ttl-value* is 0.

Command Mode

Interface configuration mode.

Usage Guide

Use show running-config to display configuration. A device with multicast enabled can maintain one TTL threshold for every interface. If the TTL of the multicast packet received is greater than the threshold of the interface, the packets will be forwarded. Otherwise, the packet is discarded. Note that the TTL threshold is effective only to the multicast frames. In addition, you must configure it on the L3 interface.

Examples

The following example sets the TTL threshold on the interface to 5.

```
FS(config-if)# ip multicast ttl-threshold 5
```

1.10 msf force-forwarding

Use this command to enable IPv4 multicast data packets destined for the CPU to be forcedly forwarded by software. Use the **no** or **default** form of this command to restore the default settings.

msf force-forwarding

no msf force-forwarding

default msf force-forwarding

Parameter Description

Parameter	Description
N/A	N/A

Default

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

N/A

Examples

The following example enable IPv4 multicast data packets destined for the CPU to be forcedly forwarded by software.

```
FS(config)# msf force-forwarding
```

1.11 msf ipmc-overflow override

Use this command to enable the overflow overriding mechanism. Use the **no** or **default** form of this command to remove the configuration.

msf ipmc-overflow override

no msf ipmc-overflow override

default msf ipmc-overflow override

Parameter Description

Parameter	Description
-	-

Default

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

N/A

Examples

The following example enables the overflow overriding mechanism.

```
FS (config)# msf ipmc-overflow override
FS (config)#
```

1.12 msf nsf

Use this command to configure the parameter for the continuous multicast forwarding. Use the **no** or **default** form of this command to remove the configuration.

msf nsf {{**convergence-time** *time*} | {**leak** *interval*} }

no msf nsf {**convergence-time** | **leak**}

default msf nsf {convergence-time | leak}

Parameter Description

Parameter	Description
convergence-time *ttl-value*	Maximum time for the multicast protocol convergence, in the valid range of the 0-3600s.
leak *interval*	Packet multicast leak time, in the valid range of 0-3600s

Default

convergence-time *time* :140s;

leak interval: 150s

Command Mode

Global configuration mode

Usage Guide

N/A

Examples

The following example sets the maximum time for the protocol convergence.

```
FS (config)# msf nsf convergence-time 300
FS (config)#
```

The following example sets the packets leak time:

```
FS(config)# msf nsf leak 200
```

```
FS(config)#
```

1.13 show ip mrf mfc

Use this command to show the IPv4 multicast routing forwarding table.

show ip mrf mfc [*soure-address group-address*]

Parameter Description

Parameter	Description
source-address	Source address of the multicast routing forwarding entries.
group-address	Group address of the multicast routing forwarding entries.

Default

-

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

The three parameters in this command are optional, wherein the source address and group address must be specified at the same time.

- If no source address and group address are specified, all mfc entries are displayed.
- When the source address and group address are specified only, the entries corresponding to the source and group addresses are displayed.

Examples

The following example shows all IPv4 layer-3 multicast routing forwarding entries with source address 20.0.1.30.

```
FS#show ip mrf mfc 20.0.1.30 233.3.3.3
Multicast Routing and Forwarding Cache Table
(20.0.1.30, 233.3.3.3)
 FAST_SW, SWTCHED, MIN_MTU: 1500, MIN_MTU_IFINDEX: 4099, WRONG IF: 0
 Incoming interface: VLAN 1[4097]
Outgoing interface list:
VLAN 3 (1)
```

The fields in the execution of the **show ip mrf mfc** command are described in the following table.

Field	Description
20.0.1.30	Source address of the entry.
233.3.3.3	Group address of the entry.
FAST_SW	The Flag shows whether to allow the fast forwarding or not. If the non-Ethernet interface, ppp, hdlc and frame relay exist, no fast forwarding entry generates.
SWTCHED	Indicate whether the entry configuration on the next layer forwarding table has done not not.
MIN_MTU MTU	The minimum MTU of the entry.
MIN_MTU_IFINDEX	The interface index with the minimum MTU value.

WRONG IF	The statistics number of the multicast data packets received on the wrong incoming interface.
Incoming interface	Incoming interface of the entry.
VLAN 3 (1)	The layer-3 outgoing interface of the entry is VLAN3. 1 for the ttl threshold of this layer-3 interface.

1.14 show ip mroute

Use this command to show the IPv4 multicast routing forwarding table.

show ip mroute [*group-or-source-address* [*group-or-source-address*]] [**dense** | **sparse**] [**summary** | **count**]

Parameter Description

Parameter	Description
group-or-source-address	Multicast or source IP address
group-or-source-address	Multicast or source IP address. The two addresses must not be the multicast addresses or source addresses at the samet time.
dense	Show PIM-DM multicast routing table.
sparse	Show PIM-SM multicast routing table.
summary	Show the summary of the multicast routing table.
count	Show the count of the multicast routing table.

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

The three parameters in this command are optional, wherein the source address and group address must be specified at the same time.

- If no source address and group address are specified, all mfc entries are displayed.
- When the source address and group address are specified only, the mfc entries corresponding to the source and group addresses are displayed.

Examples

The following example shows the information of the multicast routing table:

```
FS# show ip mroute
IP Multicast Routing Table
Flags: I - Immediate Stat, T - Timed Stat, F - Forwarder installed
Timers: Uptime/Stat Expiry
Interface State: Interface (TTL)
(10.10.1.52, 224.0.1.3), uptime 00:00:31, stat expires 00:02:59
Owner PIM-SM, Flags: TF
Incoming interface: FastEthernet 2/1
Outgoing interface list:
FastEthernet 1/3
```

The following example shows the information of a specific entry:

```
FS# show ip mroute 10.10.1.52 224.0.1.3
```

```
IP Multicast Routing Table
Flags: I - Immediate Stat, T - Timed Stat, F - Forwarder installed
Timers: Uptime/Stat Expiry
Interface State: Interface (TTL)
(10.10.1.52, 224.0.1.3), uptime 00:03:24, stat expires 00:01:28
Owner PIM-SM, Flags: TF
Incoming interface: FastEthernet 2/1
Outgoing interface list:
FastEthernet 1/3
```

The following example shows the count of the routing table:

```
FS# show ip mroute count
IP Multicast Statistics
Total 1 routes using 132 bytes memory
Route limit/Route threshold: 2147483647/2147483647
Total NOCACHE/WRONGVIF/WHOLEPKT recv from fwd: 1/0/0
Total NOCACHE/WRONGVIF/WHOLEPKT sent to clients: 1/0/0
Immediate/Timed stat updates sent to clients: 0/0
Reg ACK recv/Reg NACK recv/Reg pkt sent: 0/0/0
Next stats poll: 00:01:10
Forwarding Counts: Pkt count/Byte count, Other Counts: Wrong If pkts
Fwd msg counts: WRONGVIF/WHOLEPKT recv
Client msg counts: WRONGVIF/WHOLEPKT/Imm Stat/Timed Stat sent
Reg pkt counts: Reg ACK recv/Reg NACK recv/Reg pkt sent
(10.10.1.52, 224.0.1.3), Forwarding: 2/19456, Other: 0
Fwd msg: 0/0, Client msg: 0/0/0/0, Reg: 0/0/0
```

The following example shows the summary of the routing table:

```
FS# show ip mroute summary
IP Multicast Routing Table
Flags: I - Immediate Stat, T - Timed Stat, F - Forwarder installed
Timers: Uptime/Stat Expiry
Interface State: Interface (TTL)
(10.10.1.52, 224.0.1.3), 00:01:32/00:03:20, PIM-SM, Flags: T
```

Field	Description
Flags	I-Immediate statistic T-Timed statistic F-Already set to the forwarding table
Timers:Uptime/Stat Expiry	Time when the entry is created. Time when it is aged.
Interface State	Interface state.
Owner	Owner of the entry, which may be a multicast routing protocol

Incoming interface	Expected packet incoming interface. If the actual incoming interface does not match it, the packets will be discarded.
Outgoing interface list	Outgoing interface list; the packets will be forwarded on the interfaces in the list.
Forwarding Counts: Pkt count/Byte count,	Forwarding count: packet count/byte count forwarded by the entry
Other Counts: Wrong If pkts	Count of the packets received from the wrong incoming interface.

Related Commands

Command	Description
ip multicast-routing	Enabling the multicast routing forwarding.
ip pim dense-mode	Enable the PIM-DM on the interface.
ip pim sparse-mode	Enable the PIM-SM on the interface.

1.15 show ip mroute static

Use this command to show the v4 static multicast routing information.

show ip mroute static

Parameter Description

Parameter	Description
-	-

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuraion mode

Usage Guide

In the same conditions, the priority of the static multicast routing is higher than the dynamically learned.

Examples

The following example shows the information of the user-configured static multicast routing:

```
FS#show ip mroute static
Mroute: 172.16.0.0, RPF neighbor: 172.30.10.13
 Protocol: , distance: 0
```

1.16 show ip mvif

Use this command to show the basic information of the multicast interface.

show ip mvif { *interface-type interface-number* }

Parameter Description

Parameter	Description
interface-type interface-number	Interface Type and number

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuraion mode

Examples

The following example shows the basic information of the multicast interface of svil.

```
FS#show ip mvif vlan 1
```

```
Interface Vif Owner TTL Local Remote Uptime
 Idx Module Address Address
VLAN 1 1 PIM-DM 2 192.168.1.1 0.0.0.0 00:13:16
```

1.17 show ip rpf

Use this command to show the RPF information of the specified source IP address.

show ip rpf {*source-address* }

Parameter Description

Parameter	Description
source-address	Specified source IP address

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuraion mode

Usage Guide

The three parameters in this command are optional, wherein the source address and group address must be specified at the same time.

- If no source address and group address are specified, all mfc entries are displayed.
- When the source address and group address are specified only, the mfc entries corresponding to the source and group addresses are displayed.

Examples

The following example shows the information of the RPF to 192.168.1.54:

```
FS# show ip rpf 192.168.1.54
RPF information for 192.168.1.54
RPF interface: VLAN 1
RPF neighbor: 0.0.0.0
RPF route: 192.168.1.0/24
RPF type: unicast (connected)
RPF recursion count: 0
Doing distance-preferred lookups across tables
Distance: 0
Metric: 0
```

1.18 show ip rpf

Use this command to show IPv4 multi-layer multicast forwarding table.

show msf msc [*soure-address*] [*group-address*]

Parameter Description

Parameter	Description
source-address	Specified source IP address of the multi-layer multicast forwarding table.
group-address	Specified group address of the multi-layer multicast forwarding table.

Default

-

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuraion mode

Usage Guide The three parameters in this command are optional.

- If only the source address is specified as s1, all msc entries with source address 1 are displayed.
- If the source address is specified as s1 and the group address as g1, all corresponding msc entries are displayed.
- Each parameter shall be input in order. Only when the parameter in front has been configured, the following one could be set.

Examples The following example shows the IPv4 layer-3 multicast forwarding entries with source IP address 192.168.195.25:

```
FS# show msf msc 192.168.195.25
Multicast Switching Cache Table
(192.168.195.23, 233.3.3.3, 1), SYNC, MTU:0, 1 OIFs
VLAN 1(0): 1 OPORTs, REQ: DONE
OPORT 6, IGMP-SNP, REQ: DONE
```

The fields in the execution of the **show mrf mfc** command are described in the following table.

Field	Description
192.168.195.23	Source address of the entry.
233.3.3.3	Group address of the entry.
1	Vlan id where the incoming interface of the entry is.
SYNC	The entry has been synchronized to the hardware.
MTU	MTU value
OIFs	Layer-3 outgoing interface number.
VLAN1(0)	The vlan where the layer-3 outgoing interface oif is.
1 OPORTs	The number of layer-2 port in the layer-3 outgoing oif.
REQ: DONE	This oif configuration on the hardware has done.
OPORT 6	The layer-2 port in the oif with index 6.
IGMP-SNP	This port is created by the IGMP SNOOPING protocol. This value can also be the PIM-SNP, which means this port is created by the PIM SNOOPING protocol. And the ROUTER means this port is created by the layer-3 protocol.
REQ: DONE	The port configuration on the hardware has done.

1.19 show msf nsf

Use this command to show the configuration of continuous multicast forwarding.

show msf nsf

Parameter Description

Parameter	Description
-	-

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuraion mode

Examples

The following example shows the configuration of continuous multicast forwarding.

```
FS# show msf nsf
Multicast HA Parameters
-----------------------------------------------------+-------+
protocol convergence timeout 120 secs
flow leak interval 20 secs
FS#
```

Related Commands

Command	Description
msf nsf	Configure the multicast NSF parameter.

2 IPv6 Multicast Routing Commands

2.1 clear ipv6 mroute

Use this command to remove the specific or all IPv6 multicast forwarding entries.

clear ipv6 mroute { * | *v6group-address* [*v6source -address*]}

Parameter Description

Parameter	Description
*	Removes all the forwarding information in the IPv6 multicast route table.
v6group-address	Group IPv6 address of IPv6 multicast routes
v6source-address	Source IPv6 address of multicast routes

Command Mode

Privileged EXEC mode

Configuration Examples

The following example removes all the multicast routing entries.

```
FS# clear ip mroute *
```

Related Commands

Command	Description
show ipv6 mroute	N/A
clear ipv6 mroute statistics	N/A

2.2 clear ipv6 statistics

Use this command to remove the statistics of IPv6 multicast routes.

clear ipv6 mroute statistics {* | *v6group-address* [*v6source -address*]}

Parameter Description

Parameter	Description
*	Removes all the forwarding entries in the multicast route table.
v6group-address	Group IPv6 address of IPv6 multicast routes
v6source-address	Source IPv6 address of multicast route

Command Mode

Privileged EXEC mode

Usage Guide

-

Configuration Examples

The following example clears all the statistical information of the multicast routing entries.

```
FS# clear ip mroute statistics *
```

Related Commands

Command	Description
show ipv6 mroute	Displays the multicast route forwarding information.
clear ipv6 mroute	Clears the multicast route forwarding information.

2.3 ipv6 mroute

Use this command to configure static IPv6 multicast routes. Use the **no** or **default** form of this command to restore the default setting.

ipv6 mroute *ipv6-prefix/prefix-length* [*protocol*] { *v6rpf-addrress* | *interface-type interface-number* } [*distance*]

no ipv6 mroute *ipv6-prefix/prefix-length* [*protocol*]

default ipv6 mroute *ipv6-prefix/prefix-length* [*protocol*]

Parameter Description

Parameter	Description
ipv6-prefix/prefix-length	Source IPv6 address of the multicast route
mask	Mask of the source IPv6 address
protocol	(Optional) The unicast routing protocol being used
v6rpf-address	Incoming interface of the multicast route
interface-type interface-number	Interface type and interface ID
distance	Management distance used to determine whether to use the route for RPF routing, ranging from 1 to 255. The default value is 0.

Defaults

The static IPv6 multicast routing is not configured by default.

Command Mode

Global configuration mode

Usage Guide

This command is used to configure the route for the purpose of RFF check. Note that the configured route is prior to the route learned in the unicast form.

If the outgoing direction of static multicast route but not the next-hop IP shall be specified, the outgoing direction must be of the point-to-point type.

Configuration Examples

The following example allows the static multicast route 2233::/64 to pass 3333::3333:

```
FS(config)# ipv6 mroute 2233::/64 3333::3333
```

2.4 ipv6 multicast boundary

Use this command to configure the boundary of an IPv6 multicast group. Use the **no** form of this command to restore the default setting.

ipv6 multicast boundary *access-list-name* [**in** | **out**]

no ipv6 multicast boundary *access-list-name* [**in** | **out**]

Parameter Description

Parameter	Description
access-list-name	Access list associated with the multicast boundary
in	Inbound redirection
out	Outbound direction

Defaults

The boundary of a specified IPv6 multicast group is not defined by default.

Command Mode

Interface configuration mode

Usage Guide

Note that the ACL associated with the multicast boundary is either standard ACL or extended ACL. But the extended ACL only match the destination IPv6 address.

This command filters MLD, PIM-SMv6 packets of the specified IPv6 address range. Multicast packets will not be received and sent through the interface of the boundary.

Configuration Examples

The following example configures svi1 as the boundary of all IPv6 multicast groups.

```
FS(config)# ip access-list mul-boun
FS(config-std-nacl)# permit ip 233.3.3.0 0.0.0.255
FS(config-std-nacl)#exit
FS(config)# interface vlan 1
FS(config-if)# ip multicast boundary mul-boun
```

2.5 ipv6 multicast route-limit

Use this command to limit the number of the entries that can be added to the IPv6 multicast routing table. Use the **no** or **global** form of this command to restore the default setting.

ipv6 multicast route-limit *limit* [*threshold*]

no ipv6 multicast route-limit *limit* [*threshold*]

default ipv6 multicast route-limit *limit* [*threshold*]

Parameter Description

Parameter	Description
limit	The number of the entries that can be added to the IPv6 multicast routing table is 1 to 2147483647
threshold	(Optional) Number of IPv6 multicast routes at which alarms will be triggered

Defaults

The default value of *limit* is 1024.

The default value of *threshold* is 2147483647.

Command Mode

Global configuration mode

Usage Guide

The hardware resources of different devices are limited. The routes exceeding the hardware resource will be forwarded by software, which leads to lower product performance.

Configuration Examples

The following example sets the route limit to 500 and the warning value 90.

```
FS(config)# ipv6 multicast route-limit 500 90
```

2.6 ipv6 multicast rpf longest-match

Use this command to limit the number of the entries that can be added to the IPv6 multicast routing table. Use the **no** or **global** form of this command to restore the default setting.

ipv6 multicast route-limit *limit* [*threshold*]

no ipv6 multicast route-limit *limit* [*threshold*]

default ipv6 multicast route-limit *limit* [*threshold*]

Parameter Description

Parameter	Description
limit	The number of the entries that can be added to the IPv6 multicast routing table is 1 to 2147483647
threshold	(Optional) Number of IPv6 multicast routes at which alarms will be triggered

Defaults

The default value of *limit* is 1024.

The default value of *threshold* is 2147483647.

Command Mode

Global configuration mode

Usage Guide

The hardware resources of different devices are limited. The routes exceeding the hardware resource will be forwarded by software, which leads to lower product performance.

Configuration Examples

The following example sets the route limit to 500 and the warning value 90.

```
FS(config)# ipv6 multicast route-limit 500 90
```

2.7 ipv6 multicast static

Use this command to enable flow control for multicast packets on the Layer 2 interface. Use the **no** or **default** form of this command to restore the default setting.

ipv6 multicast static *source-address group-address interface-type interface-number*

no ipv6 multicast static *source-address group-address interface-type interface-number*

default ipv6 multicast static *source-address group-address interface-type interface-number*

Parameter Description

Parameter	Description
source-address	Source IPv6 address
group-address	IPv6 address of the multicast group
interface-type interface number	2-layer interface on which multicast packets are allowed to forward

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

You can configure more than one command (or more than one interface) for a multicast flow. With flow control enabled, the multicast flow can only be forwarded through these configured interfaces.

This command controls the forwarding of multicast flows on an interface without any direct influence on the packet processing of multicast protocols. However, the action of a multicast protocol (for instance, PIM-SMv6) may be affected because some features of the multicast protocol are driven by multicast flows.

Configuration Examples

The following example configures forwarding multicast flows (2222::3333, ff66::100) through GigabitEthernet 2/6 and FastEthernet 3/2.

```
FS(config)# ipv6 multicast static 2222::3333 ff66::100 G2/6
FS(config)# ipv6 multicast static 2222::3333 ff66::100 F3/2
```

2.8 ipv6 multicast-routing

Use this command to enable the IPv6 multicast routing forwarding. Use the **no** or **default** form of this command to restore the default setting.

ipv6 multicast-routing

no ipv6 multicast-routing

default ipv6 multicast-routing

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

Use this command to enable the IPv6 multicast routing forwarding. With this function disabled, the multicast protocol cannot be enabled.

This command must be configured to enable the IPv6 multicast routing forwarding. This function conflicts with IGMP Snooping.

Configuration Examples

The following example enables the IPv6 multicast routing forwarding.

```
FS(config)# ipv6 multicast-routing
```

The following example disables the IPv6 multicast routing forwarding.

```
FS(config)#no ipv6 multicast-routing
```

2.9 msf6 force-forwarding

Use this command to enable IPv6 multicast data packets destined for the CPU to be forcedly forwarded by software. Use the **no** or **default** form of this command to restore the default settings.

msf6 force-forwarding

no msf6 force-forwarding

default msf6 force-forwarding

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode Global configuration mode

Usage Guide N/A

Examples The following example enable IPv6 multicast data packets destined for the CPU to be forcedly forwarded by software.

```
FS(config)# msf6 force-forwarding
```

2.10 msf6 nsf

Use this command to configure parameters for multicast non-stop forwarding. Use the **no** or **default** form of this command to restore the default setting.

msf6 nsf { **convergence-time** *time* | **leak** *interval* }

no msf6 nsf { **convergence-time** | **leak** }

default msf6 nsf {**convergence-time** | **leak**}

Parameter Description

Parameter	Description
convergence-time *time*	Maximum duration for which the system waits for multicast protocol convergence The unit is second. The value ranges from 0 to 3600.
leak *interval*	Interval at which multicast packets are leaked The unit is second. The value ranges from 0 to 3600.

Defaults The default convergence-time is 20 seconds and leak interval is 30 seconds.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example sets the maximum duration for which the system waits for multicast protocol convergence.

```
FS (config)# msf6 nsf convergence-time 300
```

The following example sets the interval at which multicast packets are leaked.

```
FS(config)# msf6 nsf leak 200
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.11 show ipv6 mrf6 mfc

Use this command to display the IPv6 multicast forwarding table.

show ipv6 mrf6 mfc [*v6source-address v6group-address*]

Parameter Description

Parameter	Description
v6group-address	IPv6 address of a multicast group
v6source-address	IPv6 address of a multicast source

Defaults

N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

The two parameters are optional. The source address and group address must be specified together.

If the two parameters are not specified, all mrf table entries will be displayed.

If the two parameters are specified, the mrf entries of the specified source address and group address are displayed.

Configuration Examples

The following example displays the 3-layer multicast forwarding table entries of IPv6 (the source address is 2000::1 and the group address is FF55::1).

```
FS#show ipv6 mrf6 mfc 2000::1 FF55::1
Multicast Routing and Forwarding Cache6 Table
(2000::1, FF55::1)
  FAST_SW, SWTCHED, MIN_MTU: 1500, MIN_MTU_IFINDEX: 4099, WRONG IF: 0
  Incoming interface: VLAN 1[4097]
  Outgoing interface list:
VLAN 3 (1)
```

Field	Description
2000::1	Source address of entries
FF55::1	Group address of entries
FAST_SW	Indicates whether the entries allow fast forwarding, that is, whether the entries can be forwarded by using hardware or software forwarding. If the entries include an interface that does not support the multicast function (for example, the GRE tunnel interface), fast forwarding is not allowed.
SWTCHED	Indicates whether the entries have been placed in the forwarding table on the next layer.
MIN_MTU MTU	Minimum MTU value of entries
MIN_MTU_IFINDEX	Index of the interface that has the minimum MTU value
WRONG IF	Number of multicast packets sent from the wrong inbound interface
VLAN 1[4097]	Indicates that the rpf inbound interface is VLAN1. 4097 indicates the IFINDEX of the interface.
VLAN 3 (1)	Indicates that the 3-layer outbound interface of the entries is VLAN 3. 1 indicates the ttl threshold of the 3-layer interface.

Related

Command	Description

Commands	N/A	N/A

Platform Description N/A

2.12 show ipv6 mroute

Use this command to display the IPv6 multicast forwarding table.

show ipv6 mroute [*group-or-source-address* [*group-or-source-address*]] [**sparse**] [**summary** | **count**]

Parameter Description

Parameter	Description
group-or-source-address	Multicat group IPv6 address
group-or-source-address	Multicast source IPv6 address
sparse	Displays the core entry of the multicast routing table.
summary	Displays the summary of the multicast routing table.
count	Displays the count of the multicast routing table.

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Configuration Examples

The following example displays all information of the IPv6 multicast routing table.

```
FS# show ipv6 mroute
IPv6 Multicast Routing Table
Flags: I - Immediate Stat, T - Timed Stat, F - Forwarder installed
Timers: Uptime/Stat Expiry
Interface State: Interface (TTL)
(2222::1234, ff56::1234), uptime 00:00:31, stat expires 00:02:59
Owner PIM-SMv6, Flags: TF
Incoming interface: FastEthernet 2/1
Outgoing interface list:
FastEthernet 1/3
```

The following example displays the count of the routing table.

```
FS# show ipv6 mroute count
IPv6 Multicast Statistics
Total 1 routes using 168 bytes memory
Route limit/Route threshold: 1024/2147483647
Total NOCACHE/WRONGVIF/WHOLEPKT recv from fwd: 77/147/0
Total NOCACHE/WRONGVIF/WHOLEPKT sent to clients: 77/147/0
Immediate/Timed stat updates sent to clients: 0/29
Reg ACK recv/Reg NACK recv/Reg pkt sent: 0/0/0
Next stats poll: 00:00:09
Forwarding Counts: Pkt count/Byte count, Other Counts: Wrong If pkts
Fwd msg counts: WRONGVIF/WHOLEPKT recv
Client msg counts: WRONGVIF/WHOLEPKT/Imm Stat/Timed Stat sent
Reg pkt counts: Reg ACK recv/Reg NACK recv/Reg pkt sent
(2222::1234, ff56::1234), Forwarding: 1/0, Other: 0
 Fwd msg: 0/0, Client msg: 0/0/0/0, Reg: 0/0/0
```

The following example displays the summary of the routing table.

```
FS# show ipv6 mroute summary
IPv6 Multicast Routing Table
Flags: I - Immediate Stat, T - Timed Stat, F - Forwarder installed
Timers: Uptime/Stat Expiry
Interface State: Interface (TTL)
(2222::1234, ff56::1234), 00:00:28/00:03:25, PIM-SMv6, Flags: TF
```

Field	Description
Flags	I-Immediate statistic T-Timed statistic F-Already set to the forwarding table
Timers:Uptime/Stat Expiry	Time when the entry is created. Time when it is aged.
Interface State	Interface state.

Owner	Owner of the entry, which may be a multicast routing protocol
Incoming interface	Expected packet incoming interface. If the actual incoming interface does not match it, the packets will be discarded.
Outgoing interface list	Outgoing interface list; the packets will be forwarded on the interfaces in the list.
Forwarding Counts: Pkt count/Byte count,	Forwarding count: packet count/byte count forwarded by the entry
Other Counts: Wrong If pkts	Count of the packets received from the wrong incoming interface.

Related Commands

Command	Description
clear ipv6 mroute	N/A
clear ipv6 mroute statistics	N/A

2.13 show ipv6 mroute static

Use this command to display the static IPv6 multicast routing information.

show ipv6 mroute static

Parameter Description

Parameter	Description
N/A	N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

Configuration Examples

The following example displays the static IPv6 multicast routing information.

```
FS#show ipv6 mroute static
Mroute: 2233::/64, RPF neighbor: 3333::3333
Protocol: , distance: 0
```

2.14 show ipv6 mvif

Use this command to display the basic information of the multicast interface.

show ipv6 mvif { *interface-type interface-number* }

Parameter

Parameter	Description

Description	*interface-type interface-number*	Interface type and number

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Configuration Examples

The following example displays the basic information of the multicast interface of svil.

```
FS#show ipv6 mvif
Interface       Mif Owner       Uptime
          Idx Module
Register        0          03d03h09m
VLAN 1          1    PIMSMV6      03d03h09m
```

2.15 show ipv6 rpf

Use this command to display the RPF information of the specified source IPv6 address.

show ipv6 rpf *v6source-address*

Parameter Description

Parameter	Description
v6source-address	Specified source IPv6 address

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Configuration Examples

The following example displays the information of the RPF to 2222::3333:

```
FS# show ipv6 rpf 2222::3333
 RPF interface: GigabitEthernet 0/1
  RPF neighbor: ::
  RPF route: 2222::/64
  RPF type: unicast (connected)
  RPF recursion count: 0
  Doing distance-preferred lookups across tables
  Distance: 0
  Metric: 0
```

2.16 show msf6 msc

Use this command to display entries of the IPv6 routing multicast data stream exchange table.

show msf6 msc [*v6source-address*] [*v6group-address*] [*vlan-id*]

Parameter Description

Parameter	Description
v6group-address	IPv6 address of a multicast group
v6source-address	IPv6 address of a multicast source
vlan-id	VLAN ID of the inbound interface of the entries If the value is greater than 4096, the interface is a routing interface.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide This command is used to display entries of the IPv6 routing multicast data stream exchange table.

The three parameters are all optional.

If only the source address is specified and set to s1, msc entries of this source address will be displayed.

If the source address is set to s1 and the group address is set to g1, msc entries of this source address and group address will be displayed.

If the source address is set to s1, the group address is set to g1, and the VLAN ID is set to v1, then msc entries that meet these three conditions will be displayed.

You must specify these three parameters in sequence. That is, you must specify the current parameter before specifying the next.

Configuration Examples The following example displays entries of the IPv6 routing multicast data exchange table of source address 2000::1:

```
FS# show msf6 msc 2000::1
Multicast Switching Cache Table
(2000::1, FF55::1, 1), SYNC, MTU:0, 1 OIFs
 VLAN 4094(8190): 1 OPORTs, REQ: DONE
OPORT 6, MLD-SNP, REQ: DONE
```

Field	Description
2000::1	Source address of entries
FF55::1	Group address of entries
1	VLAN ID of the inbound interface of the entries
SYNC	Indicates that the entries have been synchronized to the bottom-layer hardware.
MTU	MTU value of the entries
OIFs	Number of 3-layer interfaces of the entries
VLAN 4094(8190)	Indicates a 3-layer outbound interface VLAN xxx (yyy). If the 3-layer interface is an SVI interface, the value of xxx is the VLAN VID of the SVI, and the value of yyy is the VLAN vid+4096. If the 3-layer interface is a routing interface, the value of xxx is the IFINDEX of the interface+4096, and the value of yyy is the IFINDEX. This facilitates the index management of all 3-layer interfaces.
1 OPORTs	Number of 2-layer interfaces owned by this 3-layer exit oif
REQ: DONE	Indicates that the oif has been set to the bottom-layer hardware. The value may be: Waiting to be added. Usually it is waiting for a data stream to be triggered. DEL: Being deleted. DONE: Synchronized to the hardware.
OPORT 6	Indicates that the oif has a 2-layer interface with the interface number of 6.
MLD-SNP	Indicates that the interface is created based on MLD SNOOPING. Alternatively, the value may be one of the following options: ROUTER: Indicates that the interface is created based on the 3-layer protocol. INHERIT_FM_MLD_SNP: Indicates that the interface is created based on the MLD SNOOPING

	protocol inherited from other entries.
REQ: DONE	Indicates that the interface has been set to the bottom-layer hardware. The value may be: ADD: Waiting to be added. Usually it is waiting for a data stream to be triggered. DEL: Being deleted. DONE: Synchronized to the hardware.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.17 show msf6 nsf

Use this command to display the multicast non-stop forwarding configuration.

show msf6 nsf

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the multicast non-stop forwarding configuration.

```
FS# show msf6 nsf
Multicast HA Parameters
----------------------------------------------+----------+
protocol convergence timeout        120 secs
flow leak interval              20 secs
```

Related Commands

Command	Description
msf6 nsf	Multicast non-stop forwarding

Platform Description N/A

3 IGMP Commands

3.1 clear ip igmp group

Use this command to clear dynamic group member information obtained from the response messages in the IGMP buffer.

clear ip igmp group [*group-address* [*interface-type interface-number*]]

Parameter Description

Parameter	Description
group-address	32-bit multicast group IP address
interface-type	Interface type
interface-number	Interface number

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

The IGMP buffer includes a list that contains the multicast groups that the hosts in the direct subnet join. If the device joins a group, this group will be included in this list. To delete all the entries from the IGMP buffer, use the **clear ip igmp group** command without parameters.

Configuration Examples

The following example clears all group entries.

```
FS# clear ip igmp group
```

Related Commands

Command	Description
show ip igmp groups	N/A
show ip igmp interface	N/A

Platform Description

N/A

3.2 clear ip igmp interface

Use this command to clear the IGMP entry for the interface.

clear ip igmp interface *interface-type interface-number*

Parameter Description

Parameter	Description
interface-type	Interface type
interface-number	Interface number

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to clear the information on the interface that is generated when IGMP is configured. The information includes the number of report/leave packets, and group members on interfaces.

Configuration Examples The following example clears the IGMP entry for the interface.

```
FS# clear ip igmp interface gi 0/1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.3 ip igmp access-group

Use this command to control a multicast group on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp access-group *access-list*

no ip igmp access-group

default ip igmp access-group

Parameter Description

Parameter	Description
access-list	Name of access control list in the range from 1 to 199, 1,300 to 2,699, or characters.

Defaults This command is disabled by default.

Command Mode Interface configuration mode

Usage Guide You can add several multicast groups into the specific interfaces of the host in a subnet. These multicast groups can be controlled using **ip igmp access-group**.

With the IGMPv3 enabled, when the multicast group accesses the control command, the extended ACL is associated. If the IGMP report information received is (S1, S2, S3…Sn, G), the corresponding ACL will be used by this command to the (0, G) for the matching check. In order to use this command normally, the (0, G) must be configured explicitly for the extended ACL so as to implement the normal filtering of (S1, S2, S3…Sn, G).

Configuration Examples

The following example adds the interface Ethernet 0/1 to the group 225.2.2.2.

```
FS# configure terminal
FS(config)# access-list 1 permit 225.2.2.2 0.0.0.0
FS(config)# interface ethernet 0/1
```

FS(config-if-Ethernet 0/1)# ip igmp access-group 1The following example associates the group control list with the extended ACL on the interface Eth 0/1 which only processes the igmp protocol packets with source address 1.1.1.1 and group address 233.3.3.3.

```
FS# configure terminal
FS(config)# ip access-list extended ext_acl
FS(config-ext-nacl)# permit ip host 1.1.1.1 host 233.3.3.3
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1)# ip igmp access-group ext_acl
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.4 ip igmp enforce-router-alert

Use this command to receive IGMP packets with **router-alert** option , and discard those without the option.

ip igmp enforce-router-alert

Use the **no** form of this command to receive all IGMP packets.

no ip igmp enforce-router-alert

Use the **default** form of this command to restore the default setting.

default ip igmp enforce-router-alert

Parameter Description

Parameter	Description
-	-

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration

The following example receives IGMP packets with **router-alert** option.

Examples

```
FS# configure terminal
FS(config)#ip igmp enforce-router-alert
```

Platform Description N/A

3.5 ip igmp enforce-source-subnet

Use this command to receive only the IGMP report packet containing the source address in the same network segment as the port.

ip igmp enforce-source-subnet

Use the **no** form of this command to restore the default setting.

no ip igmp enforce-source-subnet

Use the **default** form of this command to restore the default setting.

default ip igmp enforce-source-subnet

Parameter Description

Parameter	Description
-	-

Defaults The source IP address is not checked by default.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example receives only the IGMP report packet containing the source address in the same network segment as the port.

```
FS# configure terminal
FS(config)# ip igmp enforce-source-subnet
```

Platform Description N/A

3.6 ip igmp immediate-leave group-list

In the IGMPversion2 and IGMPversion3 versions, use this command to shorten the delay of leaving a group. This command is used when a single receiving host is connected to a single interface.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp immediate-leave group-list *access-list*

no ip igmp immediate-leave

default ip igmp immediate-leave

Parameter Description

Parameter	Description
access-list	Name of access control list in the range from 1 to 199, 1,300 to 2,699, or characters.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

If this command is not configured, the device will send a particular group query message upon receiving the leaving message from the interface. When the host response is timeout, the device stops forwarding packets to this interface. The length of timeout depends on the query interval of the last member and IGMP robustness variable. The default value is 2s.

If this command is configured, the device does not send a particular group query message upon receiving the leaving message from the interface. Instead, it directly removes this interface from the IGMP buffer and notifies the IGMP protocol. This will shorten the time significantly.

Configuration Examples

The following example provides the immediate leaving function for some multicast groups. Certainly, you must make sure each interface of these multicast groups have one group member only.

```
FS# configure terminal
FS(config)# access-list 1 permit 225.192.20.0 0.0.0.255
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1)# ip igmp immediate-leave group-list 1
FS(config-if-Ethernet 0/1)# exit
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.7 ip igmp join-group

Use this command to configure the interface of the switch with host activities and adds it to a multicast group, so that the sub-switch can learn the corresponding group information. You can use this command to add an interface to a group.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp join-group *group-address*

no ip igmp join-group *group-address*

default ip igmp join-group *group-address*

Parameter Description

Parameter	Description
group-address	Multicast group IP address

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

This command enables the host activities for the IGMP interface. When the host function is enabled, the interface can initiate the report message and respond to the query message.

If the IGMP function is enabled on the interface, the interface can initiate the report message, so that the interface can learn the configured group members.

You can use this command to add an interface to a group.

Configuration Examples

The following example adds a host group member manually.

```
FS# configure terminal
FS(config)# interface fast 0/1
FS(config-if-Ethernet 0/1)# ip igmp join-group 233.3.3.3
FS(config-if-Ethernet 0/1)# exit
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.8 ip igmp last-member-query-count

Use this command to configure the value of **last-member-query-count**.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp last-member-query-count *number*

no ip igmp last-member-query-count

default ip igmp last-member-query-count

Parameter Description

Parameter	Description
number	Value of the last member query count in the range from 2 to 7.

Defaults

The default is 2.

Command Mode

Interface configuration mode

Usage Guide

This command only supports IGMPv2 and IGMPv3.

When the interface of the device receives an IGMPv2 group leaving message, the device waits for duration of query interval multiplying **last-member-query-count** time. The device will delete information about this group member if no group member report is received within the waiting time. The waiting time = last-member-query-interval * last-member-query-count + 1/2 * query-max-response-time

Configuration Examples

The following example sets the value of last member query count to 3.

```
FS# configure terminal
FS(config)# interface ethernet 0
FS(config-if-Ethernet 0/1)# ip igmp last-member-query-count 3
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.9 ip igmp last-member-query-interval

Use this command to set the time interval of sending the group query message.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp last-member-query-interval *interval*

no ip igmp last-member-query-interval

default ip igmp last-member-query-interval

Parameter Description

Parameter	Description
interval	The interval sending the group query message in the range from1 to 255 in the unit of 0.1 second.

Defaults

The default is 10 (1 second).

Command Mode

Interface configuration mode

Usage Guide

This command only supports IGMPv2 and IGMPv3.

When the interface of the device receives an IGMPv2 group leaving message, the device waits for duration of query interval multiplying **last-member-query-count** time. The device will delete information about this group member if no group member report is received within the waiting time.

The waiting time = last-member-query-interval * last-member-query-count + 1/2 * query-max-response-time

Configuration Examples

The following example sets the interval of sending the group query message to 20 seconds.

```
FS# configure terminal
FS(config)# interface eth 0
```

```
FS(config-if-Ethernet 0/1)# ip igmp last-member-query-interval 200
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.10 ip igmp limit

Use this command to globally set the maximum number of IGMP group records.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp limit *number* [**except** *access-list*]

no ip igmp limit

default ip igmp limit

Parameter Description

Parameter	Description
number	Maximum number of IGMP states, depending on devices
except *access-list*	Name of access control list in the range from 1 to 199, 1,300 to 2,699, or characters.

Defaults

Global: 65,536

Interface:1,0124

Command Mode

Global configuration mode/Interface configuration mode

Usage Guide

Use this command to configure the maximum number of IGMP group records globally or on interfaces. The messages of the members exceeding the threshold will not be saved in the IGMP buffer and will not be forwarded. The messages of the members will be ignored if they exceed the interface or global configuration. If the configured value in global configuration mode is less than that in interface configuration mode, take the former.

Configuration Examples

The following example sets the maximum number to 400 globally and to 300 on interfaces except ACL 1.

```
FS# configure terminal
FS(config)# ip igmp limit 400 except acl1
FS(config)# interface eth 0/1
FS(config-if-Ethernet 0/1)# ip igmp limit 300 except acl1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.11 ip igmp mroute-proxy

Use this command to configure an interface as an mroute-proxy interface that can transmit messages to its uplink ports.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp mroute-proxy *interface-type interface-number*

no ip igmp mroute-proxy

default ip igmp mroute-proxy

Parameter Description

Parameter	Description
interface-type interface-number	Name of the relevant uplink interface

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide Use the **ip igmp proxy-service** command to set the uplink interface as the **proxy-service** interface.

Use the **ip igmp mroute-proxy** command to set the downlink interface as the **mroute-proxy** interface.

IGMP query packets are forwarded from the **proxy-service** interface to the **mroute-proxy** interface. IGMP report packets are forward reversely.

Configuration Examples The following example configures E0/1 as **proxy-service** E0/2 as **mroute-proxy**.

```
FS(config)# interface eth 0/1
FS(config-if-Ethernet 0/1)# ip igmp proxy-service
FS(config-if-Ethernet 0/1)# exit
FS(config)# interface eth 0/2
FS(config-if-Ethernet 0/2)# ip igmp mroute-proxy
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.12 ip igmp proxy-service

Use this command to enable the service function of all downlink **mroute-proxy** ports.

If you run this command on an interface, the interface becomes the uplink port of the corresponding **mroute-proxy** that associates its downlink ports and maintains the group information reported by the downlink

ports.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp proxy-service

no ip igmp proxy-service

default ip igmp proxy-service

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Interface configuration mode

Usage Guide

Use the **ip igmp proxy-service** command to set the uplink interface as the **proxy-service** interface.

Use the **ip igmp mroute-proxy** command to set the downlink interface as the **mroute-proxy** interface.

The command can configure at most 32 proxy-service ports. The number of interface with IGMP Proxy enabled is limited by the supported multicast interface number. When receiving a query message, the **proxy-service** port responds according to the IGMP group member information maintained by the port itself. The member information maintained by the **proxy-service** port is collected from the interface configured with **mroute-proxy**. Therefore, if a port is configured with proxy-service, the port performs the host activities, but not the device activities.

If **switch port** operation is performed on an interface with proxy-service command configured, the **ip igmp mroute-proxy interface** command configured on the associated downlink ports is automatically deleted.

Configuration Examples

The following example configures E0/1 as **proxy-service** and E0/2 as **mroute-proxy**.

```
FS(config)# interface eth 0/1
FS(config-if-Ethernet 0/1)# ip igmp proxy-service
FS(config-if-Ethernet 0/1)# exit
FS(config)# interface eth 0/2
FS(config-if-Ethernet 0/2)# ip igmp mroute-proxy
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.13 ip igmp query-interval

Use this command to configure the query interval of an ordinary member.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp query-interval *seconds*

no ip igmp query-interval

default ip igmp query-interval

Parameter Description

Parameter	Description
seconds	Query interval of ordinary member, in the range is from 1 to 18,000 in the unit of seconds.

Defaults The default is 125 seconds.

Command Mode Interface configuration mode

Usage Guide

Configuration Examples The following example configures the query interval of ordinary member to 120 seconds on the interface Ethernet 0.

```
FS(config-if)# ip igmp query-interval 120
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.14 ip igmp query-max-response-time

Use this command to configure the maximum response interval.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp query-max-response-time *seconds*

no ip igmp query-max-response-time

default ip igmp query-max-response-time

Parameter Description

Parameter	Description
seconds	The maximum response interval, in the range from 1 to 25 seconds

Defaults The default is 10 seconds.

Command Mode Interface configuration mode

Usage Guide This command controls the interval for the respondent to respond the query message before the device deletes the group information.

Configuration Examples

The following example configures the maximum response interval to 20 seconds on the interface Ethernet 0.

```
FS(config-if-Ethernet 0/1)# ip igmp query-max-response-time 20
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.15 ip igmp query-timeout

Use this command to configure the time the device waits before it takes over as the querier.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp query-timeout *seconds*

no ip igmp query-timeout

default ip igmp query-timeout

Parameter Description

Parameter	Description
seconds	Time the device waits before it takes over as the querier, in the range from 60 to 300 in the unit of seconds.

Defaults

The default is 255 seconds.

Command Mode

Interface configuration mode

Usage Guide

This device becomes the querier if no query packet is received in this duration.

Configuration Examples

The following example configures the time the device waits before it takes over as the querier to 200 s seconds on the interface Ethernet 0/1.

```
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1)# ip igmp query-timeout 200
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.16 ip igmp robustness-variable

Use this command to change the value of the robustness variable.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp robustness-variable *number*

no ip igmp robustness-variable

default ip igmp robustness-variable

Parameter Description

Parameter	Description
number	The value of robustness variable, in the range from 2 to 7

Defaults

The default is 2.

Command Mode

Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the value of robustness variable to 3.

```
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1)# ip igmp robustness-variable 3
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.17 ip igmp send-router-alert

Use this command to send IGMP report packets with the Router Alert option.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp send-router-alert

no ip igmp send -router-alert

default ip igmp send -router-alert

Parameter Description

Parameter	Description
-	-

Defaults

The Router Alert option is not carried in IGMP packets by default.

Command

Global configuration mode

Mode

Usage Guide N.A

Configuration Examples The following example sends IGMP report packets with the Router Alert option.

```
FS# configure terminal
FS(config)# ip igmp send-router-alert
```

Platform Description N/A

3.18 ip igmp ssm-map enable

Use this command to enable the **igmp ssm-map** function in the global configuration mode.

Use the **no** form of this command to restore the default setting.

ip igmp ssm-map enable

no ip igmp ssm-map enable

default ip igmp ssm-map enable

Parameter Description

Parameter	Description
-	-

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide If this command is configured, the dynamically learned group information is added forcibly to the associated source record. This command is usually used together with the **ip igmp ssm-map static** command.

Configuration Examples The following example enables the **igmp ssm-map** function in the global configuration mode.

```
FS(config)# ip igmp ssm-map enable
FS(config)# ip igmp ssm-map static 11 192.168.2.2.
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.19 ip igmp ssm-map static

Use this command to map the static **ssm-map** source IP address to the group records.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp ssm-map static *access-list source-address*

no ip igmp ssm-map static *access-list source-address*

default ip igmp ssm-map enable *access-list source-address*

Parameter Description

Parameter	Description
access-list	ACL name in the range 1 to 99, 1,300 to 1,999 or characters.
source-address	Unicast address mapped to the group record.

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

This command is used together with the **ip igmp ssm-map enable** and **ip igmp ssm-map static** command. After configuration, the port maps the corresponding source IP address to all received messages below **v3**.

Configuration Examples

The following example maps the source address 192.168.2.2 to all group records permitted by ACL 11.

```
FS(config)# ip igmp ssm-map enable
FS(config)# ip igmp ssm-map static 11 192.168.2.2.
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.20 ip igmp static-group

Use this command to directly add an interface to a group.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp static-group *group-address*

no ip igmp static-group *group-address*

default ip igmp static-group *group-address*

Parameter Description

Parameter	Description
group-address	Multicast group IP address

Defaults

The switch is not added to a multicast group by default.

Command Mode

Interface configuration mode

Usage Guide

This command directly adds an interface to a multicast group. The difference from **join-group** is that it directly adds an interface to the group without interacting with a report message.

You can use this command to add an interface to a group.

The added interfaces by this command can only be deleted by using the **no ip igmp static-group** command.

Configuration Examples

The following example adds a host group member.

```
FS# configure terminal
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1)# ip igmp static-group 236.6.6.6
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.21 ip igmp version

Use this command to set the version number of IGMP to be used on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp version { **1** | **2** | **3** }

no ip igmp version

default ip igmp version

Parameter Description

Parameter	Description
1	IGMP v1
2	IGMP v2
3	IGMP v3

Defaults

The default is IGMPv2.

Command Mode

Interface configuration mode

Usage Guide

Use this command to globally configure the IGMP version. It should be noted that IGMP will reset after configuration.

Configuration Examples

The following example sets the version number to 3.

```
FS# configure terminal
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1)# ip igmp version 3
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.22 show ip igmp groups

Use this command to display the groups directly connected to the device and the group information learnt from IGMP.

show ip igmp groups [*interface-type interface-number*] [*group-address*] [**detail**]

Parameter Description

Parameter	Description
group-address	32-bit multicast group IP address, namely Category D address. 8 bits are in one group in decimal form. Groups are separated with dots.
interface-type	Interface type
interface-number	Interface number
detail	Displays the detailed information

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

Use this command without any parameters to display group address, interface type, and information about all the multicast groups directly connected to the interface. Information about a specific group is displayed if a group address is added to the command.

Configuration Examples

The following example displays information about all the groups.

```
FS# show ip igmp groups
IGMP Connected Group Membership
Group Address    Interface    Uptime      Expires      Last Reporter
224.0.1.1    eth2          00:00:09     00:04:17     10.10.0.82
224.0.1.24          eth2          00:00:06     00:04:14     10.10.0.84
224.0.1.40   eth2          00:00:09     00:04:15     10.10.0.91
224.0.1.60          eth2          00:00:05     00:04:15     10.10.0.7
239.255.255.250  eth2  00:00:12     00:04:15     10.10.0.228
239.255.255.254  eth2  00:00:08     00:04:13     10.10.0.84
```

The following example displays detailed information about a specific group.

```
FS# show ip igmp groups 224.1.1.1 detail
Interface              : eth1
Group: 224.1.1.1
Uptime: 00:00:42
```

```
Group mode: Include
Last reporter: 192.168.50.111
TIB-A Count: 2
TIB-B Count: 0
Group source list: (R - Remote, M - SSM Mapping)
Source Address Uptime v3 Exp Fwd Flags
192.168.55.55 00:00:42 00:03:38 Yes R
192.168.55.66 00:00:42 00:03:38 Yes R
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.23 show ip igmp interface

Use this command to display the information of this interface.

show ip igmp interface [*interface-type interface-number*]

Parameter Description

Parameter	Description
interface-type	Interface type.
interface-number	Interface number.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Run this command without any parameter, and all interface information is displayed by default.

Configuration Examples The following example displays the information of all the interfaces.

```
FS# show ip igmp interface
Interface vlan 1(Index 4294967295)
IGMP Active, Non-Querier, Version 3 (default)
IGMP querying router is 0.0.0.0
IGMP query interval is 125 seconds
IGMP querier timeout is 255 seconds
IGMP max query response time is 10 seconds
Last member query response interval is 1000 milliseconds
Group Membership interval is 260 seconds
```

Related

Command	Description

Commands

N/A	N/A

Platform Description N/A

3.24 show ip igmp ssm-mapping

Use this command to display the **ssm-map** information of the IGMP configuration.

show ip igmp ssm-mapping [*group-address*]

Parameter Description

Parameter	Description
group-address	Source address to be mapped

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Run this command without any parameter, and all SSM-MAP information is displayed.

Configuration Examples The following example displays the **ssm-map** configuration information.

```
FS#show ip igmp ssm-mapping 233.3.3.3
Group address: 233.3.3.3
Database          : Static
Source list    : 192.3.3.3
                          : 3.3.3.3
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4 MLD Commands

4.1 clear ipv6 mld group

Use this command to clear the dynamic group member learned by MLD protocol.

clear ipv6 mld group [*group-address*] [*interface-type interface-number*]

Parameter Description

Parameter	Description
group-address	IPv6 multicast group address with 128 bits
interface-type	The associated interface type
interface-number	The associated interface number

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

MLD maintains a list of the multicast groups to be added to the host in the directly-connected sub-net. Use the **clear ipv6 mld group** command to remove all dynamic group member record from the MLD group member list.

Configuration Examples

The following example clears all group records.

```
FS# clear ipv6 mld group
```

The following example clears one group record.

```
FS# clear ipv6 mld group ff1e::100
```

The following example s clears the record on a specified interface.

FS# **clear ipv6 mld group** *ff1e::100 interfa fa0/1*

Related Commands

Command	Description
show ipv6 mld groups	N/A
show ipv6 mld interface	N/A

Platform Description

N/A

4.2 clear ipv6 mld interface

Use this command to clear all MLD statistical information and the group member records on the interface.

clear ipv6 mld interface *interface-type interface-number*

Parameter Description

Parameter	Description
interface-type	The interface type

interface-number	The interface ID

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to clear all group information and some packet statistical information learned by LDP on the interface. Those packet statistical information include the number of the received report packets, the number of the done packets and the the number of the group members on the interface.

Configuration Examples The following example clears all MLD statistical information and the group member records on the interface.

```
FS# clear ipv6 mld interface fa 1/1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.3 ipv6 mld access-group

Use this command to filter the specific requested group on the interface. Only the report packets in accordance with the corresponding ACL are allowed to be processed.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld access-group *access-list*

no ipv6 mld access-group

default ipv6 mld access-group

Parameter Description

Parameter	Description
access-list	The IPv6 ACL name

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide Use this command to filter some groups on the interface and associate with the corresponding ACLs. The correspondent ACL deny report packets will be discarded. This command supports the extended ACL and the source record information of the MLDv2 packets can be filtered.

The multicast group access control command is associated with the extended ACL. When the received MLD report mesage is (S1,S2,S3…Sn,G), use this command to match and check the (0,G) message using the

corresponding ACL. To this end, a (0,G) must be configured for the extended ACL to filter the (S1,S2,S3…Sn,G).

Configuration Examples

The following example enables the group information carried in the report packets to be in accordance with acl for the normal handling on the interface Eth0/1.

```
FS(config)#ipv6 access-list acl
FS(config-ipv6-acl)#permit ipv6 ::/64 ff66::100/64
FS(config-ipv6-acl)#permit ipv6 2222::3333/64 ff66::100/64
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1-Ethernet 0/1)# ipv6 mld access-group acl
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.4 ipv6 mld immediate-leave group-list

Use this command to set the immediate-leave mechanism. With this command configured, the group within the range of group-list, will not send the query packet for the specific group and will remove this group from the group member list immediately after receiving the corresponding done packets. This function is used in the condition that there is only one multicast source that receives the host request on an interface. Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld immediate-leave group-list *access-list*

no ipv6 mld immediate-leave group-list

default ipv6 mld immediate-leave group-list

Parameter Description

Parameter	Description
access-list	The IPv6 ACL name

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

Without this command configured, when the device receives the MLD leave packets, the request packets for the specific groups will be sent. If there is still no host reply within the response time, the device will remove the corresponding group record from the group member list. The timeout interval is determined by the last member query interval and the MLD robustness variable, and the default value is 2 seconds.

With this command configured, when the device receives the MLD leave packets, it will not send the request packets for the specific groups, but remove the group information immediately, which reduces the leave delay

greatly in the condion that there is only one host connecting to the interface.

Configuration Examples

The following example configures the immediate-leave function.

```
FS# configure terminal
FS(config)#ipv6 access-list acl
FS(config-ipv6-acl)#permit ipv6 2222::3333/64 ff66::100/64
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1-Ethernet 0/1)# ipv6 mld immediate-leave group-list acl
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.5 ipv6 mld join-group

Use this command to configure the host action for the switch interface and add the related multicast group to the interface.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld join-group *group-address*

no ipv6 mld join-group *group-address*

default ipv6 mld join-group group-address

Parameter Description

Parameter	Description
group-address	The IPv6 non-management multicast group address, which cannot start with 0xFF*1, 0xFF*2, and 0xFF3*

Defaults

The interface is not added to any group by default.

Command Mode

Interface configuration mode

Usage Guide

Use this command to enable the MLD host action on the interface. The interface can not only send the packets initiatively, but also reply to the query packets.

Use this command if it is necessary to join a group member to the interface.

Configuration Examples

The following example adds the host group member:

```
FS# configure terminal
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1-Ethernet 0/1)# ipv6 mld join-group ff55::100
```

Related

Command	Description

Commands

N/A	N/A

Platform Description N/A

4.6 ipv6 mld last-member-query-count

Use this command to set the last-member-query-count number.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld last-member-query-count *number*

no ipv6 mld last-member-query-count

default ipv6 mld last-member-query-count

Parameter Description

Parameter	Description
number	The last member query count number. The valid range is 2 to 7.

Defaults The default is 2.

Command Mode Interface configuration mode

Usage Guide With the MLD leave packets received on the interface, if there is no group reply within the timeout interval, this group will be removed from the MLD group member list on the interface. The timeout interval is the query interval for the specific group (multiplied by the value of **mld last-member-query-count**) plus half the reply time.

Configuration Examples The following example sets the last-member-query-count number to 3.

```
FS# configure terminal
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1)# ipv6 mld last-member-query-count 3
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.7 ipv6 mld last-member-query-interval

Use this command to set the time interval of sending the query packets to the specific group.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld last-member-query-interval *interval*

no ipv6 mld ast-member-query-interval

default ipv6 mld last-member-query-interval

Parameter Description

Parameter	Description
interval	The valid range is 1-255 in the unit of 0.1 seconds.

Defaults

The default is 10 seconds.

Command Mode

Interface configuration mode

Usage Guide

With the MLD leave packets received on the interface, if there is no group reply within the timeout interval, this group will be removed from the MLD group member list on the interface. The timeout interval is the query interval for the specific group(multiplied by the value of **mld last-member-query-count**) plus half the reply time.

Configuration Examples

The following example sets the mld last-member-query-interval to 2 seconds.

```
FS# configure terminal
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1)# ipv6 mld last-member-query-interval 20
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.8 ipv6 mld limit

Use this command to enable to learn the max-number of the group member through the MLD protocol.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld limit *number* [**except** *access-list*]

no ipv6 mld limit *number* [**except** *access-list*]

default ipv6 mld limit ***number*** [**except** *access-list*]

Parameter Description

Parameter	Description
number	The maximum number of the group member learned by the MLD
except *access-list*	(Optional) The ACL beyond the configured mld limit

Defaults

Interface: 1,024

Global: 65,536

Command

Interface configuration mode/Global configuration mode

Mode

Usage Guide

Use this command to set the max-number of the group members learned through the MLD in the global configuration mode. If the group member number has exceeded the limit, the received report packets later will be discarded and fail to form the group record.

If the except list has also been set at the same time, the group member packets, including the packets in the access-list, will be free from the member number limit.

This command can also be used in the interface configuration mode. The configurations in two different configuration modes are independent. If the number limit in the global configuration mode is lower than the one in the interface configuration mode, the former configuration takes precedence.

Configuration Examples

The following example sets the MLD limit to 400, but the configured ACL can still learn.

```
FS(config-if)# ipv6 mld limit 300 except acl
FS# configure terminal
FS(config)# ipv6 mld limit 400 except acl1
FS(config)# interface eth 0/1
FS(config-if-Ethernet 0/1)# ipv6 mld limit 300 except acl1
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.9 ipv6 mld mroute-proxy

Use this command to enable the interface to forward the packets to the correspondent connected interface.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld mroute-proxy *interface-type interface-number*

no ipv6 mld mroute-proxy

default ipv6 mld mroute-proxy

Parameter Description

Parameter	Description
interface-type interface-number	The correspondent connected interface

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

Use the **ipv6 mld proxy-service** command to configure the uplink interface as **proxy-service** one.

Use the **ipv6 mld mroute-proxy** command to configure the downlink interface as **mroute-proxy** one.

After the connected interface has been configured as the proxy-service interface, it can forward the MLD packets

sent from other members.

Configuration Examples

The following example sets the interface as the mroute-proxy interface and enables multicast proxy.

```
FS(config)# interface eth 0/1
FS(config-if-Ethernet 0/1)# ipv6 mld proxy-service
FS(config-if-Ethernet 0/1)# exit
FS(config)# interface eth 0/2
FS(config-if-Ethernet 0/2)# ipv6 mld mroute-proxy eth 0/1
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.10 ipv6 mld proxy-service

Use this command to enable the proxy-service function for the interface connected with the mroute-proxy interface in the downward direction. After configuring this command, the interface becomes the one connected with the mroute-proxy in the upward direction, and associates with and maintains the group information from the interfaces in the downward direction. Use the **no** or **default** form of this command to disable the default setting.

ipv6 mld proxy-service

no ipv6 mld proxy-service

default ipv6 mld proxy-service

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Interface configuration mode

Usage Guide

Use the **ipv6 mld proxy-service** command to configure the uplink interface as **proxy-service** one.

Use the **ipv6 mld mroute-proxy** command to configure the downlink interface as **mroute-proxy** one.

The configurable max-number limit is 32. The number of the interfaces with MLD Proxy enabled is limited by the number multicast interfaces supported device. After receiving the query packet, the proxy-service interface replies according to the member information, which are collected from the mroute-proxy interface and maintained by the proxy-service interface itself. With proxy-service configured, this interface owns the host action rather than the router action.

The **ipv6 mld mroute-proxy interface** command configuration on the associated interface in the downward direction is removed automatically if the switchport operation is performed on the interfaces.

Configuration Examples

The following example sets the interface proxy-service and enables multicast proxy.

```
FS(config)# interface eth 0/1
FS(config-if-Ethernet 0/1)# ipv6 mld proxy-service
FS(config-if-Ethernet 0/1)# exit
FS(config)# interface eth 0/2
FS(config-if-Ethernet 0/1-Ethernet 0/2)# ipv6 mld mroute-proxy eth 0/1
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.11 ipv6 mld querier-timeout

Use this command to set the querier alive period.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld querier-timeout *seconds*

no ipv6 mld querier-timeout

default ipv6 mld querier-timeout

Parameter Description

Parameter	Description
seconds	The querier alive period, in the range from 60 to 300 in the unit of seconds.

Defaults

The default is 255 seconds.

Command Mode

Interface configuration mode

Usage Guide

After the querier sends the query packet, the querier will wait to receive the query packet sent by another querier within the alive period. If no packet is received by the first querier within the alive period, then the first querier takes itself as the only querier on the network segment.

Configuration Examples

The following example sets the querier alive period to 200 seconds.

```
FS(config-if-Ethernet 0/1)# ipv6 mld querier-timeout 200
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.12 ipv6 mld query-interval

Use this command to set the query interval for the general member.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld query-interval *seconds*

no ipv6 mld query-interval

default ipv6 mld query-interval

Parameter Description

Parameter	Description
seconds	The query interval for the general member, in the range from 1 to 18,000 in the unit of seconds.

Defaults

The default is 125 seconds.

Command Mode

Interface configuration mode

Usage Guide

Configuration Examples

The following example sets the query-interval for the general member on the interface Ethernet 0/1.

```
FS(config-if-Ethernet 0/1)# ipv6 mld query-interval 120
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.13 ipv6 mld query-max-response-time

Use this command to set the maximum response time.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld query-max-response-time *seconds*

no ipv6 mld query-max-response-time

default ipv6 mld query-max-response-time

Parameter Description

Parameter	Description
seconds	The maximum response time, in the range from 1 to 25 in the unit of seconds

Defaults

The default is 10 seconds.

Command

Interface configuration mode

Mode

Usage Guide Use this command to control the maximum response time of the host after the device sends the query packets. If there is no response within the maximum response time, MLD will remove the corresponding group from the group member list.

Configuration Examples The following example sets the maximum query response time on the interface Ethernet 0/1.

```
FS(config-if-Ethernet 0/1)# ipv6 mld query-max-response-time 20
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.14 ipv6 mld robustness-variable

Use this command to set querier robustness value.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld robustness-variable *number*

no ipv6 mld robustness-variable

default ipv6 mld robustness-variable

Parameter Description

Parameter	Description
number	Sets the querier robustness value, in the range from 2 to 7.

Defaults The default is 2.

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example sets the querier robustness value to 3.

```
FS# configure terminal
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1)# ipv6 mld robustness-variable 3
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.15 ipv6 mld ssm-map enable

Use this command to enable the mld ssm-map function.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld ssm-map enable

no ipv6 mld ssm-map enable

default ipv6 mld ssm-map enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide With this command configured, the group information dynamically learned will be added to the related source record forcibly. Usually, this command is set with the **ipv6 mld ssm-map static** command.

Configuration Examples The following example enables the mld ssm-map function in the global configuration mode.

```
FS(config)# ipv6 mld ssm-map enable
FS(config)# ipv6 mld ssm-map static 11 4444::1234
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.16 ipv6 mld ssm-map static

Use this command to set the mld ssm-map static mapping source record in the global configuration mode.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld ssm-map static *access-list source-address*

no ipv6 mld ssm-map static *access-list source-address*

default ipv6 mld ssm-map static *access-list source-address*

Parameter Description

Parameter	Description
access-list	Sets the IPv6 ACL name.

source-address	Sets the unicast address for the group record mapping.

Defaults There is no mapping source address by default.

Command Mode Global configuration mode

Usage Guide This command is used with the **ipv6 mld ssm-map enable** command. With this command configured, the received mldv1 packets are mapped to the correspondent source record.

Configuration Examples The following example maps all group record of the ACL name to the source address 4444::1234.

```
FS(config)# ipv6 mld ssm-map enable
FS(config)# ipv6 mld ssm-map static te 4444::1234
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.17 ipv6 mld static-group

Use this command to add an interface to a group statically.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld static-group *group-address*

no ipv6 mld static-group *group-address*

default ipv6 mld static-group *group-address*

Parameter Description

Parameter	Description
group-address	Sets the IPv6 non-management multicast group address.

Defaults The interface is not added to any group statically.

Command Mode Interface configuration mode

Usage Guide Use this command to add a multicast group to the interface directly. The difference from the join-group is that the packet interaction is not necessary.

Use this command when it is necessary to add a group member to the interface. It is worth mentioning that only the **no ipv6 mld static-group** command can be used to delete the group, but not the **clear** command.

Configuration Examples The following example adds interface Eth0/1 to group ff55::3 statically.

```
FS# configure terminal
```

```
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1)# ipv6 mld static-group ff55::3
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.18 ipv6 mld version

Use this command to set the MLD version number on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld version { **1** | **2** }

no ipv6 mld version

default ipv6 mld version

Parameter Description

Parameter	Description
{ **1** | **2** }	Sets the MLD version number.

Defaults The default is 2.

Command Mode Interface configuration mode

Usage Guide Use this command to control the MLD version number.

Configuration Examples The following example sets the MLD version 1.

```
FS# configure terminal
FS(config)# interface ethernet 0/1
FS(config-if-Ethernet 0/1)# ipv6 mld version 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.19 show ipv6 mld groups

Use this command to display the group connected with the switch and the group information learned from the MLD.

show ipv6 mld groups [*group-address* | *interface-type interface-number*] [**detail**]

Parameter Description

Parameter	Description
group-address	Sets the IPv6 multicast group address in 128 bits.
interface-type	Sets the interface type.
interface-number	Sets the interface number.
detail	Displays the information in detail.
	Displays all the group information.

Defaults N/A

Command Mode Privileged EXEC mode/Interface configuration mode

Usage Guide Use this command without the parameters to display the information including the group address, the interface type and the multicast group information. Use this command with a parameter to display the information on a specific group.

Configuration Examples The following example displays all group information.

```
FS# show ipv6 mld groups
MLD Connected Group Membership
Group Address    Interface Uptime Expires    Last Reporter
ff66::1 VLAN1 00:10:57 00:02:16 fe80::2d0:f8ff:fe22:3378
```

The following example displays the detailed information.

```
FS# show ipv6 mld groups detail
Interface:          VLAN 1
Group:              ff66::1
Uptime:             00:10:26
Group mode:         Exclude (Expires: 00:02:47)
Last reporter:    fe80::2d0:f8ff:fe22:3378
Source list is empty
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.20 show ipv6 mld interface

Use this command to display the configurations on the interface.

show ipv6 mld interface [interface-type interface-number]

Parameter Description

Parameter	Description
interface-type	Sets the interface type.
interface-number	Sets the interface number.

Defaults N/A

Command Mode User EXEC mode/Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the state information of all interfaces.

```
FS# show ipv6 mld interface
Interface VLAN 2 (Index 4098)
  MLD Enabled, Inactive, Version 2 (default)
  MLD interface limit is 1024
  MLD interface has 0 group-record states
  MLD interface has 1 join-group records
  MLD interface has 0 static-group records
  MLD activity: 0 joins, 0 leaves
  MLD query interval is 125 seconds
  MLD querier timeout is 255 seconds
  MLD max query response time is 10 seconds
  Last member query response interval is 10 (1/10s)
  Last member query count is 2
  Group Membership interval is 260
  Robustness Variable is 2
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.21 show ipv6 mld ssm-mapping

Use this command to display the mapping information of the source address for the group record.

show ipv6 mld ssm-mapping [*group-address*]

Parameter Description

Parameter	Description
group-address	Displays the group address.

Defaults N/A

Command Mode User EXEC mode/Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the state information of all interfaces.

```
FS# show ipv6 mld interface
Interface VLAN 2 (Index 4098)
  MLD Enabled, Inactive, Version 2 (default)
  MLD interface limit is 1024
  MLD interface has 0 group-record states
  MLD interface has 1 join-group records
  MLD interface has 0 static-group records
  MLD activity: 0 joins, 0 leaves
  MLD query interval is 125 seconds
  MLD querier timeout is 255 seconds
  MLD max query response time is 10 seconds
  Last member query response interval is 10 (1/10s)
  Last member query count is 2
  Group Membership interval is 260
  Robustness Variable is 2
```

Related Commands

Command	Description
N/A	N/A

5 PIM-DM Commands

5.1 clear ip pim dense-mode track

Use this command to clear the statistics of PIM-DM packets.

clear ip pim dense-mode track

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to reconfigure the start time of the statistics and clear the PIM packet counter.

Configuration Examples The following example clears the statistics of PIM-DM packets.

```
FS# clear ip pim dense-mode track
```

Related Commands

Command	Description
show ip pim dense-mode track	Displays the statistics of the PIM packets.

Platform Description N/A

5.2 ip pim dense-mode

Use this command to enable PIM-DM on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ip pim dense-mode

no ip pim dense-mode

default ip pim dense-mode

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Interface configuration mode

Mode

Usage Guide

- Before enabling the PIM-DM, enable the multicast forwarding function in the global configuration mode. Otherwise, the multicast data packet cannot be forwarded even the PIM-DM is enabled.
- Once the PIM-DM is enabled, the IGMP is enabled automatically on the interface without manual configuration.
- During the execution of this command, if the prompt "Failed to enable PIM-DM on <Interface Name>, resource temporarily unavailable, please try again" appears, re-execute this command.
- During the execution of this command, if the prompt "PIM-DM Configure failed! VIF limit exceeded in NSM!!!" appears; it indicates the allowed configured multicast interface number exceeds the upper limit of the multicast interfaces. In this case, if it's still necessary to enable the PIM-DM on the interface, delete the unnecessary PIM-DM, PIM-SM or DVMRP interfaces.
- It is not recommended to configure different multicast routing protocols on different interfaces of a device.
- IPv4 multicast function supports only 4Over4, 4Over4 GRE, 4Over6, and 4Over6 GRE on tunnel ports. For those multicast-incapable, through multicast function can be enabled, there are no error prompts and packet multicast transmission.
- Multicast tunnels can be established only on Ethernet ports, which do not support nested tunneling and multicast QoS/ACL.

Configuration Examples

The following example enables PIM-DM on the interface.

```
FS# configure terminal
FS(config)# interface fastethernet 0/1
FS(config-if)# ip pim dense-mode
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.3 ip pim dense-mode passive

Use this command to enable PIM-DM PASSIVE.

Use the **no** or **default** form of this command to restore the default setting.

ip pim dense-mode passive

no ip pim dense-mode passive

default ip pim dense-mode passive

Parameter Description

Parameter	Description
N/A	N/A

Defaults PIM-DM PASSIVE is disabled by default.

Command Mode Interface configuration mode

Usage Guide Please configure multicast route forwarding in global configuration mode before enabling PIM-DM PASSIVE.
When PIM-DM PASSIVE is enabled, IGMP is enabled on each interface automatically.
Enabled with PIM-DM PASSIVE, the interface neither receives nor sends PIM packets. Instead, it forwards multicast packets. PIM-DM PASSIVE is generally configured on the device of the stub area, so as to avoid floods of PIM hello packets.

Configuration Examples The following example enables PIM-DM PASSIVE on interface fastethernet 0/1.

```
FS# configure terminal
FS(config)# interface fastethernet 0/1
FS(config-if)# ip pim dense-mode passive
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.4 ip pim dense-mode subvlan

Use this command to enable PIM-DM on the Super VLAN interface. Use the **no** or **default** form of this command is to restore the default setting.

ip pim dense-mode subvlan [**all** | *vid*]

no ip pim dense-mode subvlan

default ip pim dense-mode subvlan

Parameter Description

Parameter	Description
all	Sends PIM packets to all sub VLANs.
vid	Sends PIM packets to the specified VLAN.

Defaults PIM-DM is disabled on the Super VLAN interface by default.

Command Mode Interface configuration mode

Usage Guide In general, a super VLAN includes many sub VLANs. If the PIM-DM protocol is enabled on the interfaces of the super VLAN, PIM-DM multicast packets will be replicated and sent to all sub VLANs. As a result, the traffic may exceed the device capability, causing protocol flapping. The Super VLAN interface is disabled with PIM-DM generally. Use this command to enable PIM-DM on the Super VLAN interface to send PIM packets to all sub VLANs

or the specified sub VLAN.

Configuration Examples

The following example enables PIM-DM on the Super VLAN interface and sends PIM packets to sub VLAN 200.

```
FS# configure terminal
FS(config)# interface vlan 100
FS(config-if-vlan 100)# ip pim dense-mode subvlan 200
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.5 ip pim neighbor-filter

Use this command to enable the neighbor filtering on the interface. Use the **no** or **default** form of this command is to restore the default setting.

ip pim neighbor-filter *access-list*

no ip pim neighbor-filter *access-list*

default ip pim neighbor-filter *access-list*

Parameter Description

Parameter	Description
access-list	Access control list supporting numerical ACL in the range from 1 to 99 and name ACL

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

If the neighbor filtering is set, PIM-DM will not establish the peering relationship with this neighbor or will terminate the established peering relationship with this neighbor once the neighbor is denied by the filtering access list.

Configuration Examples

The following example enables the neighbor filtering on the interface.

```
FS# configure terminal
FS(config)# interface fastethernet 0/1
FS(config-if)# ip pim neighbor-filter 14
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.6 ip pim override-interval

Use this command to reconfigure the override-interval of the hello message.

Use the **no** or **default** form of this command to restore the default setting.

ip pim override-interval *interval-milliseconds*

no ip pim override-interval

default ip pim override-interval

Parameter Description

Parameter	Description
interval-milliseconds	In the range from 1 to 65,535 in the unit of milliseconds

Defaults The default is 2,500 milliseconds.

Command Mode Interface configuration mode

Usage Guide Configuring the override-interval is to set the pruning veto time for the interface.

Configuration Examples The following example sets the override-interval to 3,000 milliseconds.

```
FS# configure terminal
FS(config)# interface fastethernet 0/1
FS(config-if)# ip pim override-interval 3000
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.7 ip pim propagation-delay

Use this command to reconfigure the propagation-interval of the hello message.

Use the **no** or **default** form of this command to restore the default setting.

ip pim propagation-delay *interval-milliseconds*

no ip pim propagation-delay

default ip pim propagation-delay

Parameter Description

Parameter	Description
interval-milliseconds	Propagation-interval of the hello message in the range from 1 to 32,767 in the

	unit of milliseconds

Defaults The default is 500 milliseconds.

Command Mode Interface configuration mode

Usage Guide Configuring the propagation-delay is to set the transmission delay time for the interface.

Configuration Examples The following example sets the propagation-delay to 600 milliseconds.

```
FS# configure terminal
FS(config)# interface fastethernet 0/1
FS(config-if)# ip pim propagation-delay 600
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.8 ip pim query-interval

Use this command to reconfigure the interval of sending the hello message.

Use the **no** or **default** form of this command to restore the default setting.

ip pim query-interval *interval-seconds*

no ip pim query-interval

default ip pim query-interval

Parameter Description

Parameter	Description
interval-seconds	Interval of sending the hello message in the range from 1 to 65,535 in the unit of seconds

Defaults The default is 30 seconds.

Command Mode Interface configuration mode

Usage Guide If hello interval is set, the hello holdtime value will be updated to 3.5 times of hello interval.

Configuration Examples The following example sets the interval of sending the hello message to 123 seconds.

```
FS# configure terminal
FS(config)# interface fastethernet 0/1
FS(config-if)# ip pim query-interval 123
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.9 ip pim state-refresh disable

Use this command to prohibit the interface from processing and forwarding the PIM-DM state refresh messages.

Use the **no** or **default** form of this command to restore the default setting.

ip pim state-refresh disable

no ip pim state-refresh disable

default ip pim state-refresh disable

Parameter Description

Parameter	Description
N/A	N/A

Defaults By default, the PIM-DM state refresh messages can be processed and forwarded.

Command Mode Global configuration mode

Usage Guide When the state refresh function is disabled, the PIM-DM state refresh message is not processed and forwarded. The sent Hello message does not contain the status refresh option. Consequently, the SR Cap field will not be processed when the Hello message is received.

Generally, it is not recommended to disable the status refresh function because disabling this function may converge the PIM-DM multicast forwarding tree again that has been converged, resulting in unnecessary waste of bandwidth and oscillation of multicast routing table.

Configuration Examples The following example disables the processing of the PIM-DM state refresh message.

```
FS# configure terminal
FS(config)# ip pim state-refresh disable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.10 ip pim state-refresh origination-interval

Use this command to set the interval of sending the PIM-DM state refresh message. The interval is the seconds elapsed between two state refresh messages.

Use the **no** or **default** form of this command to restore the default setting.

ip pim state-refresh origination-interval *interval-seconds*

no ip pim state-refresh origination-interval

default ip pim state-refresh origination-interval

Parameter Description

Parameter	Description
interval-seconds	Interval of sending the PIM-DM update message in the range from 1 to 100 in unit of seconds

Defaults The default is 60 seconds.

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example sets the interval of sending the PIM-DM state refresh message to 65 seconds.

```
FS# configure terminal
FS(config)# interface fastethernet 0/1
FS(config-if)# ip pim state-refresh origination-interval 65
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.11 ip pim mib dense-mode

Use this command to switch the device from the PIM MIB sparse mode to the PIM MIB dense mode. Use the **no** form or **default** form of this command to switch back to the PIM MIB sparse mode.

ip pim mib dense-mode

no ip pim mib dense-mode

default ip pim mib dense-mode

Parameter Description

Parameter	Description
N/A	N/A

Defaults The device is in the PIM MIB sparse mode by default.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example switches the device from the PIM MIB sparse mode to the PIM MIB dense mode.

```
FS# configure terminal
FS(config)# ip pim mib dense-mode
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.12 show ip pim dense-mode interface

Use this command to display the information about the PIM-DM interface.

show ip pim dense-mode interface [*interface-type interface-number*] [**detail**]

Parameter Description

Parameter	Description
interface-type interface-number	Interface type and interface ID
detail	Displays details of the interface.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the information about the PIM-DM interface.

```
FS# show ip pim dense-mode interface
Address     Interface    VIFIndex    Ver/Mode       Nbr
Mode Count
10.10.10.10 FastEthernet 0/45 3      v2/D                1
50.50.50.50 VLAN4                    2           v2/D                1
```

Field	Description
Address	Primary IP address of the PIM-DM interface
Interface	Name of the PIM-DM interface
VIF Index	VIF ID (ID)

Ver/Mode	PIM version/mode
Nbr Count	Number of neighbors of the PIM-DM interface.

Related Commands

Command	Description
show ip pim dense-mode neighbor	Displays the information about the neighbors of the PIM-DM interface.

Platform Description

N/A

5.13 show ip pim dense-mode mroute

Use this command to display the information about the PIM-DM routing table.

show ip pim dense-mode mroute [*group-or-source-address* [*group-or-source-address*]] [**summary**]

Parameter Description

Parameter	Description
group-or-source-address	Group address or source address
group-or-source-address	Group address or source address. Two addresses cannot both be the group addresses or the source addresses.
summary	Displays the brief information of routing entries.

Defaults

N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example displays the information about the PIM-Dm routing table.

```
FS# show ip pim dense-mode mroute
PIM-DM Multicast Routing Table
(1.1.1.111, 229.1.1.1)
  MRT lifetime expires in 205 seconds
  RPF Neighbor: 50.50.50.1, Nexthop:50.50.50.1,VLAN 4
  Upstream IF: VLAN 4
    Upstream State: Pruned, PLT:200
    Assert State: NoInfo
  Downstream IF List:
    FastEthernet 0/45:
      Downstream State: NoInfo
      Assert State: Loser, AT:170
```

Related

Command	Description

Commands

N/A	N/A

Platform Description N/A

5.14 show ip pim dense-mode neighbor

Use this command to display the information about the PIM-DM neighbors.

show ip pim dense-mode neighbor [*interface-type interface-number*]

Parameter Description

Parameter	Description
interface-type interface-number	Interface type and interface ID

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the information about the PIM-DM neighbors.

```
FS# show ip pim dense-mode neighbor
Neighbor-Address Interface          Uptime/Expires        Ver
10.10.10.1       FastEthernet 0/45 00:19:29/00:01:21    v2
50.50.50.1       VLAN 4                 00:22:09/00:01:39    v2
```

Description of fields in the results:

Field	Description
Neighbor-Address	IP address of the neighbor
Interface	Name of the interface connecting the neighbor
Uptime/Expires	Valid time and aging time of the entry
Ver	PIM version

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.15 show ip pim dense-mode nexthop

Use this command to display the information about the PIM-DM next hop.

show ip pim dense-mode nexthop

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the information about the PIM-Dm next hop:

```
FS# show ip pim dense-mode nexthop
Destination    Nexthop    Nexthop    Nexthop    Metric Pref
                   Num          Addr          Interface
1.1.1.111        1          50.50.50.1   VLAN 4      0      1
```

Field	Description
Destination	Multicast source IP address
Nexthop Num	Number of next hop
Nexthop Addr	IP address of next hop
Nexthop interface	Interface connecting to the of next hop
Metric	Route metric
Pref	Route priority

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.16 show ip pim dense-mode track

Use this command to display the statistics of the PIM-DM packets.

show ip pim dense-mode track

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

This command is used to display the number of sent and received PIM packets during the period from the beginning of the statistics till now. When the system starts up, it sets the start time of the statistics. The start time of the statistics is reconfigured and the PIM packet counter is cleared on calling the clear ip pim dense-mode track every time.

Configuration Examples

The following example displays the statistics of the PIM-DM packets.

```
FS# show ip pim dense-mode track
                    PIM packet counters
Elapsed time since counters cleared: 00:04:03
                          received      sent
Valid PIMDM packets:      1             8
Hello:                    1             8
Join/Prune:               0             0
Graft:                    0             0
Graft-Ack:                0             0
Assert:                   0             0
State-Refresh:            0             0
PIM-SM-Register:          0             0
PIM-SM-Register-Stop:     0             0
PIM-SM-BSM:               0             0
PIM-SM-C-RP-ADV:          0             0
Unknown Type:             0
Errors:
Malformed packets:        0
Bad checksums:            0
Unknown PIM version:      0
Send errors:              0
```

Related Commands

Command	Description
clear ip pim dense-mode track	Clears the statistics of the PIM packets.

Platform Description

N/A

6 PIM-SM Commands

6.1 clear ip pim sparse-mode bsr rp-set *

Use this command to clear all the RP information learnt dynamically.

clear ip pim sparse-mode bsr rp-set *

Parameter Description

Parameter	Description
-	-

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide All the RP information learnt dynamically can be cleared manually.

Configuration Examples The following example clears all the RP information learnt dynamically.

```
FS# clear ip pim sparse-mode bsr rp-set *
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

6.2 clear ip pim sparse-mode track

Use this command to reconfigure the start time of the statistics and clear the PIMv6 packet counter.

clear ip pim sparse-mode track

Parameter Description

Parameter	Description
-	-

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide

Configuration Examples

The following example clears the PIM packet counter.

```
FS# clear ip pim sparse-mode track
```

Related Commands

Command	Description
show ip pim sparse-mode track	Displays the PIM packet statistics.

Platform Description

N/A

6.3 ip pim accept-bsr list

Use this command to confine the BSR address range.

Use the **no** or **default** form this command to restore the default setting.

ip pim accept-bsr list *access-list*

no ip pim accept-bsr

default ip pim accept-bsr

Parameter Description

Parameter	Description
list *access-list*	IP standard number ACL in the range of 1 to 99, 1300 to 1999 and characters

Defaults

By default, the PIMSM router receives all external BSM packets.

Command Mode

Global configuration mode

Usage Guide

Use this command to limit the range of the legal BSR.

Configuration Examples

The following example confines the BSR address range.

```
FS(config)# ip pim accept-bsr list 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.4 ip pim accept-crp list

Use this command to confine the C-RP address range and the multicast group address range it serves.

Use the **no** or **default** form of this command to restore the default setting,

ip pim accept-crp list *access-list*

no ip pim accept-crp

default ip pim accept-crp

Parameter Description

Parameter	Description
list *access-list*	IP extension number ACL in the range of 1 to 99, 1300 to 1999 and characters

Defaults

By default, the elected BSR receives all external advertisements of candidate RPs.

Command Mode

Global configuration mode

Usage Guide

With this command configured on the candidate BSR, when this BSR becomes the elected BSR, it is able to limit the address range of the legal C-RP and the multicast group range it serves.

Configuration Examples

The following example confines the C-RP address range and the multicast group address range it serves.

```
FS (config)# ip pim accept-crp list 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.5 ip pim accept-crp-with-null-group

Use this command to receive the C-RP-ADV packets whose prefix-count is 0.

Use the **no** or **default** form of this command to restore the default setting.

ip pim accept-crp-with-null-group

no ip pim accept-crp-with-null-group

default ip pim accept-crp-with-null-group

Parameter Description

Parameter	Description
-	-

Defaults

By default, the BSR does not receive the C-RP-ADV packets whose prefix-count is 0.

Command Mode

Global configuration mode

Usage Guide

With this command configured on the candidate BSR, when this BSR becomes the elected BSR, it is able to receive the C-RP-ADV packets whose prefix-count is 0, and considers this C-RP supports all groups.

Configuration

The following example receives the C-RP-ADV packets whose prefix-count is 0.

Examples

```
FS (config)# ip pim accept-crp-with-null-group
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.6 ip pim accept-register list

Use this command to confine the address range of the (S,G) entry of the register packets.

Use the **no** or **default** form of this command to restore the default setting.

ip pim accept-register { **list** *access-list* [**route-map** *map-name*] | **route-map** *map-name* [**list** *access-list*] }

no ip pim accept-register

default ip pim accept-register

Parameter Description

Parameter	Description
list *access-list*	Uses an extended IP access list to define the (S, G) address range. Access control list supporting numerical ACL in the range of 100 to 199 and 2000 to 2699 and name ACL.
route-map *map-name*	Uses a route map to define the (S, G) address range.

Defaults

The (S, G) address range is not confined by default.

Command Mode

Global configuration mode

Usage Guide

This command is used to confine the source IP address of register messages on RP.

Configuration Examples

The following example confines the source address of register packets on the RP.

```
FS (config)# ip pim accept-register list 100
FS (config)# access-list 100 permit ip 192.168.195.0 0.0.0.255 225.1.1.1 0.0.0.255
```

Related Commands

Command	Description
access-list	N/A

Platform Description

N/A

6.7 ip pim bsr-border

Use this command to configure the BSR border.

Use the **no** or **default** form of this command to restore the default setting.

ip pim bsr-border

no ip pim bsr-border

default ip pim bsr-border

Parameter Description

Parameter	Description
N/A	N/A

Defaults No BSR border is configured by default.

Command Mode Interface configuration mode

Usage Guide To restrain BSM flooding, configure BSR border on the interface so that the interface drops BSM packets upon receiving them and the BSM packets are not forwarded from this interface.

Configuration Examples The following example sets the BSR border on the interface *g 0/3*

```
FS(config)# interface gi 0/3
FS(config-if- GigabitEthernet 0/3)# ip pim bsr-border
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

6.8 ip pim bsr-candidate

Use this command to configure the C-BSR.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim bsr-candidate *interface-type interface-number* [*hash-mask-length* [*priority-value*]]

no ipv6 pim bsr-candidate

default ip pim bsr-candidate

Parameter Description

Parameter	Description
interface-type interface-number	Interface type and number
hash-mask-length	(Optional) HASK mask length configured for electing the RP in the range from 0 to 32, The default is 10.
priority-value	(Optional) Priority configured for the candidate BSR in the range from 0 to 255. The default is 64.

Defaults No C-BSR is configured by default.

Command Mode Global configuration mode

Usage Guide A PIM-SM domain must contain a unique BootStrap Router (BSR). BSR is responsible for collect and issue RP information. A unique recognized BSR is elected among multiple candidate BSRs through the bootstrap packet. Before BSR information is available, C-BSRs consider them to be the BSR, and regularly send bootstrap packets using the multicast address 224.0.0.13 in the PIM-SM domain. This packet contains the address and priority of the BSR.

This command allows the device to send a bootstrap message to all the PIM neighbors using the assigned BSR address. Each neighbor compares the original BSR address with the address in the received bootstrap message. If the IP address of the received address is equal to or larger than the original address, each neighbor saves this received address as the BSR address. Otherwise, they will discard this message.

The current device considers itself to be BSR until it receives a bootstrap message from another candidate BSR and is notified that it has a higher priority value (or the same priority value, but with a larger IP address).

Configuration Examples The following example configures the C-BSR.

```
FS(config)# ip pim bsr-candidate gi 0/3 30 192
```

Related Commands

Command	Description
access-list	N/A

Platform Description N/A

6.9 ip pim dr-priority

Use this command to set the DR priority.

Use the **no** or **default** form of this command to restore the default setting.

ip pim dr-priority *priority-value*

no ip pim dr-priority

default ip pim dr-priority

Parameter Description

Parameter	Description
priority-value	The larger the value, the higher the priority is. The range is from 0 to 4,294,967,294.

Defaults The default is 1.

Command Mode Interface configuration mode

Usage Guide To select a DR:

If the priority parameter of the Hello message is set for the devices in a LAN, the one of the highest priority is elected to be the DR. If several devices have the same priority, the one of the largest IP address is elected to be the DR.

If the priority parameter of the Hello message is not set for the devices in a LAN, the one of the largest IP address is elected to be the DR.

Configuration Examples

The following example sets the DR priority.

```
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet 0/3)# ip pim dr-priority 10000
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.10 ip pim ignore-rp-set-priority

Use this command to ignore the RP priority.

Use the **no** or **default** form of this command to restore the default setting.

ip pim ignore-rp-set-priority

no ip pim ignore-rp-set-priority

default ip pim ignore-rp-set-priority

Parameter Description

Parameter	Description
-	-

Defaults

By default, the C-RP with higher priority is selected.

Command Mode

Global configuration mode

Usage Guide

Configuration Examples

The following example ignores the RP priority.

```
FS(config)# ip pim ignore-rp-set-priority
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.11 ip pim jp-timer

Use this command to set the interval to send the join/prune message.

Use the **no** or **default** form of this command to restore the default setting.

ip pim jp-timer *seconds*

no ip pim jp-timer

default ip pim jp-timer

Parameter Description

Parameter	Description
seconds	Interval to send the join/prune message in the range from 1 to 65535 in the unit of seconds

Defaults The default is 60 seconds.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example sets the interval to send the Join/Prune message to 50 seconds.

```
FS(config)# ip pim jp-timer 50
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

6.12 ip pim neighbor-filter

Use this command to confine the neighbor address range.

Use the **no** or **default** form of this command to restore the default setting.

ip pim neighbor-filter *access_list*

no ip pim neighbor-filter *access_list*

default ip pim neighbor-filter *access_list*

Parameter Description

Parameter	Description
access_list	Access control list supporting numerical ACL in the range 1 to 99 and name ACL

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide Neighbor filtering can enhance the security of a PIM-enabled network and provide neighbor restriction. As long as a neighbor is denied by the access list, PIM-SM will not establish the peering relationship with this neighbor or terminate the established peering relationship with this neighbor.

Configuration Examples The following example blocks the neighbor address 192.168.1.5.

```
FS(config)# interface gi 0/3
FS(config-if- GigabitEthernet 0/3)# ip pim neighbor-filter 14
FS(config-if- GigabitEthernet 0/3)# exit
FS(config)# access-list 14 deny 192.168.1.5 0.0.0.255
```

Related Commands

Command	Description
access-list	N/A

Platform Description N/A

6.13 ip pim neighbor-tracking

Use this command to disable join restraint on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ip pim neighbor-tracking

no ip pim neighbor-tracking

default ip pim neighbor-tracking

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Interface configuration mode

Usage Guide Use this command to disable join restraint on the interface. With join constraint enabled, the interface is constrained not to send its Join message to the upstream neighbor when it receives the Join message that its neighbor sends to the upstream neighbor. On the other hand, with join constrain disabled, the interface will send its Join message to the upstream neighbor when it receives the Join message that its neighbor sends to the upstream neighbor. This function allows upstream routers to track how many receivers in downstream in accord with all received Join messages.

Configuration The following example disables join restraint on the interface.

Examples

```
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet 0/3)# ip pim neighbor-tracking
```

Related Commands

Command	Description
ip pim propagation-delay	N/A

Platform Description

N/A

6.14 ip pim override-interval

Use this command to set the override-interval on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ip pim override-interval *milliseconds*

no ip pim override-interval

default ip pim override-interval

Parameter Description

Parameter	Description
interval-milliseconds	In the range from 1 to 65,535 in the unit of milliseconds

Defaults

The default is 2,500 milliseconds.

Command Mode

Interface configuration mode

Usage Guide

Use this command to set the override-interval for the interface.

Change of propagation delay or prune delay will influence the override interval of Join/prune message. As specified in the protocol, the override interval of Join/prune message must be less than its hold time or otherwise this will cause temporary interruption.

Configuration Examples

The following example sets the override-interval as 3000 milliseconds.

```
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet 0/3)# ip pim override-interval 3000
```

Related Commands

Command	Description
ip pim propagation-delay	N/A

Platform Description

N/A

6.15 ip pim probe-interval

Use this command to set the register probe interval.

Use the **no** or **default** form of this command to restore the default setting.

ip pim probe-interval *seconds*

no ip pim probe-interval

default ip pim probe-interval

Parameter Description

Parameter	Description
interval-seconds	In the range from 1 to 65535 seconds

Defaults

The default is 5 seconds.

Command Mode

Global configuration mode

Usage Guide

Use this command to set the registration probe time. The DR can send the null registration message to the RP in a period before the registration suppression time expires. This period is called probe time of null registration packet.

The probe time must be less than half of registration suppression time. Furthermore, 3* registration suppression time plus registration probe time should be no more than 65535s or otherwise the system triggers an alarm.

Configuration Examples

The following example sets the probe time to 6 seconds.

```
FS(config)# ip pim probe-interval 6
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.16 ip pim propagation-delay

Use this command to set the propagation-delay on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ip pim propagation-delay *milliseconds*

no ip pim propagation-delay

default ip pim propagation-delay

Parameter Description

Parameter	Description
interval-milliseconds	In the range from 1 to 32,765 milliseconds

Defaults The default is 500 milliseconds.

Command Mode Interface configuration mode

Usage Guide Use this command to set the propagation-delay for the interface.

Change of propagation delay or prune delay will influence the override interval of Join/prune message. As specified in the protocol, the override interval of Join/prune message must be less than its hold time or otherwise this will cause temporary interruption.

Configuration Examples The following example sets the propagation delay to 600 milliseconds.

```
FS(config)# interface gi 0/3
FS(config)# ip pim propagation-delay 600
```

Related Commands

Command	Description
ip pim override-interval	N/A
Ip pim neighbor-tracking	N/A

Platform Description N/A

6.17 ip pim query-interval

Use this command to set the interval to send the hello packets.

Use the **no** or **default** form of this command to restore the default setting.

ip pim query-interval *seconds*

no ip pim query-interval

default ip pim query-interval

Parameter Description

Parameter	Description
interval-seconds	Interval to send the Hello message, in the range from 1 to 65,535 in the unit of seconds.

Defaults The default is 30 seconds.

Command Mode Interface configuration mode

Usage Guide Upon updating the interval to send the Hello message, the time of holding the Hello message is updated by the following principle: The hold time is updated to be 3.5 times the transmission interval. If the transmission interval*3.5 is more than 65535, the hold time is updated to 18752.

Configuration Examples

The following example sets the interval to send the hello packets to 123 seconds.

```
FS(config)# interface gi 0/3
FS(config)# ip pim query-interval 123
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.18 ip pim register-checksum-wholepkt

Use this command to calculate the checksum of the whole register packet.

Use the **no** or **default** form of this command to restore the default setting.

ip pim register-checksum-wholepkt [**group-list** *access-list*]

no ip pim register-checksum-wholepkt [**group-list** *access-list*]

default ip pim register-checksum-wholepkt [**group-list** *access-list*]

Parameter Description

Parameter	Description
access-list	Access-list: access control list supporting numerical ACL in the range from100 to 199 and from1300 to 1999 and name ACL. Group-list access-list :all multicast packets use this configuration by default

Defaults

By default, the checksum of register messages calculates the head of PIM message and register message rather than the whole PIM message

Command Mode

Global configuration mode

Usage Guide

Some vendors calculate checksum based on the overall registration packets. FS Networks introduces this function for the compatibility with devices of other vendors.

Configuration Examples

The following example calculates the checksum of the whole register packet.

```
FS(config)#ip pim register-checksum-wholepkt group-list 99
FS(config)# access-list 99    permit 225.1.1.1 0.0.0.255
```

Related Commands

Command	Description
access-list	N/A

Platform Description

N/A

6.19 ip pim register-decapsulate-forward

Use this command to enable the RP to decapsulate the register packets and forward the multicast packets.

Use the **no** or **default** form of this command to restore the default setting.

ip pim register-decapsulate-forward

no ip pim register-decapsulate-forward

default ip pim register-decapsulate-forward

Parameter Description

Parameter	Description
-	-

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

Use this command to implement the decapsulate of the PIM-SM registration packets with the multicast data packets received on the candidate RP and forward the multicast data packets.

As the decapsulating and forwarding are performed by the software, it is not recommended to configure this command in the case that many registration packets need to be decapsulated and forwarded, which may cause the CPU busy with this function configured.

Configuration Examples

The following example enables the RP to decapsulate the register packets and forwards the multicast packets.

```
FS(config)# ip pim register-decapsulate-forward
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.20 ip pim register-rate-limit

Use this command to limit the rate of register packets.

Use the **no** form of this command to restore the default setting.

ip pim register-rate-limit *rate*

no ip pim register-rate-limit

default ip pim register-rate-limit

Parameter Description

Parameter	Description
-	-
rate	Maximum number of register packets that can be sent per second, in the

	range from 1 to 65,535

Defaults By default, there is no rate limitation on register messages.

Command Mode Global configuration mode

Usage Guide This command is used to configure speed of transmitting register packet in each (S, G) status, not the speed of transmitting register packets in the system. Using this command will decrease the load of source DR and RP. The register packets can be transmitted at the speed within the limit.

Configuration Examples The following example limits the rate of register packets.

```
FS(config)# ip pim register-rate-limit 3000
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

6.21 ip pim register-rp-reachability

Use this command to check RP reachability before sending register packets**.**

Use the **no** or **default** form of this command to restore the default setting.

ip pim register-rp-reachability

no ip pim register-rp-reachability

default ip pim register-rp-reachability

Parameter Description

Parameter	Description
-	-

Defaults By default, the RP reachability is not checked before sending register packets.

Command Mode Global configuration mode

Usage Guide This command is used to check the RP reachability before sending register packets. If not, register packets are not transmitted.

Configuration Examples The following example checks the RP reachability before sending register packets.

```
FS(config)# ipv6 pim register-rp-reachability
```

Related

Command	Description

Commands

N/A	N/A

Platform Description

N/A

6.22 ip pim register-source

Use this command to specify the source IP address of the register packets.

Use the **no** or **default** form of this command to restore the default setting.

ip pim register-source { *local_address* | *interface-type interface-number* }

no ip pim register-source

default ip pim register-source

Parameter Description

Parameter	Description
-	-
interface-type interface-number	Interface whose IP address is used as the source IP address of register packets
local_address	Specifies the source IP address of the register packet.

Defaults

By default, the source IP address of register packets is the IP address of the DR interface connecting the multicast source.

Command Mode

Global configuration mode

Usage Guide

This command is used to configure the source IP address of register messages.

The source IP address must be reachable. When RP receives the register packet, it transmits Register-Stop packet, using its source IP address as the destination IP address of the Register-Stop packet. It is not necessary to enable the PIM.

Configuration Examples

The following example specifies the source IP address of the register packets.

```
FS(config)# ip pim register-source 192.168.195.80
FS(config)# ip pim register-source gi 0/3
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.23 ip pim register-suppression

Use this command to set the register suppression time.

Use the **no** or **default** form of this command to restore the default setting.

ip pim register-suppression *seconds*

no ip pim register-suppression

default ip pim register-suppression

Parameter Description

Parameter	Description
suppression	Suppression time in the range from 1 to 65,535 in the unit of seconds.

Defaults

The default is 60 seconds.

Command Mode

Global configuration mode

Usage Guide

Executing this command on the DR will change the register packet suppression time configured. if the **ip pim rp-register-kat** command is not configured, executing this command on RP will modify the period of RP keepalive.

Configuration Examples

The following example sets the register suppression time to 100 seconds.

```
FS(config)# ip pim register-suppression 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.24 ip pim rp-address

Use this command to configure the static RP.

Use the **no** or **default** form of this command to restore the default setting.

ip pim rp-address *rp-address* [*access_list*]

no ip pim rp-address *rp-address* [*access_list*]

default ip pim rp-address *rp-address* [*access_list*]

Parameter Description

Parameter	Description
rp-address	IP address of RP
access_list	Access control list supporting numerical ACL in the range 1 to 99 and 1300 to 1999 and name ACL. All multicast groups are supported by default.

Defaults

No IP address is configured for the static RP by default.

Command

Global configuration mode

Mode

Usage Guide

This system supports the configuration of multicast static RP, as well as the configuration of static RP and BSR mechanisms at the same time. When you use this command, note that:

If both the BSR mechanism and the static RP configuration take effect, the dynamic configuration takes precedence.

You can configure multiple multicast groups (using ACL) or all multicast groups (not using ACL) for the static RP. But a static RP can be configured only once.

If there are more than one static RP in a multicast group, the one of the highest IP address is used.

Only the addresses permitted by ACL are valid multicast groups. By default, all the multicast groups 224/4 are permitted.

After configuration is performed, the static RP's source IP address is inserted to the group range-based static RP group tree structure. Each group range-based static multicast group maintains the chain list structure of a static RP group. This chain list is sorted in descending order of IP address. When you select a RP from a static RP group, the first entry, namely the one with the largest IP address, will be selected first.

Deleting a static IP address also deletes this address from all the existing static RP groups and selects one from in the existing RP group tree structure as the RP address.

Configuration Examples

The following example specifies the source IPv6 address of the register packet.

```
FS(config)# ip pim rp-address 210.34.0.55 4
FS(config)# access-list 4 permit 255.1.1.1 0.0.0.255
```

Related Commands

Command	Description
access-list	N/A

Platform Description

N/A

6.25 ip pim rp-candidate

Use this command to configure the C-RP.

Use the **no** or **default** form of this command to restore the default setting.

ip pim rp-candidate *interface-type interface-number* [**priority** *priority-value*] [**interval** *seconds*] [**group-list** *access_list*]

no ip pim rp-candidate [*interface-type interface-number*]

default ip pim rp-candidate [*interface-type interface-number*]

Parameter Description

Parameter	Description
interface-type interface-number	Interface type and interface number
priority-value	(Optional) Priority in the range 0 to 255, 192 by default
seconds	(Optional) Interval in the range 0 to 16,383 seconds, 60s by default
access_list	(Optional) Numerical ACL in the range 1 to 99 or name ACL. By default, all multicast groups are permitted.

Defaults No C-RP is configured by default.

Command Mode Global configuration mode

Usage Guide In the PIM-SM protocol, the shared tree RPT created by the multicast routing uses the Rendezvous Point (RP) as the root node. RP is elected by the candidate RPs. After BSR is elected, all C-RPs sends C-RP messages in the unicast form to BSR regularly, and BSR spreads the messages throughout the PIM domain.
To specify an interface as the candidate RP of a specific group, execute this command with ACL. Note that the group range is calculated only based on the permit rule, not the deny rule.

Configuration Examples The following example configures the C-RP.

```
FS(config)# ip pim rp-candidate gi 0/3 priority 200 group-list 3 interval 70
FS(config)# access-list 3 permit 255.1.1.1 0.0.0.255
```

Related Commands

Command	Description
access-list	N/A

Platform Description N/A

6.26 ip pim rp-register-kat

Use this command to set the KAT interval on the RP.
Use the **no** or **default** form of this command to restore the default setting.
ip pim rp-register-kat *seconds*
no ip pim rp-register-kat
default ip pim rp-register-kat

Parameter Description

Parameter	Description
seconds	KAT timer time in the range from 1 to 65,525 in the unit of seconds

Defaults The default is 210 seconds.

Command Mode Global configuration mode

Usage Guide

Configuration Examples The following example sets the KAT interval on the RP to 250 seconds.

```
FS(config)# ip pim rp-register-kat 250
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.27 ip pim sparse-mode

Use this command to enable PIM-SM on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ip pim sparse-mode

no ip pim sparse-mode

default ip pim sparse-mode

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

This command is used to enable PIM-SM on the interface.

You need to enable multicast routing forwarding in the global configuration mode before enabling PIM-SM. Otherwise, multicast packets cannot be forwarded even though you enable PIM-SM.

During the execution of this command, if the prompt "Failed to enable PIM-SM on <Interface Name>, resource temporarily unavailable, please try again" appears, re-execute this command.

During the execution of this command, if the prompt "PIM-SM Configure failed! VIF limit exceeded in NSM!!!" appears; it indicates the allowed configured interface number exceeds the upper limit of the multicast interfaces. In this case, if you still need to enable PIM-SM on the interface, delete the unnecessary PIM-SM, PIM-DM or DVMRP interfaces.

Configuration Examples

The following example enables PIM-SM on the interface.

```
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet 0/3)# ip pim sparse-mode
```

Related Commands

Command	Description
N/A	N/A

Platform

N/A

Description

6.28 ip pim sparse-mode passive

Use this command to enable PIM-SM PASSIVE.

Use the **no** or **default** form of this command to restore the default setting.

ip pim sparse-mode passive

no ip pim sparse -mode passive

default ip pim sparse-mode passive

Parameter Description

Parameter	Description
N/A	N/A

Defaults

PIM-SM PASSIVE is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

Please configure multicast route forwarding in global configuration mode before enabling PIM-SM PASSIVE.

When PIM-SM PASSIVE is enabled, IGMP is enabled on each interface automatically.

Enabled with PIM-SM PASSIVE, the interface neither receives nor sends PIM packets. Instead, it forwards multicast packets. PIM-SM PASSIVE is generally configured on the device of the stub area, so as to avoid floods of PIM hello packets.

Configuration Examples

The following example enables PIM-SM PASSIVE on interface GigabitEthernet 0/3.

```
FS# configure terminal
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet 0/3)# ip pim sparse-mode passive
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.29 ip pim sparse-mode subvlan

Use this command to enable PIM-SM on the Super VLAN interface. Use the **no** or **default** form of this command is to restore the default setting.

ip pim sparse-mode subvlan [**all** | *vid*]

no ip pim sparse-mode subvlan

default ip pim sparse-mode subvlan

Parameter

Parameter	Description

Description

all	Sends PIM packets to all sub VLANs.
vid	Sends PIM packets to the specified VLAN.

Defaults

PIM-SM is disabled on the Super VLAN interface by default.

Command Mode

Interface configuration mode

Usage Guide

In general, a super VLAN includes many sub VLANs. If the PIM-SM protocol is enabled on the interfaces of the super VLAN, PIM-SM multicast packets will be replicated and sent to all sub VLANs. As a result, the traffic may exceed the device capability, causing protocol flapping. The Super VLAN interface is disabled with PIM-SM generally. Use this command to enable PIM-SM on the Super VLAN interface to send PIM packets to all sub VLANs or the specified sub VLAN.

Configuration Examples

The following example enables PIM-SM on the Super VLAN interface and sends PIM packets to sub VLAN 200.

```
FS# configure terminal
FS(config)# interface vlan 100
FS(config-if-vlan 100)# ip pim sparse-mode subvlan 200
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.30 ip pim spt-threshold

Use this command to enable the SPT switching function.

Use the **no** or **default** form of this command to restore the default setting.

ip pim spt-threshold [**group-list** *access-list*]

no ip pim spt-threshold [**group-list** *access-list*]

default ip pim spt-threshold [**group-list** *access-list*]

Parameter Description

Parameter	Description
access_list	(Optional) Numerical ACL in the range 1 to 99 and 1300 to 1999 or name ACL. By default, all multicast groups are permitted for SPT switching.

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

This command is used to enable the RP tree-to-SPT tree switching function in a specific multicast group range

(using **group-list**) or all multicast groups (not using **group-list**) .

Configuration Examples

The following example enables the SPT switching function.

```
FS(config)# ip pim spt-threshold group-list 12
FS(config)# access-list 12 permit 225.1.1.1 0.0.0.255
```

Related Commands

Command	Description
access-list	N/A

Platform Description

N/A

6.31 ip pim ssm

Use this command to enable SSM and set the SSM group address range.

Use the **no** or **default** form of this command to restore the default setting.

ip pim ssm { **default** | **range** *access_list* }

no ip pim ssm

default ip pim ssm

Parameter Description

Parameter	Description
default	Multicast groups of 232/8
range *access_list*	Numerical ACL in the range 1 to 99 and 1300 to 1999 or name ACL.

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

This command is used to enable PIM-SSM (or in some specific multicast groups).

Configuration Examples

The following command enables SSM and sets the SSM group range to 232/8:

```
FS(config)# ip pim ssm default
```

The following command sets the source-specific multicast with ACL 10.

```
FS(config)# ip pim ssm range 10
FS(config)# access-list 10 permit 232.0.0.1 0.0.0.255
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.32 ip pim triggered-hello-delay

Use this command to configure Triggered-Hello-Delay time on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ip pim triggered-hello-delay *seconds*

no ip pim triggered-hello-delay

default ip pim triggered-hello-delay

Parameter Description

Parameter	Description
seconds	In the range from 1 to 5 in the unit of seconds.

Defaults

The default is 5 seconds.

Command Mode

Interface configuration mode

Usage Guide

Use this command to configure the triggered-hello-delay of the interface. When the interface starts or detects a new neighbor, it uses the trigger-hello-delay to generate random time, and then the interface sends the Hello message in random time.

Configuration Examples

The following command sets the triggered-hello-delay to 3 seconds.

```
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet 0/3)# ip pim triggered-hello-delay 3
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.33 show debugging

Use this command to display the debugging status.

show debugging

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

Configuration Examples

The following example displays the debugging status.

```
FS#show debugging
ip packet debug:
ip packet debug debugging is on, acl: 0
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.34 show ip pim sparse-mode bsr-router

Use this command to display the BSR information

show ip pim sparse-mode bsr-router

Parameter Description

Parameter	Description
-	-

Defaults

N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

Configuration Examples

The following example displays BSR information.

```
FS# show ip pim sparse-mode bsr-router
PIMv2 Bootstrap information
This system is the Bootstrap Router (BSR)
BSR address: 192.168.127.1
Uptime:    01d23h14m, BSR Priority: 64, Hash mask length: 10
Next bootstrap message in 00:00:42
Role: Candidate BSR      Priority: 64, Hash mask length: 10
State: Elected BSR
Candidate RP: 30.30.100.200(GigabitEthernet 0/3)
Advertisement interval 60 seconds
00:00:32
```

Related

Command	Description

Commands

N/A	N/A

Platform Description

N/A

6.35 show ip pim sparse-mode interface

Use this command to display PIM-SM interface information.

show ip pim sparse-mode interface [*interface-type interface-number*] [**detail**]

Parameter Description

Parameter	Description
interface-type interface-number	(Optional) Interface name. This command takes effect for all interfaces by default.
detail	(Optional) Displays the details of an interface.

Defaults

N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

Configuration Examples

The following example displays the PIM-SM information on the interface.

```
FS#show ip pim sparse-mode interface detail
GigabitEthernet 0/3 (vif 3):
Address 30.30.100.200, DR 30.30.100.200
Hello period 30 seconds, Next Hello in 11 seconds
Triggered Hello period 5 seconds
Neighbors:
2.2.2.2
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.36 show ip pim sparse-mode local-members

Use this command to display the local IGMP information on the PIM-SM interface.

show ip pim sparse-mode local-members [*interface-type interface-number*]

Parameter Description

Parameter	Description
interface-type interface-number	(Optional) Interface name. This command takes effect for all interfaces by default.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

Configuration Examples The following example displays the local IGMP information on the PIM-SM interface.

```
FS (config-if)#sh ip pim sparse-mode local-members
PIM Local membership information
GigabitEthernet 0/3:
(*, 225.1.1.1) : Include
Loopback 1:
GigabitEthernet 0/5:
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

6.37 show ip pim sparse-mode mroute

Use this command to display the PIM-SM routing information.

show ip pim sparse-mode mroute [*group-or-source-address* [*group-or-source-address*]]

Parameter Description

Parameter	Description
group-or-source-address	Group IP address or source IP address. Two addresses cannot both be the group addresses or the source addresses.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide This command is used to display routing information. Only one group IP address, one source IP address or one group IP address-source IP address pair can be configured at a time. You can also specify no group IP address or source IP address.

Configuration Examples

The following example displays the PIM-SM routing information.

```
FS#show ip pim sparse-mode mroute
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.38 show ip pim sparse-mode neighbor

Use this command to display the neighbor information.

show ip pim sparse-mode neighbor [**detail**]

Parameter Description

Parameter	Description
detail	(Optional) Displays the details of an interface.

Defaults

N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

Configuration Examples

The following example displays the neighbor information.

```
FS# show ip pim sparse-mode neighbor
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.39 show ip pim sparse-mode nexthop

Use this command to display the next-hop information, including the interface ID, address and metric.

show ip pim sparse-mode nexthop

Parameter Description

Parameter	Description

-	-

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the next-hop information.

```
FS# show ip pim sparse-mode nexthop
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

6.40 show ip pim sparse-mode rp mapping

Use this command to display the information on all RPs and the multicast groups they serve.

show ip pim sparse-mode rp mapping

Parameter Description

Parameter	Description
mapping	All group and RP information

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the information on all RPs and the multicast groups they serve.

```
FS# show ip pim sparse-mode rp mapping
PIM Group-to-RP Mappings
Group(s): 224.0.0.0/4
RP: 30.30.200.1
Info source: 30.30.200.1, via bootstrap, priority 192
Uptime: 00:00:51, expires: 00:01:39
RP: 30.30.100.1
Info source: 30.30.200.1, via bootstrap, priority 192
Uptime: 00:19:14, expires: 00:01:38
```

```
Group(s): 224.0.0.0/4, Static
RP: 100.100.100.100
Uptime: 00:45:35
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

6.41 show ip pim sparse-mode rp-hash

Use this command to display the RP information corresponding to the group address.

show ip pim sparse-mode rp-hash *group-address*

Parameter Description

Parameter	Description
group-address	Group address to be resolved

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

Configuration Examples The following example displays the RP information corresponding to the group address.

```
FS# show ip pim sparse-mode rp-hash 255.1.1.1
RP: 30.30.100.1
Info source: 30.30.100.1, via bootstrap
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

6.42 show ip pim sparse-mode track

Use this command to display the number of sent and received PIM packets during the period from the beginning of the statistics till now.

show ip pim sparse-mode track

Parameter Description

Parameter	Description
-	-

Defaults

N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

This command is used to display the number of sent and received PIM packets during the period from the beginning of the statistics till now. When the system starts up, it sets the start time of the statistics. The start time of the statistics is reconfigured and the PIM packet counter is cleared on calling the **clear ip pim sparse-mode track** every time.

Configuration Examples

The following example displays the number of sent and received PIM packets during the period from the beginning of the statistics till now.

```
FS # show ip pim sparse-mode track
PIM packet counters track
Elapsed time since counters cleared: 00:04:03
received        sent
Valid PIMSM packets:        0                    8
Hello:                                  0                    8
Join-Prune:                     0                    0
Register:                       0                    0
Register-Stop:                  0                    0
Assert:                         0                    0
BSM:                                    0                    0
C-RP-ADV:                               0                    0
PIMDM-Graft:                    0
PIMDM-Graft-Ack :               0
PIMDM-State-Refresh:            0
Unknown PIM Type:               0
Errors:
Malformed packets:                      0
Bad checksums:                                  0
Send errors:                                    0
Packets received with unknown PIM version:      0
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7 PIM-SMv6 Commands

7.1 clear ipv6 mroute

Use this command to clear multicast routing entries.

clear ipv6 mroute {* | *ipv6_group_address* [*ipv6_source_address*] }

Parameter Description

Parameter	Description
*	Deletes all the multicast routing entries.
ipv6_group_address	Deletes the multicast routing entries of the specific group.
ipv6_source_address	Deletes the multicast routing entries of the specific group and source IPv6 address.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples

The following example clears all the multicast routing entries.

```
FS# clear ipv6 mroute *
```

The following example clears the multicast routing entries of the specified group.

```
FS# clear ipv6 mroute ff66::6666
```

The following example clears the multicast routing entries of the specified group and source address.

```
FS# clear ipv6 mroute ff66::6666 3333::3333
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.2 clear ipv6 mroute statistics

Use this command to delete the statistics of the multicast routing entries.

clear ipv6 mroute statistics {* | *ipv6_group_address* [*ipv6_source_address*] }

Parameter Description

Parameter	Description
*	Deletes the statistics of all multicast routing entries.
ipv6_group_address	Deletes the statistics of the multicast routing entries of the specific group.

ipv6_source_address	Deletes the statistics of the multicast routing entries of the specific group and source IPv6 address.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example deletes the statistics of the multicast routing entries.

```
FS# clear ipv6 mroute statistics *
```

The following example clears the statistics of the multicast routing entries of the specified group.

```
FS# clear ipv6 mroute statistics ff66::6666
```

The following example clears the statistics of the multicast routing entries of the specified group and source address.

```
FS# clear ipv6 mroute statistics ff66::6666 3333::3333
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.3 clear ipv6 pim sparse-mode bsr rp-set *

Use this command to clears the RP information learnt dynamically.

clear ipv6 pim sparse-mode bsr rp-set *

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Only the RP information learnt dynamically can be cleared manually.

Configuration Examples The following example clears the RP information learnt dynamically.

```
FS# clear ipv6 pim sparse-mode bsr rp-set *
```

Related

Command	Description

Commands

N/A	N/A

Platform Description N/A

7.4 clear ipv6 pim sparse-mode track

Use this command to reconfigure the start time of the statistics and clear the PIMv6 packet counter.

clear ipv6 pim sparse-mode track

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example clears the PIMv6 packet counter.

```
FS# clear ipv6 pim sparse-mode track
```

Related Commands

Command	Description
show ipv6 pim sparse-mode track	N/A

Platform Description N/A

7.5 ipv6 pim accept-bsr list

Use this command to confine the BSR address range.

Use the **no** or **default** form this command to restore the default setting.

ipv6 pim accept-bsrr list *ipv6_access-list*

no ipv6 pim accept-bsr

default ipv6 pim accept-bsr

Parameter Description

Parameter	Description
list *ipv6_access-list*	IPv6 ACL supporting named ACL

Defaults By default, the PIM-SMv6 router receives all external BSM packets.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example confines the BSR address range.

```
FS(config)# ipv6 pim accept-bsr list bsr-list
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.6 ipv6 pim accept-crp list

Use this command to confine the C-RP address range and the multicast group address range it serves.

Use the **no** or **default** form of this command to restore the default setting,

ipv6 pim accept-crp list *ipv6_access-list*

no ipv6 pim accept-crp

default ipv6 pim accept-crp-with-null-group

Parameter Description

Parameter	Description
list *ipv6_access-list*	IPv6 ACL supporting named ACL

Defaults No address is filtered by default.

Command Mode Global configuration mode

Usage Guide With this command configured on the candidate BSR, when this BSR becomes the elected BSR, it is able to limit the address range of the legal C-RP and the multicast group range it serves.

Configuration Examples The following example confines the C-RP address range and the multicast group address range it serves.

```
FS (config)# ipv6 pim accept-crp list crp-list
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.7 ipv6 pim accept-crp-with-null-group

Use this command to receive the C-RP-ADV packets whose prefix-count is 0.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim accept-crp-with-null-group

no ipv6 pim accept-crp-with-null-group

default ipv6 pim accept-crp-with-null-group

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide With this command configured on the candidate BSR, when this BSR becomes the elected BSR, it is able to receive the C-RP-ADV packets whose prefix-count is 0, and considers this C-RP supports all groups.

Configuration Examples The following example receives the C-RP-ADV packets whose prefix-count is 0.

```
FS (config)# ipv6 pim accept-crp-with-null-group
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.8 ipv6 pim accept-register

Use this command to accept specific register packets at the RP.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim accept-register { **list** *ipv6_access-list* [**route-map** *map-name*] | **route-map** *map-name* [**list** *ipv6_access-list*] }

no ipv6 pim accept-register

default ipv6 pim accept-register

Parameter Description

Parameter	Description
list *ipv6_access-list*	IPv6 ACL supporting named ACL
route-map *map-name*	Defines the routing map rule

Defaults All register packets are received by default.

Command Mode Global configuration mode

Usage Guide This command is used to confine the source IPv6 address of register messages on RP. If the unauthorized register source is received, the RP will return the Register-Stop message immediately.

Configuration Examples The following example denies register packets of the specified source address at the RP.

```
FS(config)# ipv6 pim accept-register list register-access-list
FS(config)# ipv6 access-list register-access-list
FS(config-ipv6-acl)# deny ipv6 fe80::2d0:f8ff:fe22:33ad/128 any
```

Platform Description N/A

7.9 ipv6 pim bsr-border

Use this command to configure the BSR border.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim bsr-border

no ipv6 pim bsr-border

default ipv6 pim bsr-border

Parameter Description

Parameter	Description
N/A	N/A

Defaults No BSR border is configured by default.

Command Mode Interface configuration mode

Usage Guide To restrain BSM flooding, configure BSR border on the interface so that the interface drops BSM packets upon receiving them and the BSM packets are not forwarded from this interface.

Configuration Examples The following example sets the BSR border on the interface *gi 0/3*.

```
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet)# ipv6 pim bsr-border
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.10 ipv6 pim bsr-candidate

Use this command to configure the candidate bootstrap router (C-BSR).

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim bsr-candidate *interface-type interface-number* [*hash-mask-length* [*priority-value*]]

no ipv6 pim bsr-candidate

default ipv6 pim bsr-candidate

Parameter Description

Parameter	Description
interface-type interface-number	Interface type and number.
hash-mask-length	(Optional) HASK mask length configured for electing the RP in the range from 0 to 128. The default is 126.
priority-value	(Optional) Priority configured for the C-BSR in the range from 0 to 255. The default is 64.

Defaults No C-BSR is configured by default.

Command Mode Global configuration mode

Usage Guide A PIM-SMv6 domain must contain a unique BootStrap Router (BSR). BSR is responsible for collect and issue RP information. A unique recognized BSR is elected among multiple candidate BSRs through the bootstrap packet. Before BSR information is available, C-BSRs consider them to be the BSR, and regularly send bootstrap packets using the multicast address 224.0.0.13 in the PIM-SM domain. This packet contains the address and priority of the BSR.

This command allows the device to send a bootstrap message to all the PIM neighbors using the assigned BSR address. Each neighbor compares the original BSR address with the address in the received bootstrap message. If the IPv6 address of the received address is equal to or larger than the original address, each neighbor saves this received address as the BSR address. Otherwise, they will discard this message.

The current device considers itself to be BSR until it receives a bootstrap message from another candidate BSR and is notified that it has a higher priority value (or the same priority value, but with a larger IPv6 address).

Configuration Examples The following example s configures the C-BSR.

```
FS(config)# ipv6 pim bsr-candidate gi 0/3 30 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.11 ipv6 pim dr-priority

Use this command to configure the DR priority.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim dr-priority *priority-value*

no ipv6 pim dr-priority

default ipv6 pim dr-priority

Parameter Description

Parameter	Description
priority-value	The larger the value, the higher the priority is. The range is from 0 to 4,294,967,294. The default is 1.

Defaults

The default is 1.

Command Mode

Interface configuration mode

Usage Guide

To select a DR:

- If the priority parameter of the Hello message is set for the devices in a LAN, the one of the highest priority is elected to be the DR. If several devices have the same priority, the one of the largest IP address is elected to be the DR.
- If the priority parameter of the Hello message is not set for the devices in a LAN, the one of the largest IP address is elected to be the DR.

Configuration Examples

The following example configures the DR priority.

```
FS(config)# interface gi 0/3
FS(config-if)# ipv6 pim dr-priority 11234
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.12 ipv6 pim ignore-rp-set-priority

Use this command to ignore the RP priority.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim ignore-rp-set-priority

no ipv6 pim ignore-rp-set-priority

default ipv6 pim ignore-rp-set-priority

Parameter Description

Parameter	Description
N/A	N/A

Defaults By default, the C-RP with a higher priority is selected.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example ignores the RP priority.

```
FS(config-if)# ipv6 pim ignore-rp-set-priority
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.13 ipv6 pim jp-timer

Use this command to set the interval to send the join/prune message.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim jp-timer *seconds*

no ipv6 pim jp-timer

default ipv6 pim jp-timer

Parameter Description

Parameter	Description
seconds	Interval to send the join/prune message in the range from 1 to 65,535 in the unit of seconds

Defaults The default is 60 seconds.

Command Mode Global configuration mode

Usage Guide

Configuration Examples The following example sets the interval to send the Join/Prune message to 100 seconds.

```
FS# configure terminal
FS(config)# ipv6 pim jp-timer 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.14 ipv6 pim neighbor-filter

Use this command to confine the neighbor address range.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim neighbor-filter *ipv6_access-list*

no ipv6 pim neighbor-filter *ipv6_access-list*

default ipv6 pim neighbor-filter *ipv6_access-list*

Parameter Description

Parameter	Description
ipv6_access_list	IPv6 ACL supporting named ACL

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide Neighbor filtering can enhance the security of a PIM-enabled network and provide neighbor restriction. As long as a neighbor is denied by the access list, PIM-SM will not establish the peering relationship with this neighbor or terminate the established peering relationship with this neighbor.

Configuration Examples The following example blocks the neighbor address fe80::2d0:f8ff:fe22:33ad.

```
FS(config)# interface gi 0/3
FS(config-if- GigabitEthernet 0/3)# ipv6 pim neighbor-filter acl
FS(config-if- GigabitEthernet 0/3)# exit
FS(config)# ipv6 access-list acl
FS(config-ipv6-acl)# deny ipv6 fe80::2d0:f8ff:fe22:33ad/128 any
```

Related Commands

Command	Description
ipv6_access-list	N/A

Platform Description N/A

7.15 ipv6 pim neighbor-tracking

Use this command to disable join restraint on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim neighbor-tracking

no ipv6 pim neighbor-tracking

default ipv6 pim neighbor-tracking

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Interface configuration mode

Usage Guide Use this command to disable join restraint on the interface. With join constraint enabled, the interface is constrained not to send its Join message to the upstream neighbor when it receives the Join message that its neighbor sends to the upstream neighbor. On the other hand, with join constrain disabled, the interface will send its Join message to the upstream neighbor when it receives the Join message that its neighbor sends to the upstream neighbor. This function allows upstream routers to track how many receivers in downstream in accord with all received Join messages.

Configuration Examples The following example disables join restraint on the interface.

```
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet)# ipv6 pim neighbor-tracking
```

Related Commands

Command	Description
ipv6 pim propagation-delay	N/A

Platform Description N/A

7.16 ipv6 pim override-interval

Use this command to set the override-interval on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim override-interval *milliseconds*

no ipv6 pim override-interval

default ipv6 pim override-interval

Parameter Description

Parameter	Description
milliseconds	In the range 1 to 65,535 in the unit of milliseconds

Defaults The default is 2,500 milliseconds.

Command Mode Interface configuration mode

Usage Guide Use this command to set the override-interval for the interface.

Change of propagation delay or prune delay will influence the override interval of Join/prune message. As specified in the protocol, the override interval of Join/prune message must be less than its hold time or otherwise this will cause temporary interruption.

Configuration Examples The following example sets the override-interval to 3,000 milliseconds.

```
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet)# ipv6 pim override-interval 3000
```

Related Commands

Command	Description
ipv6 pim propagation-delay	N/A

Platform Description N/A

7.17 ipv6 pim probe-interval

Use this command to set the register probe interval.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim probe-interval *seconds*

no ipv6 pim probe-interval

default ipv6 pim probe-interval

Parameter Description

Parameter	Description
seconds	In the range from 1 to 65,535 in the unit of seconds

Defaults The default is 5 seconds.

Command Mode Global configuration mode

Usage Guide Use this command to set the registration probe time. The DR can send the null registration message to the RP in a period before the registration suppression time expires. This period is called probe time of null registration packet.

The probe time must be less than half of registration suppression time. Furthermore, 3* registration suppression time plus registration probe time should be no more than 65535s or otherwise the system triggers an alarm.

Configuration Examples The following example sets the probe time as 6 seconds.

```
FS(config)# ipv6 pim probe-interval 6
```

Related Commands

Command	Description
ipv6 pim register-suppression	N/A

Platform Description N/A

7.18 ipv6 pim propagation-delay

Use this command to set the propagation-delay on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim propagation-delay *milliseconds*

no ipv6 pim propagation-delay

default ipv6 pim propagation-delay

Parameter Description

Parameter	Description
milliseconds	In the range from 1 to 32,765 in the unit of milliseconds

Defaults The default is 500 milliseconds.

Command Mode Interface configuration mode

Usage Guide Use this command to set the propagation-delay for the interface.

Change of propagation delay or prune delay will influence the override interval of Join/prune message. As specified in the protocol, the override interval of Join/prune message must be less than its hold time or otherwise this will cause temporary interruption.

Configuration Examples The following example sets the propagation delay to 600 milliseconds.

```
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet 0/3)# ipv6 pim propagation-delay 600
```

Related Commands

Command	Description
ipv6 pim override-interval	N/A
ipv6 pim neighbor-tracking	N/A

Platform Description N/A

7.19 ipv6 pim query-interval

Use this command to set the interval to send the hellp packets.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim query-interval *seconds*

no ipv6 pim query-interval

default ipv6 pim query-interval

Parameter Description

Parameter	Description
seconds	Interval to send the Hello message in the range from 1 to 65,535 in the unit of seconds

Defaults

The default is 30.

Command Mode

Interface configuration mode

Usage Guide

Upon updating the interval to send the Hello message, the time of holding the Hello message is updated by the following principle: The hold time is updated to be 3.5 times the transmission interval. If the transmission interval*3.5 is more than 65535, the hold time is updated to 18725.

Configuration Examples

The following example sets the interval to send the hello packets.

```
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet 0/3)# ipv6 pim query-interval 60
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.20 ipv6 pim register-checksum-wholepkt

Use this command to calculate the checksum of the whole register packet.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim register-checksum-wholepkt [**group-list** *ipv6_access-list*]

no ipv6 pim register-checksum-wholepkt [**group-list** *ipv6_access-list*]

default ipv6 pim register-checksum-wholepkt [**group-list** *ipv6_access-list*]

Parameter Description

Parameter	Description
group-list *ipv6_access-list*	IPv6 ACL supporting named ACL. *ipv6_access-list*:all multicast packets use this configuration by default

Defaults

By default, the checksum of register messages calculates the head of PIM message and register message rather

than the whole PIM message.

Command Mode Global configuration mode

Usage Guide Some vendors calculate checksum based on the overall registration packets. FS Networks introduces this function for the compatibility with these vendors.

Configuration Examples The following example calculates the checksum of the whole register packet.

```
FS(config)#ipv6 pim register-checksum-wholepkt group-list checksum-access-list
FS(config)# ipv6 access-list 99    checksum-access-list
FS(config-ipv6-acl)# permit ipv6 any ff66::6666/64
```

Related Commands

Command	Description
ipv6 access-list	N/A

Platform Description N/A

7.21 ipv6 pim register-rate-limit

Use this command to limit the rate of register packets.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim register-rate-limit *rate*

no ipv6 pim register-rate-limit

default ipv6 pim register-rate-limit

Parameter Description

Parameter	Description
rate	Maximum number of register packets that can be sent per second, in the range from 1 to 65,535.

Defaults By default, there is no rate limitation on register messages.

Command Mode Global configuration mode

Usage Guide This command is used to configure speed of transmitting register packet in each (S, G) status, not the speed of transmitting register packets in the system. Using this command will decrease the load of source DR and RP. The register packets can be transmitted at the speed within the limit.

Configuration Examples The following example limits the rate of register packets.

```
FS(config)# ipv6 pim register-rate-limit 3000
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.22 ipv6 pim register-rp-reachability

Use this command to check RP reachability before sending register packets**.**

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim register-rp-reachability

no ipv6 pim register-rp-reachability

default ipv6 pim register-rp-reachability

Parameter Description

Parameter	Description
N/A	N/A

Defaults

By default, the RP reachability is not checked before sending register packets.

Command Mode

Global configuration mode

Usage Guide

This command is used to check the RP reachability before transmission. If not, register packets are not transmitted.

Configuration Examples

The following example checks the RP reachability before sending register packets.

```
FS(config)# ipv6 pim register-rp-reachability
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.23 ipv6 pim register-source

Use this command to specify the source IPv6 address in the register packets.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim register-source { *ipv6_local_address* | *interface-type interface-number* }

no ipv6 pim register-source

default ipv6 pim register-source

Parameter Description

Parameter	Description
ipv6_local_address	Source IPv6 address of register packets
interface-type interface-number	Interface whose IPv6 address is used as the source IPv6 address of register packets

Defaults

By default, the source IPv6 address of register packets is the IPv6 address of the DR interface connecting the multicast source.

Command Mode

Global configuration mode

Usage Guide

The source IPv6 address must be reachable. When RP receives the register packet, it transmits Register-Stop packet, using its source IPv6 address as the destination IPv6 address of the Register-Stop packet.

It is not necessary to enable the PIM-SMv6 on the associated interfaces.

Configuration Examples

The following example configures the source IPv6 address of register messages.

```
FS(config)# ipv6 pim register-source 3333::3333
FS(config)# ipv6 pim register-source gi 0/3
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.24 ipv6 pim register-suppression

Use this command to set the register suppression time.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim register-suppression *seconds*

no ipv6 pim register-suppression

default ipv6 pim register-suppression

Parameter Description

Parameter	Description
seconds	Suppression time in the range from 1 to 65,535 in the unit of seconds

Defaults

The default is 60 seconds.

Command Mode

Global configuration mode

Usage Guide Executing this command on the DR will change the register packet suppression time configured. if the ipv6 pim rp-register-kat command is not configured, executing this command on RP will modify the period of RP keepalive.

Configuration Examples The following example sets the register packet suppression time.

```
FS(config)# ipv6 pim register-suppression 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.25 ipv6 pim rp embedded

Use this command to enable the embedded RP function.

Use the **no** or **default** form of this command to disable this function.

ipv6 pim rp embedded [**group-list** *ipv6_acl_name*]

no ipv6 pim rp embedded

default ipv6 pim rp embedded

Parameter Description

Parameter	Description
group-list *ipv6_acl_name*	IPv6 ACL

Defaults This function is enabled by default.

Command Mode Global configuration mode

Usage Guide This command is used to enable the embedded RP function explicitly and to enable the embedded RP for the IPv6 multicast address of specified embedded RP address.

Configuration Examples The following example enables the embedded RP for the IPv6 multicast addresses of all embedded RP addresses.

```
FS(config)# ipv6 pim rp embedded
```

Related Commands

Command	Description
ipv6 access-list	N/A

Platform Description N/A

7.26 ipv6 pim rp-address

Use this command to configure the static RP.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim rp-address *ipv6_rp-address* [*ipv6_access_list*]

no ipv6 pim rp-address *ipv6_rp-address* [*ipv6_access-list*]

default ipv6 pim rp-address *ipv6_rp-address* [*ipv6_access-list*]

Parameter Description

Parameter	Description
ipv6_rp-address	IPv6 address of RP
ipv6_access_list	IPv6 ACL supporting named ACL

Defaults

No IPv6 address is configured for the static RP by default.

Command Mode

Global configuration mode

Usage Guide

This system supports the configuration of multicast static RP, as well as the configuration of static RP and BSR mechanisms at the same time. When you use this command, note that:

- If both the BSR mechanism and the static RP configuration take effect, the dynamic configuration takes precedence.
- You can configure multiple multicast groups (using ACL) or all multicast groups (not using ACL) for the static RP. But a static RP can be configured only once.
- If there are more than one static RP in a multicast group, the one of the highest IPv6 address is used.
- Only the addresses permitted by ACL are valid multicast groups. By default, all the multicast groups 224/4 are permitted.
- After configuration is performed, the static RP's source IPv6 address is inserted to the group range-based static RP group tree structure. Each group range-based static multicast group maintains the chain list structure of a static RP group. This chain list is sorted in descending order of IPv6 address. When you select a RP from a static RP group, the first entry, namely the one with the largest IPv6 address, will be selected first.

Deleting a static IPv6 address also deletes this address from all the existing static RP groups and selects one from in the existing RP group tree structure as the RP address.

Configuration Examples

The following example configures the RP static address.

```
FS(config)# ipv6 pim rp-address 3333::3333 acl
FS(config)# ipv6 access-list acl
FS(config)# permit ipv6 any ff66::6666/64
```

Related Commands

Command	Description
ipv6 access-list	N/A

Platform Description

N/A

7.27 ipv6 pim rp-candidate

Use this command to configure the candidate RP (C-RP).

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim rp-candidate *interface-type interface-number* [**priority** *priority-value*] [**interval** *interval-seconds*] [**group-list** *ipv6_access-list*]

no ipv6 pim rp-candidate [*interface-type interface-number*]

default ipv6 pim rp-candidate [*interface-type interface-number*]

Parameter Description

Parameter	Description
interface-type interface-number	Interface type and interface number
priority-value	(Optional) Priority in the range from 0 to 255, 192 by default
interval-seconds	(Optional) Interval in the range from 0 to 16383 in the unit of seconds, 60 by default
ipv6_access_list	(Optional) IPv6 ACL supporting named ACL

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

In the PIM-SMv6 protocol, the shared tree RPT created by the multicast routing uses the Rendezvous Point (RP) as the root node. RP is elected by the candidate RPs. After BSR is elected, all C-RPs sends C-RP messages in the unicast form to BSR regularly, and BSR spreads the messages throughout the PIM domain.

To specify an interface as the candidate RP of a specific group, execute this command with ACL. Note that the group range is calculated only based on the permit rule, not the deny rule.

Configuration Examples

The following example configures the RP candidate.

```
FS(config)# ipv6 pim rp-candidate gi 0/3 priority 200 group-list acl interval 40
FS(config)# ipv6 access-list acl
FS(config-ipv6-acl)# permit ipv6    any ff66::6666/64
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.28 ipv6 pim rp-register-kat

Use this command to set the Keepalive Timer (KAT) of a (S, G) entry created by the register packet at the RP.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim rp-register-kat *seconds*

no ipv6 pim rp-register-kat

default ipv6 pim rp-register-kat

Parameter Description

Parameter	Description
seconds	KAT value in the range from1 to 65,525 in the unit of seconds.

Defaults The default is equal to the sum of register probe time and three times register suppression time.

Command Mode Global configuration mode

Usage Guide The KAT value at the RP should be greater than three times the register suppression time at the source DR. Otherwise, the KAT will end and the entry (S,G) will time out before another register packet is sent, so that multicast stream will break down in a short while.

Configuration Examples The following example configures the KAT interval of RP.

```
FS(config)# ipv6 pim rp-register-kat 250
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.29 ipv6 pim sparse-mode

Use this command to enable PIM-SMv6 on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim sparse-mode

no ipv6 pim sparse-mode

default ipv6 pim sparse-mode

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide This command is used to enable PIM-SMv6 on the interface.

You need to enable multicast routing forwarding in the global configuration mode before enabling PIM-SMv6. Otherwise, multicast packets cannot be forwarded even though you enable PIM-SM.

During the execution of this command, if the prompt "Failed to enable PIM-SMv6 on <Interface Name>, resource temporarily unavailable, please try again" appears, re-execute this command.

During the execution of this command, if the prompt "PIM-SMv6 Configure failed! VIF limit exceeded in NSM!!!" appears; it indicates the allowed configured interface number exceeds the upper limit of the multicast interfaces. In this case, if you still need to enable PIM-SMv6 on the interface, delete the unnecessary PIM-SMv6,or PIM-DMv6 interfaces.

If the interface is of tunnel-type, only 6Over4 configuration tunnel, 6Over GRE tunnel, 6Over4 configuration tunnel and 6Over6 GRE tunnel support the IPv6 multicasting at the moment. The multicasting can also be enabled on other tunnel interfaces which do not support the multicasting, but no error message will be displayed and no multicast packets will be received and forwarded.

The multicast tunnel can only be built on the Ethernet interface, the nested tunnel and the multicast data Qos/ACL are not supported.

IPv6 multicast packets cannot be forwarded through SuperVLAN.

Configuration Examples

The following example enables PIM-SMv6 on the interface.

```
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet 0/3)# ipv6 pim sparse-mode
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.30 ipv6 pim sparse-mode passive

Use this command to enable PIM-SMv6 PASSIVE.

Use the no or default form of this command to restore the default setting.

ipv6 pim sparse-mode passive

no ipv6 pim sparse -mode passive

default ipv6 pim sparse-mode passive

Parameter Description

Parameter	Description
N/A	N/A

Defaults

PIM-SMv6 PASSIVE is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

Please configure multicast route forwarding in global configuration mode before enabling PIM-SMv6 PASSIVE.

When PIM-SMv6 PASSIVE is enabled, IGMP is enabled on each interface automatically.

Enabled with PIM-SMv6 PASSIVE, the interface neither receives nor sends PIM packets. Instead, it forwards multicast packets. PIM-SMv6 PASSIVE is generally configured on the device of the stub area, so as to avoid floods of PIM hello packets.

Configuration Examples

The following example enables PIM-SMv6 PASSIVE on interface GigabitEthernet 0/3.

```
FS# configure terminal
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet 0/3)# ipv6 pim sparse-mode passive
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.31 ipv6 pim sparse-mode subvlan

Use this command to enable PIM-SMv6 on the Super VLAN interface. Use the **no** or **default** form of this command is to restore the default setting.

ipv6 pim sparse-mode subvlan [**all** | *vid*]

no ipv6 pim sparse-mode subvlan

default ipv6 pim sparse-mode subvlan

Parameter Description

Parameter	Description
all	Sends PIM packets to all sub VLANs.
vid	Sends PIM packets to the specified VLAN.

Defaults

PIM-SMv6 is disabled on the Super VLAN interface by default.

Command Mode

Interface configuration mode

Usage Guide

In general, a super VLAN includes many sub VLANs. If the PIM-SMv6 protocol is enabled on the interfaces of the super VLAN, PIM-SMv6 multicast packets will be replicated and sent to all sub VLANs. As a result, the traffic may exceed the device capability, causing protocol flapping. The Super VLAN interface is disabled with PIM-SMv6 generally. Use this command to enable PIM-SMv6 on the Super VLAN interface to send PIM packets to all sub VLANs or the specified sub VLAN.

Configuration Examples

The following example enables PIM-SMv6 on the Super VLAN interface and sends PIM packets to sub VLAN 200.

```
FS# configure terminal
FS(config)# interface vlan 100
FS(config-if-vlan 100)# ipv6 pim sparse-mode subvlan 200
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.32 ipv6 pim spt-threshold

Use this command to enable SPT switch.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim spt-threshold [**group-list** *ipv6_access-list*]

no ipv6 pim spt-threshold [**group-list** *ipv6_access-list*]

default ipv6 pim spt-threshold [**group-list** *ipv6_access-list*]

Parameter Description

Parameter	Description
ipv6_access_list	(Optional) IPv6 ACL supporting named ACL

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide This command is used to enable the RP tree-to-SPT tree switching function in a specific multicast group range (using group-list) or all multicast groups (not using group-list) .

Configuration Examples The following example enables the SPT switch.

```
FS(config)# ipv6 pim spt-threshold acl
FS(config)# ipv6 access-list acl
FS(config-ipv6-acl)# permit ipv6    fe80::2d0:f8ff:fe22:33ad /128    ff66::6666/64
```

Related Commands

Command	Description
ipv6 access-list	N/A

Platform Description N/A

7.33 ipv6 pim ssm

Use this command to enable SSM and set the SSM group address range.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim ssm { **default** | **range** *ipv6_access-list* }

no ipv6 pim ssm

default ipv6 pim ssm

Parameter Description

Parameter	Description
default	Group in the range of FF3x::/32
range *ipv6_access_list*	IPv6 ACL supporting named ACL

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide This command is used to enable PIM-SSMv6 (or in some specific multicast groups).

Configuration Examples The following example sets the source-specific multicast of the multicast group range ACL.

```
FS# configure terminal
FS(config)# ipv6 pim ssm range aclFS(config-ipv6-acl)# permit ipv6    fe80::2d0:f8ff:fe22:33ad /128    ff32::3333/64
```

Related Commands

Command	Description
ipv6 access-list	N/A

Platform Description N/A

7.34 ipv6 pim static-rp-preferred

Use this command to configure a higher priority for static RP over the C-RP.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim static-rp-preferred

no ipv6 pim static-rp-preferred

default ipv6 pim static-rp-preferred

Parameter Description

Parameter	Description
N/A	N/A

Defaults By default, the priority of the RP elected through BSR mechanism is high than the one configured statically.

Command Mode Global configuration mode

Usage Guide With this command configured, the priority of the static RP is higher than the one elected through the BSR mechanism.

Configuration Examples

The following example configures the priority of the static RP is higher than the one elected through the BSR mechanism.

```
FS(config-if)# ipv6 pim static-rp-preferred
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.35 ipv6 pim triggered-hello-delay

Use this command to configure Triggered-Hello-Delay time on the interface.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 pim triggered-hello-delay *seconds*

no ipv6 pim triggered-hello-delay

default ipv6 pim triggered-hello-delay

Parameter Description

Parameter	Description
seconds	In the range from1 to 5 in the unit of seconds.

Defaults

The default is 5 seconds.

Command Mode

Interface configuration mode

Usage Guide

Use this command to configure the triggered-hello-delay of the interface. When the interface starts or detects a new neighbor, it uses the trigger-hello-delay to generate random time, and then the interface sends the Hello message at the random time.

Configuration Examples

The following example sets the triggered-hello-delay to 3 seconds.

```
FS(config)# interface gi 0/3
FS(config-if-GigabitEthernet 0/3)# ipv6 pim triggered-hello-delay 3
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.36 show debugging

Use this command to display the debugging status.

show debugging

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the debugging status.

```
FS # show debugging
PIM-SM Debugging status:
PIM packet debugging is on.
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.37 show ipv6 pim sparse-mode bsr-router

Use this command to display the BSR information.

show ipv6 pim sparse-mode bsr-router

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Command Mode Privileged EXEC mode/ global configuration mode / interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays BSR information.

```
FS# show ipv6 pim sparse-mode bsr-router
PIMv2 Bootstrap information
```

```
This system is the Bootstrap Router (BSR)
BSR address: 3333::8888
Uptime:00:03:31, BSR Priority: 64, Hash mask length: 126
Next bootstrap message in 00:00:47
Role: Candidate BSR    Priority: 64, Hash mask length: 126
State: Elected BSR
Candidate RP: 3333::8888(GigabitEthernet 0/5)
Advertisement interval 60 seconds
Next Cand_RP_advertisement in 00:00:37
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.38 show ipv6 pim sparse-mode interface

Use this command to display PIM-SMv6 interface information.

show ipv6 pim sparse-mode interface [*interface-type interface-number*] [**detail**]

Parameter Description

Parameter	Description
interface-type interface-number	(Optional) Interface name. This command takes effect for all interfaces by default.
detail	(Optional) Displays the details of an interface.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the PIM-SMv6 interface information.

```
FS #show ipv6 pim sparse-mode interface detail
GigabitEthernet 0/5 (vif 1):
Address fe80::2d0:f8ff:fe22:33ad, DR fe80::2d0:f8ff:fe22:34b3
Hello period 30 seconds, Next Hello in 6 seconds
Triggered Hello period 5 seconds
Secondary addresses:
    3333::8888
    4444::4444
  Neighbors:
```

```
fe80::2d0:f8ff:fe22:34b3
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.39 show ipv6 pim sparse-mode local-members

Use this command to display the local MLD information on the PIM-SMv6 interface.

show ipv6 pim sparse-mode local-members [*interface-type interface-number*]

Parameter Description

Parameter	Description
interface-type interface-number	(Optional) Interface name. This command takes effect for all interfaces by default.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the local MLD information on the PIM-SMv6 interface.

```
FS (config-if)#show ipv6 pim sparse-mode local-members
PIM Local membership information
GigabitEthernet 0/5:
  (*, ff66::6666) : Include
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.40 show ipv6 pim sparse-mode mroute

Use this command to display the PIM-SMv6 routing information.

show ipv6 pim sparse-mode mroute [*group-or-source-address* [*group-or-source-address*]]

Parameter

Parameter	Description

Description

group-or-source-address	Group address or source address. Two addresses cannot both be the group addresses or the source addresses.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide This command is used to display route information. Only one group IPv6 address, one source IPv6 address or one group IPv6 address-source IPv6 address pair can be configured at a time. You can also specify no group IP address or source IPv6 address.

Configuration Examples N/A

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.41 show ipv6 pim sparse-mode neighbor

Use this command to display the neighbor information.

show ipv6 pim sparse-mode neighbor [**detail**]

Parameter Description

Parameter	Description
detail	(Optional) Displays the details of an interface.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

Configuration Examples The following example displays the neighbor information..

```
FS# show ipv6 pim sparse-mode neighbor detail
Nbr fe80::2d0:f8ff:fe22:34b3 (GigabitEthernet 0/5)
 Expires in 86 seconds
  Secondary addresses:
   6666::6666
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.42 show ipv6 pim sparse-mode nexthop

Use this command to display the next hop information, including the interface ID, address and metric.

show ipv6 pim sparse-mode nexthop

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples N/A

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.43 show ipv6 pim sparse-mode rp mapping

Use this command to display the information on all RPs and the multicast groups they serve.

show ipv6 pim sparse-mode rp mapping

Parameter Description

Parameter	Description
mapping	All groups and RP information.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the information on all RPs and the multicast groups they serve.

```
FS# show ipv6 pim sparse-mode rp mapping
PIM Group-to-RP Mappings
This system is the Bootstrap Router (v2)
Group(s): ff00::/8
  RP: 3333::1
    Info source: 3333::1, via bootstrap, priority 192
          Uptime: 00:12:40, expires: 00:01:50
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.44 show ipv6 pim sparse-mode rp-hash

Use this command to display the RP information corresponding to the group address.

show ipv6 pim sparse-mode rp-hash *ipv6-group-address*

Parameter Description

Parameter	Description
ipv6_group-address	IPv6 group address

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the RP information corresponding to the group address..

```
FS# show ipv6 pim sparse-mode rp-hash ff66::6666
RP: 3333::8888
Info source: 3333::8888, via bootstrap
PIMv2 Hash Value 126
RP 3333::8888, via bootstrap, priority 192, hash value 1468234650
```

Related

Command	Description

Commands

N/A	N/A

Platform Description N/A

7.45 show ipv6 pim sparse-mode track

Use this command to display the number of sent and received PIM packets during the period from the beginning of the statistics till now.

show ipv6 pim sparse-mode track

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide This command is used to display the number of sent and received PIM packets during the period from the beginning of the statistics till now.. When the system starts up, it sets the start time of the statistics. The start time of the statistics is reconfigured and the PIMv6 packet counter is cleared on calling the clear ipv6 pim sparse-mode track every time.

Configuration Examples The following example displays the number of sent and received PIM packets during the period from the beginning of the statistics till now.

```
FS# show ipv6 pim sparse-mode track
PIMv6 packet counters track
Elapsed time since counters cleared: 00:04:03
                                received        sent
Valid PIMSMv6 packets:          0               8
Hello:                                  0               8
Join-Prune:                     0               0
Register:                               0               0
Register-Stop:                  0               0
Assert:                                 0               0
BSM:                                    0               0
C-RP-ADV:                               0               0
PIMDMv6-Graft:                          0
PIMDMv6-Graft-Ack:                      0
PIMDMv6-State-Refresh:                  0
Unknown PIMv6 Type:                     0
Errors:
```

```
Malformed packets:                                  0
Bad checksums:                                          0
Send errors:                                                0
Packets received with unknown PIMv6 version:        0
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8 IGMP Snooping Commands

8.1 clear ip igmp snooping gda-table

Use this command to clear the Group Destination Address (GDA) table.

clear ip igmp snooping gda-table

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

The IGMP Snooping GDA table contains VLAN IDs (VIDs), group addresses, routing interface (static or dynamic) ID, and member interface ID. Among them, the VID and group address identify a forwarding entry; the static routing interfaces will not age and cannot be deleted by using the **clear ip igmp snooping gda-table** command.

Configuration Examples

The following example clears the Group Destination Address (GDA) table.

```
FS# clear ip igmp snooping gda-table
```

Platform Description

N/A

8.2 clear ip igmp snooping statistics

Use this command to clear IGMP Snooping statistics.

clear ip igmp snooping statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

This command is used to clear the IGMP Snooping statistics, which can be displayed by using the **show ip igmp snooping statistics** command.

Configuration

The following example clears the IGMP Snooping statistics.

Examples

```
FS# clear ip igmp snooping statistics
```

Platform Description

N/A

8.3 deny

Use this command to deny the forwarding of the multicast streams in the range specified by the profile.

deny

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The forwarding of the multicast streams in the range specified by the profile is denied.

Command Mode

Profile configuration mode

Usage Guide

First, configure the multicast range using the range command in the profile configuration mode. In addition, the profile must be applied to the interface in order to make the profile configuration take effect.

Configuration Examples

The following is an example of deny the forwarding of the multicast stream 224.2.2.2 to 224.2.2.244.

```
FS(config)# ip igmp profile 1
FS(config-profile)# range 224.2.2.2 224.2.2.244
FS(config-profile)# deny
```

Platform Description

N/A

8.4 ip igmp profile

Use this command to create a profile and enter the IGMP profile configuration mode.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp profile *profile-number*

no ip igmp profile *profile-number*

default ip igmp profile *profile-number*

Parameter Description

Parameter	Description
profile-number	Profile number, in the range from 1 to 1024

Defaults

No profile is created by default.

Command

Global configuration mode

Mode

Usage Guide

The profile is a filter to permit/deny specified groups in the following steps:

- Use the **ip igmp profile** command to create a profile and enter profile configuration mode.
- Use the **range** command to define a profile range.
- Use the **permit** command to permit this profile in the filtering, or use the **deny** command to deny this profile in the filtering.
- If the **deny** command is used without any profile specified, all profiles in the profile are permitted.
- If the **permit** command is used without any profile specified, all profiles in the profile are denied.

Configuration Examples

The following example creates and permits profile 1 with addresses from 224.2.2.2 to 224.2.2.244.

```
FS(config)# ip igmp profile 1
FS(config-profile)# range 224.2.2.2 224.2.2.244
FS(config-profile)# permit
```

Platform Description

N/A

8.5 ip igmp snooping

Use this command to enable IGMP snooping and enter the IVGL mode.

ip igmp snooping ivgl

Use this command to enable IGMP snooping and enter the SVGL mode.

ip igmp snooping svgl

Use this command to enable IGMP snooping and enter the IVGL-SVGL mode.

ip igmp snooping ivgl-svgl

Use the **no** or **default** command to restore the default setting.

no ip igmp snooping

default ip igmp snooping

Parameter Description

Parameter	Description
N/A	N/A

Defaults

IGMP Snooping is disabled by default.

Command Mode

Global configuration mode

Usage Guide

- **IVGL (Independent VLAN Group Learning):** In this mode, the multicast flows in different VLANs are independent. A host can only request multicast flows to the router interface in the same VLAN. Upon receiving the multicast flow in any VLAN, the switch forwards the flow to the member port in the same VLAN.
- **SVGL (Shared VLAN Group Learning):** In this mode, the hosts in different VLANs share the same multicast flow. A host can request multicast flows across VLANs. By designating a Shared VLAN, you can only forward the multicast flows received in this Shared VLAN to other member ports in different VLANs. In the SVGL mode,

IGMP Profile must be used to divide the multicast address range, within which the multicast flow can be forwarded across VLANs. By default, all group range is not within the SVGL range and all multicast flows are dropped. As shown in Figure-3:

- **IVGL-SVGL mode:** also known as promiscuous mode. In this mode, the IVGL mode and the SVGL mode can co-exist. Use IGMP Profile to divide a set of multicast address range to the SVGL, within which the member port of the multicast forwarding entry can be forwarded across VLANs and without which the member ports are forwarded in the same VLAN.
- For wireless products, only IVGL mode is supported. Use the **ip igmp snooping** command to enable IGMP Snooping in global configuration mode, and use the **igmp snooping** command in AP configuration mode.

SVGL mode and IVGL-SVGL mode conflict with the IP multicast function.

PIM Snooping must depend on either IVGL or IVGL-SVGL mode of IGMP Snooping. Use **no ip igmp snooping** command to disable IGMP Snooping after PIM Snooping is disabled.

Configuration Examples

The following example enables IGMP Snooping and enters the IVGL mode.

```
FS(config)# ip igmp snooping ivgl
```

The following example enables IGMP Snooping and enters the SVGL mode.

```
FS(config)# ip igmp snooping svgl
FS(config)# ip igmp snooping svgl profile 1
```

The following example enables IGMP Snooping and enters the IVGL-SVGL mode.

```
FS(config)# ip igmp snooping ivgl-svgl
FS(config)# ip igmp snooping svgl profile 1
```

The following example enables IGMP Snooping on APs.

```
FS(config)# ip igmp snooping
FS(ap-config)# igmp snooping
```

Platform Description

N/A

8.6 ip igmp snooping dyn-mr-aging-time

Use this command to set the aging time of a dynamic routing interface.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp snooping dyn-mr-aging-time *seconds*

no ip igmp snooping dyn-mr-aging-time

default ip igmp snooping dyn-mr-aging-time

Parameter Description

Parameter	Description
seconds	Aging time from 1 to 3,600 in the unit of seconds

Defaults The default is 300 seconds.

Command Mode Global configuration mode

Usage Guide If a dynamic routing interface does not receive IGMP query packets or PIM hello packets before aged, this interface will be deleted.
When the dynamic routing interface learning function is enabled, this command sets the aging time of the routing interface. If the aging time is set too short, the routes may be added and deleted frequently.

Configuration Examples The following example sets the aging time of the routing interface that the switch learns dynamically to 100 seconds.

```
FS(config)# ip igmp snooping dyn-mr-aging-time 100
```

Platform Description N/A

8.7 ip igmp snooping fast-leave enable

Use this command to enable the fast leave function.
Use the **no** or **default** form of this command to restore the default setting.
ip igmp snooping fast-leave enable
no ip igmp snooping fast-leave enable
default ip igmp snooping fast-leave enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide After you execute this command to enable the fast-leave function, the system will remove the corresponding multicast group on the corresponding interface upon the receipt of the IGMP leave message.
Subsequently, when the system receives a specific group query packet, the system does not forward it to the corresponding interface. Leave packets refer to the IGMPv2 leave packets. The fast leave function applies to scenarios in which one interface is connected to only one host. This function saves bandwidth and resources.

Configuration Examples The following example enables the fast leave function.

```
FS(config)# ip igmp snooping fast-leave
```

Platform Description N/A

8.8 ip igmp snooping filter

Use this command to specify the profile for ports.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp snooping filter *profile-number*

no ip igmp snooping filter *profile-number*

default ip igmp snooping filter

Use this command to specify the profile for VLANs.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp snooping vlan *vlan-id* **filter** *profile-number*

no ip igmp snooping vlan *vlan-id* **filter**

default ip igmp snooping vlan *vlan-id* **filter**

Parameter Description

Parameter	Description
profile-number	Profile number from 1 to 1024

Defaults This function is disabled by default.

Command Mode Global configuration mode/Interface configuration mode

Usage Guide A specific profile must be created before association.

Configuration Examples The following example specifies profile 1 for interface fastEthernet 0/1.

```
FS(config)# interface fastEthernet 0/1
FS(config-if)# ip igmp snooping filter 1
```

Platform Description N/A

8.9 ip igmp snooping host-aging-time

Use this command to configure the aging time of IGMP dynamic ports.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp snooping host-aging-time *seconds*

no ip igmp snooping host-aging-time

default ip igmp snooping host-aging-time

Parameter Description

Parameter	Description
seconds	Aging time. The unit is second. The value ranges from 1 to 65,535.

Defaults The default is 260 seconds.

Command Mode Global configuration mode

Usage Guide The aging time of a dynamic port is set by the system when the port receives an IGMP packet from the host for joining a certain IP multicast group.

When such an IGMP packet is received, the system resets the aging timer for the port. The duration of this timer is determined by **host-aging-time**. If the timer expires, the system determines that there is no host in this port for receiving multicast packets. The multicast device removes the port from the IGMP Snooping group. After the **ip igmp snooping host-aging-time** command is executed, the aging time will be determined by **host-aging-time**. This command takes effect only after the system receives the next IGMP packet. This command does not change the current aging time.

Configuration Examples The following example sets the aging time to 30 seconds.

```
FS(config)# ip igmp snooping host-aging-time 30
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

8.10 ip igmp snooping l2-entry-limit

Use this command to set the maximum number of multicast groups.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp snooping l2-entry-limit *number*

no ip igmp snooping l2-entry-limit

default ip igmp snooping l2-entry-limit

Parameter Description

Parameter	Description
number	Number of multicast groups. The value ranges from 0 to 65,536.

Defaults The default is 65,536.

Command Mode Global configuration mode

Usage Guide The maximum number of multicast groups includes the multicast groups in all ports of all VLANs (including dynamic and static multicast groups). When the number of multicast groups reaches the limit, learning new group records and configuring new static multicast group ports are not allowed.

Configuration Examples The following example sets the maximum number of multicast groups to 2000.

```
FS(config)# ip igmp snooping l2-entry-limit 2000
```

Related Commands

Command	Description
show ip igmp snooping	Displays the maximum number of multicast groups.

Platform Description N/A

8.11 ip igmp snooping limit-ipmc

Use this command to add a multicast source IP address check entry.

Use the **no** or **default** form of this command is used to delete a source IP checklist entry.

ip igmp snooping limit-ipmc vlan *vid* **address** *gaddress* **server** *saddress*

no ip igmp snooping limit-ipmc vlan *vid* **address** *gaddress*

default ip igmp snooping limit-ipmc vlan *vid* **address** *gaddress*

Parameter Description

Parameter	Description
vid	VLAN ID
group-address	Multicast group address
source-address	Multicast source IP address

Defaults Only source IP address check is enabled by default.

Command Mode Global configuration mode

Usage Guide This command is used to filter the multicast packets. With it enabled, all multicast packets from illegal IP addresses will be discarded.

Source IP address check and multicast routing function cannot be enabled meanwhile.

Configuration steps:

1. Enable source IP address check and specify the source IP address.
2. (Optional) Specify the multicast group address and source IP address for a specific VLAN.

Configuration Examples The following example enables source address check to receive multicast packets only from 192.168.1.10 and allows packets into VLAN 2013 and VLAN 104 from (192.168.1.10 , 229.1.1.1).

```
FS# configure terminal
FS(config)# ip igmp snooping source-check default-server 192.168.1.10
FS(config)# ip igmp snooping limit-ipmc vlan 203 address 229.1.1.1 server 192.168.1.10
FS(config)# ip igmp snooping limit-ipmc vlan 204 address 229.1.1.1 server 192.168.1.10
FS(config)# end
```

Platform Description N/A

8.12 ip igmp snooping max-groups

Use this command to configure the maximum number of groups that can be added dynamically to this interface.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp snooping max-groups *number*

no ip igmp snooping max-groups

default ip igmp snooping max-groups

Parameter Description

Parameter	Description
number	The maximum group number from 0 to 1,024

Defaults No maximum group number is configured by default.

Command Mode Interface configuration mode

Usage Guide If a maximum number of multicast groups are configured, the device will no longer receive and process IGMP Report messages when the number of multicast groups on this interface is beyond the range.

Configuration Examples The following example configures the maximum number of multicast groups to 100 on the megabit interface 0/1:

```
FS(config)# interface Ethernet 0/1
FS(config-if)# ip igmp snooping max-group 100
```

Platform Description N/A

8.13 ip igmp snooping mrouter learn pim-dvmrp

Use this command to configure a device to listen to the IGMP Query/Dvmrp or PIM Help packets dynamically in order to automatically identify a routing interface

Use the **no** form of this command to disable the dynamic learning.

Use the **default** form of this command to restore the default setting.

ip igmp snooping [**vlan** *vid*] **mrouter learn pim-dvmrp**

no ip igmp snooping [**vlan** *vid*] **mrouter learn pim-dvmrp**

default ip igmp snooping [**vlan** *vid*] **mrouter learn pim-dvmrp**

Parameter Description

Parameter	Description
vlan *vid*	VLAN ID. By default, the specified version is supported on all VLANs.

Defaults This function is enabled by default.

Command Mode Global configuration mode

Usage Guide Routing interface is a port through which a multicast device (with IGMP Snooping enabled) is directly connected to a multicast neighbouring device (with multicast routing protocols enabled).

By default, the dynamic routing interface learning function is enabled. You can use the no form of this command to disable this function and clear all routing interfaces learnt dynamically. With dynamic routing interface learning function disabled globally, the function of all vlans will be disabled. Beside, with this function enabled globally, if the

function of specified vlan is disabled, the dynamic routing interface learning function of the corresponding vlan is disabled. When the source port check function is enabled, only the multicast flow enters from the routing interface is legal and it is forwarded to the registered interface by the multicast equipment, the multicast flow from the non routing interface is considered to be the illegal and is discarded. With the source port check function enabled, the dynamic routing interface learning function will improve the application flexibility of IGMP snooping.

Configuration Examples

The following example enables the dynamic routing interface learning function on VLAN 1.

```
FS(config)# no ip igmp snooping mrouter learn pim-dvmrp
FS(config)# ip igmp snooping vlan 1 mrouter learn pim-dvmrp
```

Platform Description

N/A

8.14 ip igmp snooping preview

Use this command to allow the user to preview the specific multicast streams when the user doesn't have access to such multicast streams.

Use **no** or **default** form of this command to disable multicast preview.

ip igmp snooping preview *profile-number*

no ip igmp snooping preview

default ip igmp snooping preview

Parameter Description

Parameter	Description
profile-number	Profile number (1-1024)

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

Apply the IGMP Profile to a multicast preview function. When the user doesn't have access to the multicast streams (namely the user might be filtered by IGMP Snooping filter), it can allow the user to preview partial contents. This function shall be used in conjunction with IGMP Snooping filter or multicast control in order to realize effective multicast preview.

Configuration Examples

The following example associates the profile 2 to the Ethernet 0/1 and associates multicast preview with profile 1.

```
FS(config)# ip igmp snooping preview 1
FS(config-if)# int Ethernet 0/1
FS(config-if)# ip igmp snooping filter 2
```

Platform Description

N/A

8.15 ip igmp snooping preview interval

Use this command to configure the interval that allows the user to preview the specific multicast streams when the user doesn't have access to such multicast streams.

Use **no** or **default** form of this command to restore the default setting.

ip igmp snooping preview interval *seconds*

no ip igmp snooping preview interval

defaut ip igmp snooping preview interval

Parameter Description

Parameter	Description
seconds	Preview interval from 1 to 300 in the unit of seconds

Defaults

The default is 60 seconds.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the multicast preview interval as 100 seconds on the 100M port of 0/1:

```
FS(config)# ip igmp snooping preview 1
FS(config)# ip igmp snooping preview interval 100
```

Platform Description

N/A

8.16 ip igmp snooping querier

Use this command to enable the IGMP querier.

Use **no** or **default** form of this command to restore the default setting.

ip igmp snooping [**vlan** *vid*] **querier**

no ip igmp snooping [**vlan** *vid*] **querier**

default ip igmp snooping [**vlan** *vid*] **querier**

Parameter Description

Parameter	Description
vlan *vid*	VLAN ID. By default, the specified version is supported on all VLANs.

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

After globally enabling the IGMP querier, you must enable the IGMP querier function in VLAN to activate this function.

If the IGMP querier function is disabled globally, the IGMP querier will be disabled in all VLANs.

Configuration Examples

The following example enables the IGMP querier function in VLAN 2.

```
FS(config)# ip igmp snooping querier
FS(config)# ip igmp snooping vlan 2 querier
```

Platform Description

N/A

8.17 ip igmp snooping querier address

Use this command to specify a source IP address for IGMP querier.

Use **no** or **default** form of this command to remove the source IP address configured.

ip igmp snooping [**vlan** *vid*] **querier address** *a.b.c.d*

no ip igmp snooping [**vlan** *vid*] **querier address**

default ip igmp snooping [**vlan** *vid*] **querier address**

Parameter Description

Parameter	Description
vlan *vid*	VLAN ID. By default, the specified version is supported on all VLANs.
a.b.c.d	Source IP address of the IGMP querier

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

After enabling IGMP querier, you msut configure a source IP address for the IGMP querier to activate this function..

If the IGMP querier source IP has been specified in VLAN, the source IP configured in the relevant VLAN will be used first.

Configuration Examples

The following example specifies the source IP of the IGMP querier as 1.1.1.1 on the device.

```
FS(config)# ip igmp snooping querier address 1.1.1.1
```

The following example specifies the source IP of the IGMP querier as 1.1.1.1 in VLAN 3.

```
FS(config)# ip igmp snooping vlan 3 querier address 1.1.1.1
```

Platform Description

8.18 ip igmp snooping querier max-response-time

Use this command to configure the maximum response time of the IGMP querier.

Use **no** or **default** form of this command to restore to the default setting.

ip igmp snooping [**vlan** *vid*] **querier max-response-time** *seconds*

no ip igmp snooping [**vlan** *vid*] **querier max-response-time**

default ip igmp snooping [**vlan** *vid*] **querier max-response-time**

Parameter Description

Parameter	Description
seconds	Maximum response time from 1 to 25 in the unit of seconds
vlan *vid*	VLAN ID. By default, the specified version is supported on all VLANs.

Defaults

The default is 10 seconds.

Command Mode

Global configuration mode

Usage Guide

By default, the maximum response time is 10 seconds. If the maximum response time has been specified in the corresponding VLAN, the value specified in VLAN will be used first.

Configuration Examples

The following example specifies the maximum response time of the IGMP querier on the device.

```
FS(config)# ip igmp snooping querier max-response-time 15
```

The following example specifies the maximum response time of the IGMP querier in VLAN 3.

```
FS(config)# ip igmp snooping vlan 3 querier max-response-time 15
```

Platform Description

N/A

8.19 ip igmp snooping querier query-interval

Use this command to specify the interval for IGMP querier to send query packets.

Use **no** or **default** form of this command to restore the default setting.

ip igmp snooping [**vlan** *vid*] **querier query-interval** *seconds*

no ip igmp snooping [**vlan** *vid*] **querier query-interval**

default ip igmp snooping [**vlan** *vid*] **querier query-interval**

Parameter Description

Parameter	Description
seconds	Query interval from 1 to 18,000 in the unit of seconds
vlan *vid*	VLAN ID. By default, the specified version is supported on all VLANs.

Defaults

The default is 60 seconds.

Command Mode

Global configuration mode

Usage Guide

If the query interval has been configured in the corresponding VLAN, the value specified in VLAN will be used first.

Configuration Examples

The following example configures the query interval on the device.

```
FS(config)# ip igmp snooping querier query-interval 100
```

The following example configures the query interval in VLAN 3.

```
FS(config)# ip igmp snooping vlan 3 querier query-interval 100
```

Platform Description N/A

8.20 ip igmp snooping querier timer expiry

Use this command to specify the expiration timer for non-querier.

Use **no** form of this command to restore the default setting.

ip igmp snooping [**vlan** *vid*] **querier timer expiry** *seconds*

ip igmp snooping [**vlan** *vid*] **querier timer expiry** *seconds*

default ip igmp snooping [**vlan** *vid*] **querier timer expiry**

Parameter Description

Parameter	Description
seconds	Theexpiration timer from 60 to 300 in the unit of seconds
vlan *vid*	VLAN ID. By default, the specified version is supported on all VLANs.

Defaults The default is 125 seconds.

Command Mode Global configuration mode

Usage Guide After globally enabling IGMP querier, if the device is elected as a non-querier, execute this command to change the expiration timer for non-querier.

If expiration timer has been configured in the corresponding VLAN, the value specified in VLAN will be used first.

Configuration Examples The following example configures the non-querier expiration timer on the device.

```
FS(config)# ip igmp snooping querier timer expiry 60
```

The following example configures the non-querier expiration timer in VLAN 3.

```
FS(config)# ip igmp snooping vlan 3 querier timer expiry 60
```

Platform Description N/A

8.21 ip igmp snooping querier version

Use the following commands to specify IGMP Snooping querier version.

ip igmp snooping [**vlan** *vid*] **querier version 1**

ip igmp snooping [**vlan** *vid*] **querier version 2**

ip igmp snooping [**vlan** *vid*] **querier version 3**

Use **no** or **default** form of this command to restore to the default setting.

no ip igmp snooping [**vlan** *vid*] **querier version**

default ip igmp snooping [**vlan** *vid*] **querier version**

Parameter Description

Parameter	Description
vlan *vid*	VLAN ID. By default, the specified version is supported on all VLANs.

Defaults The default version is IGMPv2.

Command Mode Global configuration mode

Usage Guide If an IGMP querier version has been configured in a VLAN, the version specified in the VLAN will be used first.

Configuration Examples The following example configures IGMP querier version on the device.

```
FS(config)# ip igmp snooping querier version 1
```

Platform Description N/A

8.22 ip igmp snooping query-max-response-time

Use this command to specify the time for the switch to wait for the member join message after receiving the **query** message.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp snooping query-max-response-time *seconds*

no ip igmp snooping query-max-resposne-time

default ip igmp snooping query-max-response-time

Parameter Description

Parameter	Description
seconds	The aging time of the routing inerface that the switch learns dynamically, in the range from 1 to 65.535

Defaults The default is 10 seconds.

Command Mode Global configuration mode

Usage Guide You can specify the time for the switch to wait for the member join message after receiving the query message. If the switch does not receive the member join message in the specified time, it considers that the member has left and then deletes the member.

This command lets you adjust the waiting time after receiving the query message. This command takes effect only after the switch receives the next member join message. This command does not change the current wait time.

Configuration Examples The following examples sets the aging time of the routing interface that the switch learns dynamically to 100 seconds.

```
FS(config)# ip igmp snooping query-max-response-time 100
```

Platform Description N/A

8.23 ip igmp snooping source-check default-server

Use this command to enable the source IP address check to permit one or several IPMC flows from the server of the specified IP address.

Use the **no** or **default** form of this command is used to restore the default setting.

ip igmp snooping source-check default-server *source-address*

no ip igmp snooping source-check

default ip igmp snooping source-check

Parameter Description

Parameter	Description
source-address	Default multicast source IP address

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide The source IP address check function takes effect globally. Once it is enabled, only the IPMC streams from the specified IP address are permitted.

Source IP address check and IP multicast function cannot work meanwhile.

The device allows users to configure the source IP address of all IPMC streams, called default multicast server. The default server must be set as long as the source IP address check function is enabled.

Configuration Examples The following example enables the multicast source IP address check function.

```
FS# configure terminal
FS(config)# ip igmp snooping source-check default-server 192.168.1.10
FS(config)# ip igmp snooping limit-ipmc vlan 203 address 229.1.1.1 server 192.168.1.10
FS(config)# ip igmp snooping limit-ipmc vlan 204 address 229.1.1.1 server 192.168.1.10
FS(config)# end
```

Platform Description N/A

8.24 ip igmp snooping source-check port

Use this command to enable the source port check function of IGMP Snooping.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp snooping source-check port

no ip igmp snooping source-check port

default ip igmp snooping source-check port

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide The source port check function is used to permit one or several IPMC flows from the mroute port. When it is enabled, only the IPMC streams from the specified port are permitted. When it is disabled, all the IPMC streams are permitted and forwarded.

Configuration Examples The following example enables the source port check function of IGMP Snooping.

```
FS(config)# ip igmp snooping source-check port
```

Platform Description N/A

8.25 ip igmp snooping suppression enable

Use this command to enable IGMP snooping suppression.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp snooping suppression enable

no ip igmp snooping suppression enable

default ip igmp snooping suppression enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide When this function is enabled, IGMP Snooping only forwards the first report from a specific VLAN or group, and suppresses the following reports to constrain traffic in the networks.

This function is only supported on IGMPv1 and IGMPv2 reports.

Configuration Examples The following example enables IGMP snooping suppression on the device.

```
FS(config)# ip igmp snooping suppression enable
```

Platform Description N/A

8.26 ip igmp snooping svgl profile

Use this command to specify the multicast group address range applied in the SVGL/IVGL-SVGL mode.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp snooping svgl profile *profile-number*

no ip igmp snooping svgl profile

default ip igmp snooping svgl profile

Parameter Description

Parameter	Description
profile-number	Profile number, in the range of 1-1,024

Defaults No profile is associated.

Command Mode Global configuration mode

Usage Guide When the IGMP Snooping works in the SVGL and IVGL-SVGL mode, a profile shall be associated to specify the multicast group address range applied in the SVGL or IVGL-SVGL mode. That is to say, the member ports of the multicast forwarding entry can be forwarded across the VLANs while the member ports of the multicast forwarding entry in the other multicast address range must belong to the same VLAN.

Configuration Examples The following example specifies the profile 2 applied in SVGL mode.

```
FS(config)# ip igmp snooping svgl profile 2
```

Platform Description N/A

8.27 ip igmp snooping svgl subvlan

Use this command to specify the subvlan of multicast VLAN.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp snooping svgl subvlan [*vid-range*]

no ip igmp snooping svgl subvlan [*vid-range*]

default ip igmp snooping svgl subvlan [*vid-range*]

Parameter Description

Parameter	Description
vid-range	VLAN ID or range of VLAN ID

Defaults By default, all VLANs except shared VLANs serve as its sub VLANs.

Command Mode Global configuration mode

Usage Guide This command only takes effect in SVGL and IVGL-SVGL mode.

Configuration Examples The following example specifies VLAN 3 as the shared VLAN and VLAN 2, VLAN 5 to 7 as the sub VLANs.

```
FS(config)# ip igmp snooping svgl vlan 3
FS(config)# ip igmp snooping svgl subvlan 2,5-7
```

Platform Description N/A

8.28 ip igmp snooping svgl vlan

Use this command to specify the shared VLAN in SVGL mode.

Use the **no** form of this command to restore the default setting.

ip igmp snooping svgl vlan *vid*

no ip igmp snooping svgl vlan

default ip igmp snooping svgl vlan

Parameter Description

Parameter	Description
vid	VLAN ID

Defaults By default , the shared VLAN is VLAN 1.

Command Mode Global configuration mode

Usage Guide This command only works in the SVGL and IVGL-SVGL mode.

Configuration Examples The following example specifies VLAN 3 as the shared VLAN and VLAN 2, VLAN 5 to 7 as the sub VLANs.

```
FS(config)# ip igmp snooping svgl vlan 3
FS(config)# ip igmp snooping svgl subvlan 2,5-7
```

Platform Description N/A

8.29 ip igmp snooping tunnel

Use this command to enable 802.1Q tunneling (QinQ) support for IGMP Snooping.

Use the **no** or **default** form of this command to restore the default setting.

ip igmp snooping tunnel

no ip igmp snooping tunnel

default ip igmp snooping tunnel

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled.

Command Mode Global configuration mode

Usage Guide After IGMP Snooping is enabled and dot1q-tunnel port is configured on the device, IGMP packets received from dot1q-tunnel port will be handled in two ways:

- First: QinQ transmits IGMP packets transparently. Create multicast entries in the VLAN to which the IGMP packets belong, and forward IGMP packets in the VLAN.
- For example: It is assumed that IGMP Snooping has been enabled on the device; Port A is a dot1q-tunnel port; the default VLAN of Port A is VLAN 1, and packets from VLAN 1 and VLAN 10 are allowed by Port A. When multicast requests of VLAN 10 are sent to port A, IGMP Snooping will create the multicast entry of VLAN 10 and forward the multicast requests to the router port of VLAN 10.
- Second: Create multicast entries in the default VLAN to which the dot1q-tunnel ports belong, and forward multicast packets in the default VLAN of dot1q-tunnel port after inserting the VLAN Tag of the default VLAN of dot1q-tunnel port.
- For example: It is assumed that IGMP Snooping has been enabled on the device; Port A is a dot1q-tunnel port; the default VLAN of port A is VLAN 1, and packets from VLAN 1 and VLAN 10 are allowed Port A. When multicast requests of VLAN 10 are sent to Port A, IGMP Snooping will create the multicast entry of VLAN 1 and insert the VLAN Tag of VLAN 1 into multicast requests before forwarding the multicast requests to the router port of VLAN 1.

By default, the second way is used.

Configuration Examples The following example enables QinQ support for IGMP Snooping.

```
FS(config)# ip igmp snooping tunnel
```

Platform Description N/A

8.30 ip igmp snooping vlan

Use this command to enable the IGMP Snooping in the specified VLAN and enter IVGL mode.

Use the **no** form of this command is used to disable the IGMP Snooping.

Use the **default** form of this command to restore the default setting.

ip igmp snooping vlan *vid*

no ip igmp snooping vlan *vid*

default ip igmp snooping vlan *vid*

Parameter Description

Parameter	Description

vid	VLAN ID in the range from 1 to 4,094

Defaults IGMP Snooping is disabled by default.

Command Mode Global configuration mode

Usage Guide Use this command to enable or disable the IGMP snooping on the specified vlan.

The PIM Snooping in the specified VLAN works only when IGMP Snooping is configured. To disable PIM Snooping, you must disable IGMP Snooping in the VLAN first, or disabling will fail and be prompted.

Configuration Examples The following example enters IVGL mode and disables the IGMP Snooping in the VLAN 2.

```
FS(config)# ip igmp snooping ivgl
FS(config)# no ip igmp snooping vlan 2
```

Platform Description N/A

8.31 ip igmp snooping vlan mrouter interface

Use this command to configure a static routing interface.

Use the **no** form of this command to delete a static routing interface.

Use the **default** form of this command to restore the default setting.

ip igmp snooping vlan *vid* **mrouter interface** *interface-type interface-number*

no ip igmp snooping vlan *vid* **mrouter interface** *interface-type interface-number*

default ip igmp snooping vlan *vid* **mrouter interface** *interface-type interface-number*

Parameter Description

Parameter	Description
vid	VLAN ID in the range from 1 to 4,094
interface-type interface-number	Interface ID

Defaults No static routing interface is configured by default.

Command Mode Global configuration mode

Usage Guide A dynamic routing interface is learned dynamically through IGMP Snooping. A static routing interface is configured by using this command and cannot age.

When an interface is configured as a static routing interface, all multicast streams received on this interface will be forwarded.

When the source port check function is enabled, only the multicast flows from the routing interface are forwarded, and other flows will be discarded.

Configuration Examples

The following example configures a static routing interface.

```
FS(config)# ip igmp snooping vlan 1 mrout erinterface fastEthernet 0/1
```

Platform Description

N/A

8.32 ip igmp snooping vlan static interface

Use this command to configure a static member interface of a multicast group.

Use the **no** form of this command to delete a static member interface from a multicast group.

Use the **default** form of this command to restore the default setting.

ip igmp snooping vlan *vid* **static** *group-address* **interface** *interface-type interface-number*

no ip igmp snooping vlan *vid* **static** *group-address* **interface** *interface-type interface-number*

default ip igmp snooping vlan *vid* **static** *group-address* **interface** *interface-type interface-number*

Parameter Description

Parameter	Description
vid	VLAN ID in the range from 1 to 4,094
ip-addr	Multicast IP address
interface-id	Interface ID

Defaults

No static member interface of any multicast group is configured by default.

Command Mode

Global configuration mode

Usage Guide

The IGMP Snooping GDA table contains VLAN IDs (VIDs), group addresses, routing interface (static or dynamic) ID, and member interface ID. Among them, the VID and group address identify a forwarding entry; the static routing interfaces will not age and cannot be deleted by using the **clear ip igmp snooping gda-table** command.

Configuration Examples

The following example configures a static member interface for the multicast group 224.1.1.1.

```
FS(config)# ip igmp snooping vlan 1 static 224.1.1.1 interface GigabitEthernet 0/1
```

Platform Description

N/A

8.33 permit

Use this command to permit the multicast forwarding for specified ranges of a specified profile.

permit

Parameter Description

Parameter	Description
N/A	N/A

Defaults The forwarding of the multicast streams in the range specified by the profile is denied.

Command Mode Profile configuration mode

Usage Guide A profile is used to filter a group of multicast packets, so as to assist other features.

Configuration steps:

1. Use the **ip igmp profile** command to create a profile and enter profile configuration mode.
2. Use the **range** command to define a range for the profile.
3. Use the **permit** command to permit the multicast forwarding for the profile.

Configuration Examples The following example permits the forwarding of the multicast streams from 224.2.2.2 to 224.2.2.244 of profile 1.

```
FS(config)# ip igmp profile 1
FS(config-profile)# range 224.2.2.2 224.2.2.244
FS(config-profile)# permit
```

Platform Description N/A

8.34 range

Use this command to define a range for a specific profile.

Use the **no** form of the command to remove the range from the profile.

range *low-ip-address* [*high-ip-address*]

no range *low-ip-address* [*high-ip-address*]

Parameter Description

Parameter	Description
low-ip-address	Start address of a range
high-ip-address	End address of a range

Defaults No range is defined for a profile by default.

Command Mode Profile configuration mode

Usage Guide A profile is used to filter a group of multicast packets, so as to assist other features.

Configuration steps:

1. Use the **ip igmp profile** command to create a profile and enter profile configuration mode.
2. Use the **range** command to define a range for the profile.
3. Use the **permit** command to permit the multicast forwarding for the profile.

Configuration Examples The following is an example of allowingpermits the forwarding of the multicast streams from 224.2.2.2 to 224.2.2.244: of profile 1.

```
FS(config)# ip igmp profile 1
```

```
FS(config-profile)# range 224.2.2.2 224.2.2.244224.2.2.2
FS(config-profile)# permit
```

Platform Description N/A

8.35 show ip igmp profile

Use this command to display the profile information.

show ip igmp profile *profile-number*

Parameter Description

Parameter	Description
profile-number	Displays configuration information of the designated profile.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to display the profile information.

Configuration Examples The following example displays the profile information.

```
FS(config-if)# show ip igmp profile
Profile 1
Permit
range 224.0.1.0, 239.255.255.255
```

8.36 show ip igmp snooping

Use this command to display related information of IGMP Snooping.

show ip igmp snooping [**gda-table** | **interfaces** *interface-type interface-number* | **mdevice**| **statistics** [**vlan** *vlan-id*] | **querier** [**detail** | **vlan** *vid*] | **user-info**]

Parameter Description

Parameter	Description
vlan *vid*	VLAN ID. By defualt, IGMP Snooping information of all VLANs are displayed.
interface-type interface-number	Interface type and number

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples

The following example displays global IGMP Snooping information.

```
FS#show ip igmp snooping
IGMP Snooping running mode: IVGL
IGMP Snooping L2-entry-limit: 65536
Source port check: Disable
Source ip check: Disable
IGMP Fast-Leave: Disable
IGMP Report suppress: Disable
IGMP Global Querier: Disable
IGMP Preview: Disable
IGMP Tunnel: Disable
IGMP Snooping version: 2
IGMP Snooping version: 2IGMP Preview group aging time : 60(Seconds)
Dynamic Mroute Aging Time : 300(Seconds)
Dynamic Host Aging Time : 260(Seconds)
```

The following example displays VLAN1 IGMP Snooping information.

```
FS#show ip igmp snooping vlan 1
IGMP Snooping running mode: IVGL
IGMP Snooping L2-entry-limit: 65536
Global IGMPv2 Fast-Leave :Disable
Global multicast router learning mode :Enable
Query Max Response Time: 10 (Seconds)
Dynamic Mroute Aging Time : 300(Seconds)
Dynamic Host Aging Time : 260(Seconds)

vlan 1
--------------
IGMP Snooping state: Enable
Multicast router learning mode: pim-dvmrp
IGMP Fast-Leave: Disable
IGMP VLAN querier: Disable
IGMP VLAN Mode: STATIC
```

Platform Description

N/A

9 MLD Snooping Commands

9.1 clear ipv6 mld snooping gda-table

Use this command to clear the forwarding table information learned dynamically.

clear ipv6 mld snooping gda-table

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to clear the forwarding table information learned dynamically.

Configuration Examples The following example clears the forwarding table information learned dynamically:

```
FS# clear ipv6 mld snooping gda-table
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.2 clear ipv6 mld snooping statistics

Use this command to clear the MLD Snooping statistics, including the entry number, the entry volume, the number of various received packets, the group information and the interface information of the corresponding group.

clear ipv6 mld snooping statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use the **show ipv6 mld snooping statistics** command to verify the configuration.

Configuration Examples The following example clears the MLD Snooping statistics.

```
FS# clear ipv6 mld snooping statistics
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.3 deny

Use this command to prevent the multicast flow profile within the specified range from being forwarded in the profile configuration mode.

deny

Parameter Description

Parameter	Description
N/A	N/A

Defaults The default profile action is **deny**.

Command Mode Profile configuration mode

Usage Guide Profile is a kind of group "filter" that can be referred to by other functions.

Configuration Steps:

1. Use the **ipv6mld profile** command to create a profile and enter the profile mode.
2. Use the **range** command to define a group.
3. Use the **permit** command to allow this group to pass the filtering; Use the **deny** command to filter the packets of this group. The default command is **deny**.

Configuration Examples The following example prevents the multicast flow profile within the range from FF15::1 to FF15::100 from being forwarded.

```
FS(config)# ipv6 mld profile 1
FS(config-profile)# range FF15::1 FF15::100
FS(config-profile)# deny
```

Related Commands

Command	Description
ipv6 mld profile	Creates one profile.
range	Sets the multicast address range.
permit	Sets the profile action permit.

Platform Description N/A

9.4 ipv6 mld profile

Use the following command to create a profile.

Use the **no** or **default** form of this command to delete a profile.

ipv6 mld profile *profile-number*

no ipv6 mld profile *profile-number*

default ipv6 mld profile *profile-number*

Parameter Description

Parameter	Description
profile-number	Profile number, in the range from 1 to 1024.

Defaults N/A

Command Mode Global configuration mode

Usage Guide Profile is a kind of group "filter" that can be referred to by other functions.

Configuration Steps:

1. Use the **ipv6mld profile** command to create a profile and enter the profile mode.
2. Use the **range** command to define a group.
3. Use the **permit** command to allow this group to pass the filtering; Use the **deny** command to filter the packets of this group. The default command is **deny**.

Configuration Examples The following example creates profile 1 and allows the packets sent by devices with MAC address ranging from FF15::1 to FF15::100 to pass the filtering.

```
FS(config)#ipv6 mld profile 1
FS(config-profile)#range FF15::1 FF15::100
FS(config-profile)#permit
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.5 ipv6 mld snooping

Use this command to enable MLD Snooping and specify IVGL/SVGL/IVGL-SVGL mode.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld snooping {**ivgl** | **svgl** | **ivgl-svgl**}
no ipv6 mld snooping [**ivgl** | **svgl** | **ivgl-svgl**]
default ipv6 mld snooping [**ivgl** | **svgl** | **ivgl-svgl**]

Parameter Description

Parameter	Description
ivgl	MLD Snooping is running IVGL mode.
svgl	MLD Snooping is running SVGL mode.
ivgl-svgl	MLD Snooping is running IVGL-SVGL mode.

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide

- In IVGL mode, multicast flow in each VLAN is independent. The host only requests multicast flow from the routing interface within the same VLAN. The device forwards the multicast flow from any VLAN to the member port within the same VLAN.
- In SVGL mode, multicast flow is shared among VLANs. The host can request multicast flow across VLANs. Shared VLAN (VLAN 1 by default) should be specified. Only multicast flow from Shared VLAN can be forwarded to all member ports within the group address range, which may belong to different VLANs. Profile is used to specify a group range for SVGL. Only multicast flow within this range can be forwarded across VLANs. The other multicast flow is discarded.
- In IVGL-SVGL mode, Profile is used to specify a group range for SVGL. Multicast flow within this range is in SVGL mode and the other multicast flow is in IVGL mode.
- IPv6 multicast packets cannot be forwarded through SuperVLAN.

Configuration Examples

The following example enables MLD Snooping IVGL mode.

```
FS(config)# ipv6 igmp snooping ivgl
```

The following example enables MLD Snooping SVGL mode and specifies the shared VLAN and SVGL group range as VLAN1 and profile1 respectively.

```
FS(config)# ipv6 igmp snooping svgl
FS(config)# ipv6 igmp snooping svgl profile 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.6 ipv6 mld snooping dyn-mr-aging-time

Use this command to set the aging time of the dynamic multicast route port.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld snooping dyn-mr-aging-time *second*

no ipv6 mld snooping dyn-mr-aging-time

default ipv6 mld snooping dyn-mr-aging-time

Parameter Description

Parameter	Description
second	Sets the aging time of the dynamic multicast route port, in the range from 1 to 3,600 in the unit of seconds.

Defaults

The default is 300 seconds.

Command Mode

Global configuration mode.

Usage Guide

The switch will remove the dynamic multicast router interface from the router interface list if it fails to receive the MLD general group query packets or the ipv6 PIM Hello packets within the aging timeout on this interface.

Use this command to change the aging time of the routing ports learned dynamically. If the aging time is too short, routing ports will be added and deleted frequently.

By default, the dynamic learning of routing ports is enabled. If learning fails, use the **show run** command to check whether this function is enabled.

Configuration Examples

The following example sets the aging time of the dynamic multicast routing port to 100 seconds.

```
FS(config)# ipv6 mld snooping dyn-mr-aging-time 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.7 ipv6 mld snooping fast-leave enable

Use this command to enable the MLD Snooping fast-leave function.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld snooping fast-leave enable

no ipv6 mld snooping fast-leave enable

default ipv6 mld snooping fast-leave enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode.

Usage Guide The interface fast leave is that when IPv6 MLD Leave packets sent from the host are received on an interface, the interface is removed form the outgoing interface list of the corresponding forwarding entry. Then, the switch will not forward the received IPv6 MLD specific group query packets to the interface.

If there is only one receiver connected with the interface, enable the interface fast leave function to save the bandwidth and resources.

Configuration Examples The following example enables mld snooping fast-leave.

```
FS(config)# ipv6 mld snooping fast-leave
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.8 ipv6 mld snooping filter

Use this command to filter the specific multicast flows.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld snooping filter *profile-number*

no ipv6 mld snooping filter

default ipv6 mld snooping filter

Parameter Description

Parameter	Description
profile-number	Sets the profile number in the range from 1 to 1024.

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide You can configure an MLD Profile on an interface. If the MLD Report packets are received on the interface, the layer-2 device will determine whether the multicast address to be joined the interface is within the allowed range of the MLD Profile. The specified profile must be created before using this command.

Configuration Examples The following example associates profile1 with the interface GigabitEthernet 0/1.

```
FS(config)# interface GigabitEthernet 0/1
```

```
FS(config-if-GigabitEthernet 0/1)# ipv6 mld snooping filter 1
```

Related Commands

Command	Description
ipv6 mld profile	Creates a profile.

Platform Description N/A

9.9 ipv6 mld snooping host-aging-time

Use this command to set the aging time of the dynamic member port.

Use the **no** form of this command to cancel this configuration.

Use the **default** form of this command to restore the default setting.

ipv6 mld snooping host-aging-time *seconds*

no ipv6 mld snooping host-aging-time

default ipv6 mld snooping host-aging-time

Parameter Description

Parameter	Description
seconds	Sets the aging time of the dynamic member port, in seconds, ranging from 1-65,536 in the unit of seconds.

Defaults The default aging time of the dynamic member port is 260 seconds.

Command Mode Global configuration mode

Usage Guide The switch will remove the dynamic multicast router interface from the router interface list if it fails to receive the MLD general group query packets or the IPv6 PIM Hello packets within the aging timeout on this interface.

When the MLD Snooping is enabled, the port that receives the MLD Report packet will learn to be a dynamic member port. The default aging time of such dynamic member port is 260 seconds. You can use this command to adjust the aging time. This configuration takes effect after the port receives the the next Report packet. The aging time of the dynamic member port should be longer than the query interval.

Configuration Examples The following example sets the aging time of the dynamic member port to 30 seconds:

```
FS(config)# ipv6 mld snooping host-aging-time 30
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.10 ipv6 mld snooping max-groups

Use this command to set the maximum group allowed to join the interface dynamically.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld snooping max-groups *number*

no ipv6 mld snooping max-groups

default ipv6 mld snooping max-groups

Parameter Description

Parameter	Description
number	The number of groups, in the range from 0 to 65,536

Defaults

The default is 65,536.

Command Mode

Interface configuration mode

Usage Guide

With this command configured, when the group number exceeds the specified range on the interface, the switch will not receive and deal with the MLD Report packets.

The multicast groups are counted based on VLANs of an interface. If the interface has 3 VLANs, the counting result is 3 instead of 1 when an FF15::100 multicast request is received by all the VLAN.

Configuration Examples

The following example sets the maximum 100 multicast group on the interface GigabitEthernet 0/1.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# ipv6 mld snooping max-groups 100
```

Related Commands

Command	Description
ipv6 mld snooping filter	Filters the multicast group on the interface.

Platform Description

N/A

9.11 Ipv6 mld snooping mrouter learn

Use this command to enable the switch to dynamically learn MLD query or PIM packets to identify the mrouter interface automatically.

Use the **no** form of this command to disable this function.

Use the **default** form of this command to restore the default setting.

ipv6 mld snooping [**vlan** *vid*] **mrouter learn**

no ipv6 mld snooping [**vlan** *vid*] **mrouter learn**

default ipv6 mld snooping [**vlan** *vid*] **mrouter learn**

Parameter Description

Parameter	Description

vlan *vid*	VLAN ID, in the range from 1 to 4094

Defaults This function is enabled by default.

Command Mode Global configuration mode

Usage Guide The routing interface is the interface of the multicast device connected with the peer device. By default, the dynamically learned routing interface is enabled on the layer-2 multicast device. Use the **no** option to disable this function and clear all dynamically-learned routing interfaces.

With the source port check enabled, only the multicast flow through the mroute interface are valid and forwarded to the registered interface on the layer-2 multicast device. Those multicast flow through the non-mroute interface are invalid and will be discarded.

Configuration Examples The following example enables the dynamic multicast routing port learning function for VLAN1.

```
FS(config)# no ipv6 mld snooping mrouter learn
FS(config)# ipv6 mld snooping vlan 1 mrouter learn
```

Related Commands N/A

9.12 ipv6 mld snooping query-max-response-time

Use this command to set t the maximum response time of the MLD general query packet.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld snooping query-max-response-time *seconds*

no ipv6 mld snooping query-max-response-time

default ipv6 mld snooping query-max-response-time

Parameter Description

Parameter	Description
seconds	Sets the maximum response time of the MLD general query packet in the range from 1 to 65,535 in the unit of seconds.

Defaults The default is 10 seconds.

Command Mode Global configuration mode

Usage Guide Upon receiving the MLD general query packets, the Layer-2 multicast device updates the aging timer of all member ports. The time of the timer is the longest response value. When the timer value decreases to 0, it indicates that there is no member receiving the multicast flow on the interface, and the Layer-2 device removes this interface from the MLD Snooping forwarding list.

Upon receiving the MLD specific group query packets, the Layer-2 multicast device enables the aging timer of all

member ports in this specific group. The time of the timer is the longest response value. When the timer value decreases to 0, it indicates that there is no member receiving the multicast flow on the interface, and the Layer-2 device removes this interface from the MLD Snooping forwarding list.

For the source query packets of the MLD specific group, the timer is not updated.

The configured maximum response time is effective after another query packet is received.

Configuration Examples

The following example sets the maximum response time of the MLD general query packet to 100 seconds.

```
FS(config)# ipv6 mld snooping query-max-response-time 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.13 ipv6 mld snooping source-check port

Use this command to enable the MLD source-check port.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld snooping source-check port

no ipv6 mld snooping source-check port

default ipv6 mld snooping source-check port

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The source-check port is disabled by default.

Command Mode

Global configuration mode

Usage Guide

The MLD Snooping source port check function is to limit the MLD multicast flow through the interace strictly. With the source port check disabled, all video flow are illegal and forwarded to the registered member port according to the MLD Snooping forwarding list. With the MLD Snooping source port check enabled, only the mulitcast flow through the mroute interface is legal and forwarded to the registered interface by the layer-2 multicast device; and the multicast flow through the non-mroute interface are illegal and discarded.

This command is used to enabled the source port check globally. Once this function is enabld, all multicast flow must come from the mroute interface, or they'll be discarded.

Configuration Examples

The following example enables MLD Snooping source-check port.

```
FS(config)# ipv6 mld snooping source-check port
```

Related

Command	Description

Commands

N/A	N/A

Platform Description N/A

9.14 ipv6 mld snooping suppression enable

Use this command to enable the MLD Snooping suppression.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld snooping suppression enable

no ipv6 mld snooping suppression enable

default ipv6 mld snooping suppression enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults The MLD Snooping suppression function is disabled by default.

Command Mode Global configuration mode.

Usage Guide With the IPv6 MLD Snooping suppression function enabled, within the query interval, the layer-2 device will only forward the first received MLD Report packet in an IPv6 multicast group to the layer-3 device, but not the other MLD Report packets in the same IPv6 multicast group, reducing the packet number in the network.

This command is used to enable the IPv6 MLD Snooping suppression, and only the MLDv1 Report packets are suppressed rather than the MLDv2 Report packets.

Configuration Examples The following example enables MLD Snooping suppression.

```
FS(config)# ipv6 mld snooping suppression enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.15 ipv6 mld snooping svgl profile

Use this command to specify the group address range to be in the SVGL mode.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld snooping svgl profile *profile-number*

no ipv6 mld snooping svgl profile

default ipv6 mld snooping svgl profile

Parameter Description

Parameter	Description
profile-number	Sets the profile number, in the range from 1 to 1024.

Defaults No profiles are associated with SVGL by default.

Command Mode Global configuration mode

Usage Guide With the SVGL mode or IVGL-SVGL mode configured for the MLD Snooping working mode, a profile shall be associated with the IVGL for the purpose of specifying the group address range in the SVGL mode. That is to say, the member port of the multicast forwarding entry can be forwarded across the VLANs, while the member ports of the corresponding multicast forwarding entries within other multicast address range must belong to the same VLAN. By default, no profile is associated, which means that apply no multicast group in the SVGL mode.

Configuration Examples The following example specifies the SVGL mode application range as the profie 2 group address range.

```
FS(config)# ipv6 mld snooping svgl profile 2
```

Related Commands

Command	Description
ipv6 mld snooping ivgl	Enables the MLD Snooping and set the ivgl mode.
ipv6 mld snooping ivgl-svgl	Enables the MLD Snooping and set the ivgl-svgl mode.

Platform Description N/A

9.16 ipv6 mld snooping svgl vlan

Use this command to specify the shared VLAN in MLD Snooping SVGL mode.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld snooping svgl vlan *vid*

no ipv6 mld snooping svgl vlan

default ipv6 mld snooping svgl vlan

Parameter Description

Parameter	Description
vid	The VLAN ID, in the range from 1 to 4094.

Defaults The default is 1.

Command Mode Global configuration mode

Usage Guide This command is used to specify the SVGL shared VLAN if MLD Snooping is running in SVGL or IVGL-SVGL mode.

Configuration Examples The following example sets the shared VLAN in MLD Snooping SVGL mode to 5.

```
FS(config)# ipv6 mld snooping svgl vlan 5
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.17 ipv6 mld snooping vlan

Use this command to enable the MLD Snooping function for the specified VLAN.

Use the **no** form of this command to disable this function.

Use the **default** form of this command to restore the default setting.

ipv6 mld snooping vlan *vid*

no ipv6 mld snooping vlan *vid*

default ipv6 mld snooping vlan *vid*

Parameter Description

Parameter	Description
vid	VLAN ID, in the range from 1 to 4094.

Defaults The MLD Snooping function is enabled by default.

Command Mode Global configuration mode

Usage Guide By default, the MLD Snooping is enabled in all VLANs. You can disable the MLD Snooping for the specified VLAN.

Configuration Examples The following example disables the MLD Snooping function in VLAN 2 in IVGL mode.

```
FS(config)# ipv6 mld snooping ivgl
FS(config)# no ipv6 mld snooping vlan 2
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.18 ipv6 mld snooping vlan mrouter interface

Use this command to set the static mrouter interface.

Use the **no** or **default** form of this command to restore the default setting.

ipv6 mld snooping vlan *vid* **mrouter interface** *interface-type interface-number*

no ipv6 mld snooping vlan *vid* **mrouter interface** *interface-type interface-number*

default ipv6 mld snooping vlan *vid* **mrouter interface** *interface-type interface-number*

Parameter Description

Parameter	Description
vid	VLAN ID, in the range from 1 to 4094.
interface-type interface-number	The interface number

Defaults No static mrouter interface is configured by default.

Command Mode Global configuration mode

Usage Guide Use this command to set the static mrouter interface for the purpose that all IPv6 multicast data received on the switch can be forwarded. With the source port check function enabled, only the multicast flow through the mroute interface can be forwarded.

Configuration Examples The following example sets a multicast routing port.

```
FS(config)# ipv6 mld snooping vlan 1 mrouter interface gigabitEthernet 0/1
```

Related Commands

Command	Description
ipv6 mld snooping source-check port	Sets the multicast source port check.

Platform Description N/A

9.19 ipv6 mld snooping vlan static interface

Use this command to set a static member port to receive the multicast flow for the purpose of preventing the port from being influenced by the MLD Report packets with the MLD Snooping enabled.

Uses the **no** form of this command to restore the default setting.

ipv6 mld snooping vlan *vid* **static** *group-address* **interface** *interface-type interface-number*

no ipv6 mld snooping vlan *vid* **static** *group-address* **interface** *interface-type interface-number*

Parameter Description

Parameter	Description
vid	VLAN ID, in the range from 1 to 4094. The default is 1.
group-address	The multicast address
interface-type interface-number	The interface number

Defaults No static member port is configured by default.

Command Mode Global configuration mode

Usage Guide Use this command to set the interface as the member port of multiple static multicast addresses.

Configuration Examples The following example sets the interface gigabitEthernet 0/1 as the static member port of the FF88::1 group.

```
FS(config)# ipv6 mld snooping vlan 1 static FF88::1 interface gigabitEthernet 0/1
```

Related Commands

Command	Description
ipv6 mld snooping vlan mrouter interface	Sets the mrouter interface.

Platform Description N/A

9.20 permit

Use this command to allow the multicast flow profile within the specified range in the profile configuration mode.

permit

Parameter Description

Parameter	Description
N/A	N/A

Defaults The default profile action is **deny**.

Command Mode Profile configuration mode

Usage Guide Before configuring this command, use the **range** command to set the multicast range first.

Configuration Examples The following example allows the multicast flow profile within the range from FF15::1 to FF15::100 to be forwarded only.

```
FS(config)# ipv6 mld snooping profile 1
FS(config-profile)# range FF15::1 FF15::100
FS(config-profile)# permit
```

Related Commands

Command	Description
ipv6 mld profile	Creates one profile.
range	Sets the multicast address range.
deny	Sets the profile action deny.

Platform Description N/A

9.21 range

Use this command to specify the profile multicast flow range, which can be one single multicast address, or can be the multicast address within the specified range when configuring a profile in the profile configuration mode.

range *low-ipv6-address* [*high-ip-address*]

Parameter Description

Parameter	Description
low-ip-address	The low address within the specified range
high-ip-address	The high address within the specified range

Defaults No range is defined by default.

Command Mode Profile configuration mode

Usage Guide The value of low-ipv6-address shall be smaller than the one of high-ipv6-address. With the address range configured, an action shall be specified, and the default profile action is deny.

Configuration Examples The following example creates the multicast flow profile within the range from FF15::1 to FF15::100.

```
FS(config)# ipv6 mld snooping profile 1
FS(config-profile)# range FF15::1 FF15::100
FS(config-profile)# permit
```

Related Commands

Command	Description
ipv6 mld profile	Creates one profile.
deny	Sets the profile action deny.
permit	Sets the profile action permit.

Platform Description N/A

9.22 show ipv6 mld profile

Use this command to display the related MLD profile configuration.

show ipv6 mld profile *profile-number*

Parameter Description

Parameter	Description
profile-number	Profile number in the range from 1 to 1024

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide Use this command to display the related MLD profile configuration.

Configuration Examples The following example displays the MLD profile configuration.

```
FS# show ipv6 mld profile
ipv6 mld profile        1
   permit
   range FF15::1 FF15::100

ipv6 mld profile        2
   deny
   range FF88::1    FF88::100
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.23 show ipv6 mld snooping

Use this command to display the related MLD Snooping information.

show ipv6 mld snooping [**gda-table** | **interfaces** *interface-type interface-number* | **mrouter** | **statistics** [**vlan** *vid*] | **vlan** *vid*]

Parameter Description

Parameter	Description
gda-table	Displays the multicast forwarding rule table.
Interfaces *interface-type interface-number*	Displays the MLD Snooping filtering configuration.
mrouter	Displays the information about mrouter interface.
statistics	Displays the MLD Snooping statistics.
vlan *vlan-id*	Displays the MLD Snooping information of the specified vlan.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide Use this command to display the related MLD Snooping information.

Configuration Examples

The following example displays the MLD Snooping configurations.

```
In IVGL mode:
FS#show ipv6 mld snooping
MLD-snooping mode: IVGL
Source port check: Disable
MLD Fast-Leave: Disable
MLD Report suppress: Disable
Query Max Response Time: 10 (Seconds)
Dynamic Mroute Aging Time: 300(Seconds)
Dynamic Host Aging Time: 260(Seconds)

vlan 1
-------------
MLD Snooping state: Enabled
Multicast router learning mode: Enable
MLD Fast-Leave: Enabled
MLD VLAN Mode: STATIC

In SVGL mode:
FS#show ipv6 mld snooping
MLD-snooping mode: SVGL
SVGL vlan: 1
SVGL profile number: 1
Source port check: Disable
MLD Fast-Leave: Disable
MLD Report suppress: Disable
Query Max Respone Time: 10 (Seconds)
Dynamic Mroute Aging Time: 300(Seconds)
Dynamic Host Aging Time: 260(Seconds)

In IVGL-SVGL mode:
FS#show ipv6 mld snooping
MLD-snooping mode: IVGL-SVGL
SVGL vlan: 1
SVGL profile number: 1
Source port check: Disable
MLD Fast-Leave: Disable
MLD Report suppress: Disable
Query Max Respone Time: 10 (Seconds)
Dynamic Mroute Aging Time: 300(Seconds)
Dynamic Host Aging Time: 260(Seconds)

vlan 1
```

```
--------------
MLD Snooping state: Enabled
Multicast router learning mode: Enable
MLD Fast-Leave: Enabled
MLD VLAN Mode: STATIC
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

Chapter 7 Security Configuration Commands

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1. AAA Commands

1.1 Aaa Accounting Commands

Use this command to configure NAS command accounting.

Use the **no** form of this command to restore the default setting.

aaa accounting commands *level* **{ default |** *list-name* **} start-stop** *method1* [*method2*…]

no aaa accounting commands *level* { **default |** *list-name* }

Parameter Description

Parameter	Description
level	The accounting command level, 0-15. The message shall be recorded before which command level is executed is determined.
default	When this parameter is used, the following defined method list is used as the default method for command accounting.
list-name	Name of the command accounting method list, which could be any character strings.
method	It must be one of the keywords listed in the following table. One method list can contain up to four methods.
none	Does not perform accounting.
group	Uses the server group for accounting, the TACACS+ server group is supported.

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

FSOS enables the accounting command function after enabling the login authentication. After enabling the accounting function, it sends the command information to the security service.

The configured accounting command method must be applied to the terminal line that needs accounting command; otherwise it is ineffective.

Configuration Examples

The following example enables NAS command accounting.

```
FS(config)# aaa accounting commands 15 default start-stop group tacacs+
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa authentication	Defines AAA authentication.
accounting commands	Applies the accounting commands to the terminal line.

Platform Description

N/A

1.2 Aaa Accounting Exec

Use this command to enable NAS access accounting.

Use the **no** form of this command to restore the default setting.

aaa accounting exec { **default** | *list-name* } **start-stop** *method1* [*method2*...]

no aaa accounting exec { **default** | *list-name* }

Parameter Description

Parameter	Description
default	When this parameter is used, the following defined method list is used as the default method for Exec accounting.
list-name	Name of the Exec accounting method list, which could be any character strings
method	It must be one of the keywords: **none** and **group**. One method list can contain up to four methods.
none	Does not perform accounting.
group	Uses the server group for accounting, the RADIUS and TACACS+ server group is supported.

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide FSOS enables the exec accounting function after enabling the login authentication.

After enabling the accounting function, it sends the account start information to the security server when the users log in the NAS CLI, and sends the account stop information to the security server when the users log out. If it does not send the account start information to the security server when a user logs in, it does not send the account stop information to the security server when a user logs out, either.

The configured exec accounting method must be applied to the terminal line that needs accounting command; otherwise it is ineffective.

Configuration Examples The following example enables NAS access accounting.

```
FS(config)# aaa accounting network start-stop group radius
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa authentication	Defines AAA authentication.
accounting commands	Applies the Exec accounting to the terminal line.

Platform Description N/A

1.3 Aaa Accounting Network

Use this command to enable network access accounting.

Use the **no** form of this command to restore the default setting.

aaa accounting network { default | *list-name* **} start-stop** *method1* [*method2*..]

no aaa accounting network { **default** | *list-name* }

Parameter Description

Parameter	Description
default	When this parameter is used, the following defined method list is used as the default method for Network accounting.
list-name	Name of the accounting method list
method	Sends accounting messages at both the start time and the end time of access. Users are allowed to access the network, no matter whether the start accounting message enables the accounting successfully.
none	Does not perform accounting.
group	Uses the server group for accounting, the RADIUS and TACACS+ server group is supported.

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide FSOS performs accounting of user activities by sending record attributes to the security server. Use the **start-stop** keyword to set the user accounting option.

Configuration Examples The following example enables network access accounting.

```
FS(config)# aaa accounting network start-stop group radius
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa authorization network	Defines a network authorization method list.
aaa authentication	Defines AAA authentication.
username	Defines a local user database.

Platform Description N/A

1.4 Aaa Accounting Update

Use this command to enable the accounting update function.

Use the **no** form of this command to restore the default setting.

aaa accounting update

no aaa accounting update

Parameter Description N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide If the AAA security service is not enabled, the accounting update function cannot be used. This command is used to set the accounting interval if the AAA security service has been enabled.

Configuration Examples The following example enables the accounting update function.

```
FS(config)# aaa new-model
FS(config)# aaa accounting update
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa accounting network	Defines a network accounting method list.

Platform Description N/A

1.5 Aaa Accounting Update Periodic

Use this command to set the interval of sending the accounting update message.

Use the **no** form of this command to restore the default setting.

aaa accounting update periodic *interval*

no aaa accounting update periodic

Parameter Description

Parameter	Description
interval	Interval of sending the accounting update message, in the unit of minutes. The shortest interval is 1 minute.

Defaults The default is 5 minutes.

Command Mode Global configuration mode

Usage Guide If the AAA security service is not enabled, the accounting update function cannot be used. This command is used to set the accounting interval if the AAA security service has been enabled.

Configuration Examples The following example sets the interval of accounting update to 1 minute.

```
FS(config)# aaa new-model
FS(config)# aaa accounting update
FS(config)# aaa accounting update periodic 1
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa accounting network	Defines a network accounting method list.

Platform Description

N/A

1.6 Aaa Authentication Dot1x

Use this command to enable AAA authentication 802.1x and configure the 802.1x user authentication method list.

Use the **no** form of this command to delete the 802.1x user authentication method list.

aaa authentication dot1x { **default** | *list-name* } *method1* [*method2*...]

no aaa authentication dot1x { **default** | *list-name* }

Parameter Description

Parameter	Description
default	When this parameter is used, the following defined 802.1x user authentication method list is used as the default method for user authentication.
list-name	Name of the 802.1x user authentication method list, which could be any character string
method	It must be one of the keywords: **local**, **none** and **group**. One method list can contain up to four methods.
local	Uses the local user name database for authentication.
none	Does not perform authentication.
group	Uses the server group for authentication. At present, the RADIUS server group is supported.

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

If the AAA 802.1x security service is enabled on the device, users must use AAA for 802.1x user authentication negotiation. You must use the **aaa authentication dot1x** command to configure a default or optional method list for 802.1x user authentication.

The next method can be used for authentication only when the current method does not work.

Configuration Examples

The following example defines an AAA authentication method list named **RDS_D1X**. In the authentication method list, first the RADIUS security server is used for authentication. If the RADIUS security server does not respond, the local user database is used for authentication.

```
FS(config)# aaa authentication dot1x rds_d1x group radius local
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
dot1x authentication	Associates a specific method list with the 802.1x user.

username	Defines a local user database.

Platform Description N/A

1.7 Aaa Authentication Enable

Use this command to enable AAA Enable authentication and configure the Enable authentication method list.

Use the **no** form of this command to delete the user authentication method list.

aaa authentication enable default *method1* [*method2*...]

no aaa authentication enable default

Parameter Description

Parameter	Description
default	When this parameter is used, the following defined authentication method list is used as the default method for Enable authentication.
method	It must be one of the keywords: **local, none** and **group**. One method list can contain up to four methods.
local	Uses the local user name database for authentication.
none	Does not perform authentication.
group	Uses the server group for authentication. At present, the RADIUS and TACACS+ server groups are supported.
enable	Enables AAA Enable authentication.

Defaults N/A

Command Mode Global configuration mode

Usage Guide If the AAA Enable authentication service is enabled on the device, users must use AAA for Enable authentication negotiation. You must use the **aaa authentication enable** command to configure a default or optional method list for Enable authentication.

The next method can be used for authentication only when the current method does not work.

The Enable authentication function automatically takes effect after configuring the Enable authentication method list.

Configuration Examples The following example defines an AAA Enable authentication method list. In the authentication method list, first the RADIUS security server is used for authentication. If the RADIUS security server does not respond, the local user database is used for authentication.

```
FS(config)# aaa authentication enable default group radius local
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
enable	Switchover the user level.
username	Defines a local user database.

Platform Description N/A

1.8 Aaa Authentication Login

Use this command to enable AAA Login authentication and configure the Login authentication method list.

Use the **no** form of this command to delete the authentication method list.

aaa authentication login { **default** | *list-name* } *method1* [*method2*..]

no aaa authentication login { **default** | *list-name* }

Parameter Description

Parameter	Description
default	When this parameter is used, the following defined authentication method list is used as the default method for Login authentication.
list-name	Name of the user authentication method list, which could be any character strings
method	It must be one of the keywords: **local**, **none**, **group** and **subs**. One method list can contain up to four methods.
local	Uses the local user name database for authentication.
none	Does not perform authentication.
group	Uses the server group for authentication. At present, the RADIUS and TACACS+ server groups are supported.
subs	Uses the subs database for authentication.

Defaults N/A

Command Mode Global configuration mode

Usage Guide If the AAA Login authentication security service is enabled on the device, users must use AAA for Login authentication negotiation. You must use the **aaa authentication login** command to configure a default or optional method list for Login authentication.

The next method can be used for authentication only when the current method does not work.

You need to apply the configured Login authentication method to the terminal line which needs Login authentication. Otherwise, the configured Login authentication method is invalid.

Configuration Examples The following example defines an AAA Login authentication method list named list-1. In the authentication method list, first the RADIUS security server is used for authentication. If the RADIUS security server does not respond, the local user database is used for authentication.

```
FS(config)# aaa authentication login list-1 group radius local
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
login authentication	Applies the Login authentication method to the terminal lines.
username	Defines a local user database.

Platform Description N/A

1.9 Aaa Authentication Web-auth

Use this command to enable AAA second-generation Web authentication and configure the second-generation Web authentication method list in global configuration mode.

Use the **no** form of this command to delete the authentication method list.

aaa authentication web-auth { **default** | *list-name* } *method1* [*method2*...]

no aaa authentication web-auth { **default** | *list-name* }

Parameter Description

Parameter	Description
default	When this parameter is used, the following defined authentication method list is used as the default method for the second-generation Web authentication.
list-name	Name of second-generation Web authentication method list, which could be any character strings
method	It must be one of the keywords: **local**, **none**, **subs** and **group**. One method list can contain up to four methods.
local	Uses the local user name database for authentication.
none	Does not perform authentication.
group	Uses the server group for authentication. At present, the RADIUS server group is supported.
subs	Uses the subs database for authentication.

Defaults N/A

Command Mode Global configuration mode

Usage Guide If the AAA second-generation Web security service is enabled on the device, users must use AAA for the second-generation Web authentication negotiation. You must use the **aaa authentication web-auth** command to configure a default or optional method list for user authentication.

The next method can be used for authentication only when the current method does not work.

Configuration Examples The following example defines an AAA authentication method list named **rds_web**. In the authentication method list, the RADIUS security server is first used for authentication. If the RADIUS security server does not respond, the local user database is used for authentication.

```
FS(config)# aaa authentication web-auth rds_web group radius none
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.10 Aaa Authorization Commands

Use this command to authorize the command executed by the user who has logged in the NAS CLI. Use the **no** form of this command to restore the default setting.

aaa authorization commands *level* { **default** | *list-name* } *method1* [*method2*...]

no aaa authorization commands *level* { **default** | *list-name* }

Parameter Description

Parameter	Description
level	Command level to be authorized in the range from 0 to 15
default	When this parameter is used, the following defined method list is used as the default method for command authorization.
list-name	Name of the user authorization method list, which could be any character strings
method	It must be one of the keywords: **none** and **group**. One method list can contain up to four methods.
none	Do not perform authorization.
group	Uses the server group for authorization. At present, the TACACS+ server group is supported.

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide FSOS supports authorization of the commands executed by the users. When the users input and attempt to execute a command, AAA sends this command to the security server. This command is to be executed if the security server allows to. Otherwise, it will prompt command deny.

It is necessary to specify the command level when configuring the command authorization, and this specified command level is the default command level.

The configured command authorization method must be applied to terminal line which requires the command authorization. Otherwise, the configured command authorization method is ineffective.

Configuration Examples The following example uses the TACACS+ server to authorize the level 15 command.

```
FS(config)# aaa authorization commands 15 default group tacacs+
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
authorization commands	Applies the command authorization for the terminal line.

Platform Description N/A

1.11 Aaa Authorization Config-commands

Use this command to authorize the configuration commands (including in the global configuration mode and its sub-mode).

Use the **no** form of this command to restore the default setting.

aaa authorization config-commands

no aaa authorization config-commands

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

If you only authorize the commands in the non-configuration mode (for example, privileged EXEC mode), you can use the **no** form of this command to disable the authorization function in the configuration mode, and execute the commands in the configuration mode and its sub-mode without command authorization.

Configuration Examples

The following example enables the configuration command authorization function.

```
FS(config)# aaa authorization config-commands
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa authorization commands	Defines the AAA command authorization.

Platform Description

N/A

1.12 Aaa Authorization Console

Use this command to authorize the commands of the users who have logged in the console.

Use the **no** form of this command to restore the default setting.

aaa authorization console

no aaa authorization console

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

FSOS supports to identify the users logged in from the console and from other terminals, configure whether to authorize the users logged in from the console or not. If the command authorization function is disabled on the console, the authorization method list applied to the console line is ineffective.

Configuration Examples

The following example enables the aaa authorization console function.

```
FS(config)# aaa authorization console
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa authorization commands	Defines the AAA command authorization.
authorization commands	Applies the command authorization to the terminal line.

Platform Description

N/A

1.13 Aaa Authorization Exec

Use this command to authorize the users logged in the NAS CLI and assign the authority level.

Use the **no** form of this command to restore the default setting.

aaa authorization exec { **default** | *list-name* } *method1* [*method2*...]

no aaa authorization exec { **default** | *list-name* }

Parameter Description

Parameter	Description
default	When this parameter is used, the following defined method list is used as the default method for Exec authorization.
list-name	Name of the user authorization method list, which could be any character strings
method	It must be one of the keywords listed in the following table. One method list can contain up to four methods.
local	Uses the local user name database for authorization.
none	Does not perform authorization.
group	Uses the server group for authorization. At present, the RADIUS server group is supported.

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

FSOS supports authorization of users logged in the NAS CLI and assignment of CLI authority level (0-15). The **aaa authorization exec** function is effective on condition that Login authentication function has been enabled. It cannot enter the CLI if it fails to enable the **aaa authorization exec**.

You must apply the exec authorization method to the terminal line; otherwise the configured method is ineffective.

Configuration Examples

The following example uses the RADIUS server to authorize Exec.

```
FS(config)# aaa authorization exec default group radius
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
authorization exec	Applies the command authorization to the terminal line.
username	Defines a local user database.

Platform Description

N/A

1.14 Aaa Authorization Network

Use this command to authorize the service requests (including such protocols as PPP and SLIP) from the users that access the network.

Use the **no** form of this command to restore the default setting.

aaa authorization network { **default** | *list-name* } *method1* [*method2*...]

no aaa authorization network { **default** | *list-name* }

Parameter Description

Parameter	Description
default	When this parameter is used, the following defined method list is used as the default method for Network authorization.
method	It must be one of the keywords: none and group. One method list can contain up to four methods.
none	Does not perform authorization.
group	Uses the server group for authorization. At present, the RADIUS server group is supported.

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

FSOS supports authorization of all the service requests related to the network, such as PPP and SLIP. If authorization is configured, all the authenticated users or interfaces will be authorized automatically.

Three different authorization methods can be specified. Like authorization, the next method can be used for authorization only when the current authorization method does not work. If the current authorization method fails, other subsequent authorization method is not used.

The RADIUS server authorizes authenticated users by returning a series of attributes. Therefore, RADIUS authorization is based on RADIUS authorization. RADIUS authorization is performed only when the user passes the RADIUS authorization.

Configuration Examples

The following example uses the RADIUS server to authorize network services.

```
FS(config)# aaa authorization network default group radius
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa accounting	Defines AAA accounting.

aaa authentication	Defines AAA authentication.
username	Defines a local user database.

Platform Description N/A

1.15 Aaa Domain

Use this command to configure the domain attributes.

Use the **no** form of this command to restore the default setting.

aaa domain { **default** | *domain-name* }

no aaa domain { **default** | *domain-name* }

Parameter Description

Parameter	Description
default	Uses this parameter to configure the default domain.
domain-name	The name of the specified domain

Defaults No domain is configured by default.

Command Mode Global configuration mode

Usage Guide Use this command to configure the domain-name–based AAA service. The **default** is to configure the default domain. That is the method list used by the network device if the users are without domain information. The *domain-name* is the specified domain name, if the users are with this *domain name*, the method lists associated with this domain are used. At present, the system can configure up to 32 domains.

Configuration Examples The following example configures the domain name.

```
FS(config)# aaa domain FS.com
FS(config-aaa-domain)#
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa domain enable	Enables the domain-name-based AAA service.
show aaa domain	Displays the domain configuration.

Platform Description N/A

1.16 Aaa Domain Enable

Use this command to enable domain-name-based AAA service.

Use the **no** form of this command to restore the default setting.

aaa domain enable

no aaa domain enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide To perform the domain-name-based AAA service configuration, enable this service.

Configuration Examples The following example enables the domain-name-based AAA service.

```
FS(config)# aaa domain enable
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
show aaa doamain	Displays the domain configuration.

Platform Description N/A

1.17 Aaa Local Authentication Attempts

Use this command to set login attempt times.

aaa local authentication attempts *max-attempts*

Parameter Description

Parameter	Description
max-attempts	In the range from 1 to 2,147,483,647

Defaults The default is 3.

Command Mode Global configuration mode

Usage Guide Use this command to configure login attempt times.

Configuration Examples The following example sets login attempt times to 6.

```
FS #configure terminal
FS(config)#aaa local authentication attempts 6
```

Related Commands

Command	Description
show running-config	Displays the current configuration of the switch.
show aaa lockout	Displays the lockout configuration parameter of current login.

Platform Description N/A

1.18 Aaa Local Authentication Lockout-time

Use this command to configure the lockout-time period when the login user has attempted for more than the limited times.

aaa local authentication lockout-time *lockout-time*

Parameter Description

Parameter	Description
lockout-time	In the range from 1 to 2,147,483,647 in the unit of minutes

Defaults

The default is 15 minutes.

Command Mode

Global configuration mode

Usage Guide

Use this command to configure the length of lockout-time when the login user has attempted for more than the limited times.

Configuration Examples

The following example sets the lockout-time period to 5 minutes.

```
FS#configure terminal
FS(config)#aaa local authentication lockout-time 5
```

Related Commands

Command	Description
show running-config	Displays the current configuration of the switch.
show aaa lockout	Displays the lockout configuration parameter of current login.

Platform Description

N/A

1.19 Aaa Log Enable

Use this command to enable the system to print the syslog informing AAA authentication success. Use the **no** form of this command to restore the default setting.

aaa log enable

no aaa log enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

Use this command to enable the system to print the syslog informing aaa authentication success.

Configuration

The following example disables the system to print the syslog informing aaa authentication success.

Examples

```
FS(config)# no aaa log enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.20 Aaa Log Rate-limit

Use this command to set the rate of printing the syslog informing AAA authentication success.

Use the **no** form of this command to restore the default printing rate.

aaa log rate-limit *num*

no aaa log rate-limit

Parameter Description

Parameter	Description
num	The number of syslog entries printed per second. The range is from 0 to 65,535. 0 indicates the printing rate is not limited.

Defaults

The default is 5.

Command Mode

Global configuration mode

Usage Guide

Too much printing may flood the screen or even reduce device performance. In this case, use this command to adjust the printing rate.

Configuration Examples

The following example sets the rate of printing the syslog informing AAA authentication success to 10.

```
FS(config)# aaa log rate-limit 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.21 Aaa New-model

Use this command to enable the FSOS AAA security service.

Use the **no** form of this command to restore the default setting.

aaa new-model

no aaa new-model

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide Use this command to enable AAA. If AAA is not enabled, none of the AAA commands can be configured.

Configuration Examples The following example enables the AAA security service.

```
FS(config)# aaa new-model
```

Related Commands

Command	Description
aaa authentication	Defines a user authentication method list.
aaa authorization	Defines a user authorization method list.
aaa accounting	Defines a user accounting method list.

Platform Description N/A

1.22 Access-limit

Use this command to configure the number of users limit for the domain, which is only valid for the IEEE802.1 users.

Use the **no** form of this command to restore the default setting.

access-limit *num*

no access-limit

Parameter Description

Parameter	Description
num	The number used for the user limitation is only valid for the IEEE802.1 users.

Defaults By default, no number of users is limited.

Command Mode Domain configuration mode

Usage Guide This command limits the number of users for the domain.

Configuration Examples The following example sets the number of users to 20 for the domain named FS.com.

```
FS(config)# aaa domain FS.com
FS(config-aaa-domain)# access-limit 2
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.

aaa domain enable	Switchover the user level.
show aaa domain	Defines a local user database.

Platform Description N/A

1.23 Accounting Network

Use this command to configure the Network accounting list.

Use the **no** form of this command to restore the default setting.

accounting network { **default** | *list-name* }

no accounting network

Parameter Description

Parameter	Description
default	Uses this parameter to specify the default method list.
list-name	The name of the network accounting list

Defaults With no method list specified, if the user sends the request, the device will attempt to specify the default method list for the user.

Command Mode Domain configuration mode

Usage Guide Use this command to configure the Network accounting method list for the specified domain.

Configuration Examples The following example sets the Network accounting method list for the specified domain.

```
FS(config)# aaa domain FS.com
FS(config-aaa-domain)# accounting network default
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa domain enable	Enables the domain-name-based AAA service.
show aaa domain	Displays the domain configuration.

Platform Description N/A

1.24 Authentication Dot1x

Use this command to configure the IEEE802.1x authentication list.

Use the **no** form of this command to restore the default setting.

authentication dot1x { **default** | *list-name* }

no authentication dot1x

Parameter Description

Parameter	Description
default	Uses this parameter to specify the default method list

list-name	The name of the specified method list

Defaults With no method list specified, if users send the request, the device will attempt to specify the default method list for users.

Command Mode Domain configuration mode

Usage Guide Specify an IEEE802.1x authentication method list for the domain.

Configuration Examples The following example sets an IEEE802.1x authentication method list for the specified domain.

```
FS(config)# aaa domain FS.com
FS(config-aaa-domain)# authentication dot1x default
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa domain enable	Enables the domain-name-based AAA service.
show aaa domain	Displays the domain configuration.

Platform Description N/A

1.25 Authorization Network

Use this command to configure the Network authorization list.

Use the **no** form of this command to restore the default setting.

authorization network { **default** | *list-name* }

no authorization network

Parameter Description

Parameter	Description
default	Uses this parameter to specify the default method list.
list-name	The name of the specified method list

Defaults With no method list specified, if users send the request, the device will attempt to specify the default method list for users.

Command Mode Domain configuration mode

Usage Guide Specify an authorization method list for the domain.

Configuration Examples The following example sets an authorization method list for the specified domain.

```
FS(config)# aaa domain FS.com
FS(config-aaa-domain)# authorization network default
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa domain enable	Enables the domain-name-based AAA service.
show aaa domain	Displays the domain configuration.

Platform Description N/A

1.26 Clear Aaa Local User Lockout

Use this command to clear the lockout user list.

clear aaa local user lockout { **all** | **user-name** *word* }

Parameter Description

Parameter	Description
all	Indicates all locked users.
user-name *word*	Indicates the ID of the locked User.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to clear all the user lists or a specified user list.

Configuration Examples The following example clears the lockout user list.

```
FS(config)# clear aaa local user lockout all
```

Related Commands

Command	Description
show running-config	Displays the current configuration of the switch.
show aaa lockout	Displays the lockout configuration parameter of current login.

Platform Description N/A

1.27 Show Aaa Accounting Update

Use this command to display the accounting update information.

show aaa accounting update

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide Use this command to display the accounting update interval and whether the accounting update is enabled.

Configuration Examples The following example displays the accounting update information.

```
FS# show aaa accounting update
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa domain enable	Enables the domain-name-based AAA service.

Platform Description N/A

1.28 Show Aaa Domain

Use this command to display all current domain information.

show aaa domain [**default** | *domain-name*]

Parameter Description

Parameter	Description
default	Displays the default domain.
domain-name	Displays the specified domain.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide If no domain-name is specified, all domain information will be displayed.

Configuration Examples The following example displays the domain named domain.com.

```
FS(config)# show aaa domain domain.com
============Domain domain.com============
State: Active
Username format: Without-domain
Access limit: No limit
802.1X Access statistic: 0

Selected method list:
 authentication dot1x default
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa domain enable	Enables the domain-name-based AAA service.

Platform Description N/A

1.29 Show Aaa Group

Use this command to display all the server groups configured for AAA.

show aaa group

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following command displays all the server groups.

```
FS# show aaa group
Type          Reference   Name
---------- ---------- ----------
radius        1           radius
tacacs+       1           tacacs+
radius        1           dot1x_group
radius        1           login_group
radius        1           enable_group
```

Related Commands

Command	Description
aaa group server	Configures the AAA server group.

Platform Description N/A

1.30 Show Aaa Lockout

Use this command to display the lockout configuration.

show aaa lockout

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Privileged EXEC mode/Global configuration mode/Interface configuration mode

Mode

Usage Guide Use this command to display the lockout configuration.

Configuration Examples The following example displays the lockout configuration.

```
FS# show aaa lockout
Lock tries:       3
Lock timeout:    15 minutes
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.31 Show Aaa Method-list

Use this command to display all AAA method lists.

show aaa method-list

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide Use this command to display all AAA method lists.

Configuration Examples The following example displays the AAA method list.

```
FS# show aaa method-list
Authentication method-list
aaa authentication login default group radius
aaa authentication ppp default group radius
aaa authentication dot1x default group radius
aaa authentication dot1x san-f local    group angel group rain none
aaa authentication enable default group radius
Accounting method-list
aaa accounting network default start-stop group radius
Authorization method-list
aaa authorization network default group radius
```

Related Commands

Command	Description
aaa authentication	Defines a user authentication method list

aaa authorization	Defines a user authorization method list
aaa accounting	Defines a user accounting method list

Platform Description N/A

1.32 Show Aaa User

Use this command to display AAA user information.

show aaa user { all | lockout | by-id *session-id* **| by-name** *user-name* **}**

Parameter Description

Parameter	Description
all	Displays all AAA user information.
lockout	Displays the locked AAA user information.
by-id *session-id*	Displays the information of the AAA user that with a specified session ID.
by-name *user-name*	Displays the information of the AAA user with a specified user name.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide Use this command to display AAA user information.

Configuration Examples The following example displays AAA user information.

```
FS#show aaa user all
-----------------------------
            Id ----- Name
 2345687901          wwxy
-----------------------------
FS# show aaa user by-id 2345687901
-----------------------------
            Id ----- Name
 2345687901          wwxy
FS# show aaa user by-name wwxy
-----------------------------
            Id ----- Name
 2345687901          wwxy
```

```
-----------------------------

FS# show aaa user lockout

Name                                    Tries      Lock       Timeout(min)
--------------------------------- ---------- ---------- ------------
FS#
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.33 State

Use this command to set whether the configured domain is valid.

Use the **no** form of this command to restore the default setting.

state { **block** | **active** }

no state

Parameter Description

Parameter	Description
block	The configured domain is invalid.
active	The configured domain is valid.

Defaults

The default is active.

Command Mode

Domain configuration mode

Usage Guide

Use this command to set whether the specified configured domain is valid.

Configuration Examples

The following example sets the configured domain to be invalid.

```
FS(config)# aaa domain FS.com
FS(config-aaa-domain)# state block
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa domain enable	Enables the domain-name-based AAA service.
show aaa domain enable	Displays the domain configuration.

Platform Description

N/A

1.34 Username-format

Use this command to configure the user name whether to be with the domain information when the NAS interacts with the servers.

Use the **no** form of this command to restore the default setting.

username-format { **without-domain** | **with-domain** }

no username-format

Parameter Description

Parameter	Description
without-domain	Sets the user name without the domain information.
with-domain	Sets the user name with the domain information.

Defaults

The default is without-domain.

Command Mode

Domain configuration mode

Usage Guide

Use this command to configure the user name whether to be with the domain information when the NAS interacts with the servers.

Configuration Examples

The following example sets the user name without the domain information.

```
FS(config)# aaa domain FS.com
FS(config-aaa-domain)# username-domain without-domain
```

Related Commands

Command	Description
aaa new-model	Enables the AAA security service.
aaa domain enable	Enables the domain-name-based AAA service.
show aaa domain	Displays the domain configuration.

Platform Description

N/A

2. RADIUS Commands

2.1 Aaa Group Server Radius

Use this command to enter AAA server group configuration mode.

Use the **no** form of this command to restore the default setting.

aaa group server radius *name*

no aaa group server radius *name*

Parameter Description

Parameter	Description
name	Server group name. Keywords "radius" and "tacacs +" are excluded as they are the default RADIUS and TACACS+ server group names.

Defaults N/A

Command Mode Global configuration mode

Usage Guide This command is used to configure a RADIUS AAA server group.

Configuration Examples The following example configures a RADIUS AAA server group named ss.

```
FS(config)# aaa group server radius ss
FS(config-gs-radius)# end
FS# show aaa group
Type          Reference   Name
---------- ---------- ----------
radius        1           radius
tacacs+       1           tacacs+
radius        1           ss
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.2 Ip Radius Source-interface

Use this command to specify the source IP address for the RADIUS packet.

Use the **no** form of this command to delete the source IP address for the RADIUS packet.

ip radius source-interface *interface-name*

no radius source-interface *interface-name*

Parameter Description

Parameter	Description
interface-name	Interface that the source IP address of the RADIUS packet belongs to.

Defaults

The source IP address of the RADIUS packet is set by the network layer.

Command mode

Global configuration mode

Usage Guide

In order to reduce the NAS information to be maintained on the RADIUS server, use this command to set the source IP address of the RADIUS packet. This command uses the first IP address of the specified interface as the source IP address of the RADIUS packet. This command is used in the layer 3 devices.

Configuration Examples

The following example specifies that the RADIUS packet obtains an IP address from the fastEthernet 0/0 interface and uses it as the source IP address of the RADIUS packet.

```
FS(config)# ip radius source-interface fastEthernet 0/0
```

Related Commands

Command	Description
radius-server host	Defines the RADIUS server.
ip address	Configures the IP address of the interface.

Platform Description

N/A

2.3 Radius Attribute

Use this command to set the private attribute type value.

Use the **no** form of this command to restore the default setting.

radius attribute { *id* **| down-rate-limit | dscp | mac-limit | up-rate-limit** } **vendor-type** *type*

no radius attribute { *id* | **down-rate-limit** | **dscp** | **mac-limit | up-rate-limit** } **vendor-type**

Parameter Description

Parameter	Description
id	Function ID, in the range from 1 to 255
type	Private attribute type, in the range from 1 to 255.

Defaults

Only the default configuration of private attributes in FS is recognized.

Id	Function	Type
1	max down-rate	1
2	qos	2
3	user ip	3
4	vlan id	4

5	version to client	5
6	net ip	6
7	user name	7
8	password	8
9	file-directory	9
10	file-count	10
11	file-name-0	11
2	file-name-1	12
13	file-name-2	13
14	file-name-3	14
15	file-name-4	15
16	max up-rate	16
17	version to server	17
18	flux-max-high32	18
19	flux-max-low32	19
20	proxy-avoid	20
21	dailup-avoid	21
22	ip privilege	22
23	login privilege	42

Extended attributes:

Id	Function	Type
1	max down-rate	76
2	qos	77
3	user ip	3
4	vlan id	4
5	version to client	5
6	net ip	6
7	user name	7
8	password	8
9	file-directory	9
10	file-count	10
11	file-name-0	11
12	file-name-1	12

13	file-name-2	13
14	file-name-3	14
15	file-name-4	15
16	max up-rate	75
17	version to server	17
18	flux-max-high32	18
19	flux-max-low32	19
20	proxy-avoid	20
21	dailup-avoid	21
22	ip privilege	22
23	login privilege	42
24	limit to user number	50

Command Mode Global configuration mode

Usage Guide This command is used to configure the private attribute type value.

Configuration Examples The following example sets the type of max up-rate to 211.

```
FS(config)# radius attribute 16 vendor-type 211
```

Related Commands

Command	Description
radius set qos cos	Sets the qos value sent by the RADIUS server as the cos value of the interface.

Platform Description N/A

2.4 Radius Set Qos Cos

Use this command to set the QoS value sent by the RADIUS server as the CoS value of the interface. Use the **no** form of this command to restore the default setting.

radius set qos cos

no radius set qos cos

Parameter Description

Parameter	Description
N/A	N/A

Defaults Set the QoS value sent by the RADIUS server as the DSCP value.

Command Mode Global configuration mode.

Usage Guide This command is used to set the QoS value sent by the RADIUS server as the CoS value, and the DSCP value by default.

Configuration Examples The following example sets the QoS value sent by the RADIUS server as the CoS value of the interface:

```
FS(config)# radius set qos cos
```

Related Commands

Command	Description
radius vendor-specific extend	Extends RADIUS as not to differentiate the IDs of private vendors.

Platform Description N/A

2.5 Radius Support Cui

Use this command to enable RADIUS to support the cui function.

Use the **no** form of this command to restore the default setting.

radius support cui

no radius support cui

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide This command is used to enable RADIUS to support the cui function.

Configuration Examples The following example enables RADIUS to support the cui function.

```
FS(config)# radius support cui
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.6 Radius Vendor-specific Extend

Use this command to extend RADIUS not to differentiate the IDs of private vendors.

Use the **no** form of this command to restore the default setting.

radius vendor-specific extend

no radius vendor-specific extend

Parameter Description

Parameter	Description
N/A	N/A

Defaults Only the private vendor IDs of FS are recognized.

Command Mode Global configuration mode

Usage Guide This command is used to identify the attributes of all vendor IDs by type.

Configuration Examples The following example extends RADIUS so as not to differentiate the IDs of private vendors:

```
FS(config)# radius vendor-specific extend
```

Related Commands

Command	Description
radius attribute	Configures vendor type.
radius set qos cos	Sets the QoS value sent by the RADIUS server as the cos value of the interface.

Platform Description N/A

2.7 Radius-server Account Attribute

Use this command to enable account-request packets to contain a specified RADIUS attribute.

Use the **no** or **default** form of this command to restore the default setting.

radius-server account attribute *type* **package**

no radius-server account attribute *type* **package**

default radius-server account attribute *type* **package**

Use this command to disable account-request packets to contain a specified RADIUS attribute.

Use the **no** or **default** form of this command to restore the default setting.

radius-server account attribute *type* **unpackage**

no radius-server account attribute *type* **unpackage**

default radius-server account attribute *type* **unpackage**

Parameter Description

Parameter	Description
type	RADIUS attribute in the range from 1 to 255

Defaults RFC-compliant

Command Mode Global configuration mode

Usage Guide Use this command to enable or disable account-request packets to contain a specified RADIUS attribute.

Configuration Examples The following example disables account-request packets to contain attribute NAS-PORT-ID.

```
FS(config)# radius-server account attribute 87 unpackage
```

Platform Description N/A

2.8 Radius-server Account Update Retransmit

Use this command to configure accounting update packet retransmission for the second generation Web authentication user.

Use the **no** form of this command to restore the default setting,

radius-server account update retransmit

no radius-server account update retransmit

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Global configuration mode

Usage Guide This command is used to configure accounting update packet retransmission for the second generation Web authentication user exclusively.

Configuration Examples The following example configures accounting update packet retransmission for the second generation Web authentication user.

```
FS(config)#radius-server account update retransmit
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.9 Radius-server Account Vendor

Use this command to enable account-request packets to contain vendor-specific RADIUS attributes.

Use the **no** or **default** form of this command to restore the default setting.

radius-server account vendor [cmcc | microsoft | cisco] package

no radius-server account vendor *vendor_name* **package**

default radius-server account vendor *vendor_name* **package**

Parameter Description

Parameter	Description
cmcc | microsoft | cisco	Vendor name.

Defaults Account-request packets do not contain vendor-specific RADIUS attributes by default.

Command Mode Global configuration mode

Usage Guide Use this command to enable account-request packets to contain vendor-specific RADIUS attributes.

Configuration Examples The following example enables account-request packets to contain “cmcc”.

```
FS(config)# radius-server account vendor cmcc package
```

Platform Description N/A

2.10 Radius-server Attribute Class

Use this command to configure the way to analyze the RADIUS CLASS attributes.

Use the **no** form of this command to restore the default setting.

radius-server attribute class

no radius-server attribute class

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide This command is required if the server pushes the flow control value through the CLASS attribute.

Configuration Examples N/A

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.11 Radius-server Attribute 31

Use this command to specify the MAC-based format of RADIUS Calling-Station-ID attribute.

Use the **no** form of this command to restore the default setting.

radius-server attribute 31 mac format { **ietf** | **normal** | **unformatted** }

no radius-server attribute 31 mac format

Parameter Description

Parameter	Description
ietf	The standard format specified by the IETF RFC3580. '-'is used as the separator, for example: 00-D0-F8-33-22-AC.
normal	Normal format representing the MAC address. ;.'is used as the separator. For example: 00d0.f833.22ac.
unformatted	No format and separator. By default, unformatted is used. For example: 00d0f83322ac.

Defaults The default format is unformatted.

Command Mode Global configuration mode

Usage Guide Some RADIUS security servers (mainly used to 802.1x authentication) may identify the IETF format only. In this case, the RADIUS Calling-Station-ID attribute shall be set as the IETF format type.

Configuration Examples The following example defines the RADIUS Calling-Station-ID attribute as IETF format.

```
FS(config)# radius-server attribute 31 mac format ietf
```

Related Commands

Command	Description
radius-server host	Defines the RADIUS server.

Platform Description N/A

2.12 Radius-server Authentication Attribute

Use this command to enable access-request packets to contain a specified RADIUS attribute.

Use the **no** or **default** form of this command to restore the default setting.

radius-server authentication attribute *type* **package**

no radius-server authentication attribute *type* **package**

default radius-server authentication attribute *type* **package**

Use this command to disable access-request packets to contain a specified RADIUS attribute.

Use the **no** or **default** form of this command to restore the default setting.

radius-server authentication attribute *type* **unpackage**

no radius-server authentication attribute *type* **unpackage**

default radius-server authentication attribute *type* **unpackage**

Parameter Description

Parameter	Description
type	RADIUS attribute in the range from 1 to 255

Defaults RFC-compliant

Command Mode Global configuration mode

Usage Guide Use this command to enable access-request packets to contain a specified RADIUS attribute.

Configuration Examples The following example disables access-request packets to contain attribute NAS-PORT-ID.

```
FS(config)# radius-server authentication attribute 87 unpackage
```

Platform Description N/A

2.13 Radius-server Authentication Vendor

Use this command to enable access-request packets to contain vendor-specific RADIUS attributes.

Use the **no** or **default** form of this command to restore the default setting.

radius-server authentication vendor [cmcc | microsoft | cisco] package

no radius-server authentication vendor *vendor_name* **package**

default radius-server authentication vendor *vendor_name* **package**

Parameter Description

Parameter	Description
cmcc | microsoft | cisco	Vendor name

Defaults Access-request packets do not contain vendor- specific RADIUS attributes by default.

Command Mode Global configuration mode

Usage Guide Use this command to enable access-request packets to contain vendor- specific RADIUS attributes.

Configuration Examples The following example enables access-request packets to contain “cmcc”.

```
FS(config)# radius-server authentication vendor cmcc package
```

Platform Description N/A

2.14 Radius-server Dead-criteria

Use this command to configure criteria on a device to determine that the Radius server is unreachable.

Use the **no** form of this command to restore the default setting.

radius-server dead-criteria { **time** *seconds* [**tries** *number*] **|** **tries** *number* }

no radius-server dead-criteria { **time** [**tries**] **|** **tries** }

Parameter Description

Parameter	Description
time *seconds*	Configures the timeout value. If the device does not receive a correct response packet from the Radius server within the specified time, the Radius server is considered to be unreachable. The value is in the range from 1 to 120 in the unit of seconds.
tries *number*	Configures the successive timeout times. When sending a request from the device to the Radius server times out for the specified times, the device considers that the Radius server is unreachable. The value is in the range from 1 to 100 in the unit of seconds.

Defaults

The default **time** *seconds* is 60 and **tries** *number* is 10.

Command Mode

Global configuration mode

Usage Guide

If a Radius server meets the timeout and timeout times at the same time, it is considered to be unreachable. This command is used to adjust the parameter conditions of timeout and timeout times.

Configuration Examples

The following example sets the timeout to 120 seconds and timeout times to 20.

```
FS(config)# radius-server dead-criteria time 120 tries 20
```

Related Commands

Command	Description
radius-server host	Defines the RADIUS security server.
radius-server deadtime	Defines the duration when a device stops sending any requests to an unreachable Radius server.
radius-server timeout	Defines the timeout for the packet re-transmission.

Platform Description

N/A

2.15 Radius-server Deadtime

Use this command to configure the duration when a device stops sending any requests to an unreachable Radius server.

Use the **no** form of this command to restore the default setting.

radius-server deadtime *minutes*

no radius-server deadtime

Parameter Description

Parameter	Description
minutes	Defines the duration in minutes when the device stops sending any requests to the unreachable Radius server. The value is in the range from 1 to 1,440 in the unit of minutes.

Defaults The default value of *minutes* is 0, that is, the device keeps sending requests to the unreachable Radius server.

Command Mode Global configuration mode

Usage Guide If active Radius server detection is enabled on the device, the time parameter of this command does not take effect on the Radius server. Otherwise, the Radius server becomes reachable when the duration set by this command is shorter than the unreachable time.

Configuration Examples The following example sets the duration when the device stops sending requests to 1 minute.

```
FS(config)# radius-server deadtime 1
```

Related Commands

Command	Description
radius-server host	Defines the RADIUS security server.
radius-server dead-criteria	Defines the criteria to determine that a Radius server is unreachable.

Platform Description N/A

2.16 Radius-server Host

Use this command to specify a RADIUS security server host.

Use the **no** form of this command to restore the default setting.

radius-server host { *ipv4-address* | *ipv6-address* } [**auth-port** *port-number*] [**acct-port** *port-number*] [**test username** *name* [**idle-time** *time*] [**ignore-auth-port**] [**ignore-acct-port**]] [**key** [**0** | **7**] *text-string*]

no radius-server host { *ipv4-address* | *ipv6-address* }

Parameter Description

Parameter	Description
ipv4-address	IPv6 address of the RADIUS security server host.
ipv6-address	IPv4 address of the RADIUS security server host.
auth-port	UDP port used for RADIUS authentication.
port-number	Number of the UDP port used for RADIUS authentication. If it is set to 0, this host does not perform authentication.
acct-port	UDP port used for RADIUS accounting.
port-number	Number of the UDP port used for RADIUS accounting. If it is set to 0, this host

	does not perform accounting.
test username *name*	(Optional) Enables the active detection to the RADIUS security server and specify the username used by the active detection.
idle-time *time*	(Optional) Sets the interval of sending the test packets to the reachable RADIUS security server, which is 60 minutes by default and in the range of 1 to 1440 minutes (namely 24 hours).
ignore-auth-port	(Optional) Disables the detection to the authentication port on the RADIUS security server. It is enabled by default.
ignore-acct-port	(Optional) Disables the detection to the authentication port on the RADIUS security server. It is enabled by default.
key [**0** | **7**] *text-string*	Configure a shared key for the server. The type of encryption can be specified. 0 is no encryption and 7 is simple encryption. The default is 0.

Defaults No RADIUS host is specified by default.

Command Mode Global configuration mode

Usage Guide In order to implement the AAA security service using RADIUS, you must define a RADIUS security server. You can define one or more RADIUS security servers using the **radius-server host** command.

Configuration Examples The following example defines a RADIUS security server host:

```
FS(config)# radius-server host 192.168.12.1
```

The following example defines a RADIUS security server host in the IPv4 environment, enable the active detection with the detection interval 60 minutes and disable the accounting UDP port detection:

```
FS(config)# radius-server host 192.168.100.1 test username viven idle-time 60 ignore-acct-port
```

The following example defines a RADIUS security server host in the IPv6 environment

```
FS(config)# radius-server host 3000::100
```

Related Commands

Command	Description
aaa authentication	Defines the AAA authentication method list
radius-server key	Defines a shared password for the RADIUS security server.
radius-server retransmit	Defines the number of RADIUS packet retransmissions.

Platform Description N/A

2.17 Radius-server Key

Use this command to define a shared password for the network access server (device) to communicate with the

RADIUS security server.

Use the **no** form of this command to restore the default setting.

radius-server key [**0 | 7**] *text-string*

no radius-server key

Parameter Description

Parameter	Description
text-string	Text of the shared password
0 | 7	Password encryption type. 0: no encryption; 7: Simply-encrypted.

Defaults

No shared password is specified by default.

Command Mode

Global configuration mode.

Usage Guide

A shared password is the basis for communications between the device and the RADIUS security server. In order to allow the device to communicate with the RADIUS security server, you must define the same shared password on the device and the RADIUS security server.

Configuration Examples

The following example defines the shared password **aaa** for the RADIUS security server:

```
FS(config)# radius-server key aaa
```

Related Commands

Command	Description
radius-server host	Defines the RADIUS security server.
radius-server retransmit	Defines the number of RADIUS packet retransmissions.
radius-server timeout	Defines the timeout for the RADIUS packet.

Platform Description

N/A

2.18 Radius-server Retransmit

Use this command to configure the number of packet retransmissions before the device considers that the RADIUS security server does not respond.

Use the **no** form of this command to restore the default setting.

radius-server retransmit *retries*

no radius-server retransmit

Parameter Description

Parameter	Description
retries	Number of retransmissions in the range from 0 to 100. The value of 0 indicates no retransmission.

Defaults The default is 3.

Command Mode Global configuration mode.

Usage Guide AAA uses the next method to authenticate users only when the current security server for authentication does not respond. When the device retransmits the RADIUS packet for the specified times and the interval between every two retries is timeout, the device considers that the security sever does not respond.

Configuration Examples The following example sets the number of retransmissions to 4.

```
FS(config)# radius-server retransmit 4
```

Related Commands

Command	Description
radius-server host	Defines the RADIUS security server.
radius-server key	Defines a shared password for the RADIUS server.
radius-server timeout	Defines the timeout for the RADIUS packet.

Platform Description N/A

2.19 Radius-server Source-port

Use this command to configure the source port to send RADIUS packets.

Use the **no** form of this command to restore the default setting.

radius-server source-port *port*

no radius-server source-port

Parameter Description

Parameter	Description
port	The port ID, in the range from 0 to 65535.

Defaults The default is a random number.

Command Mode Global configuration mode

Usage Guide The source port is random by default. This command is used to specify a source port.

Configuration The following example configures source port 10000 to send RADIUS packets.

Examples

```
FS(config)# radius-server source-port 10000
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.20 Radius-server Timeout

Use this command to set the time for the device to wait for a response from the security server after retransmitting the RADIUS packet.

Use the **no** form of this command to restore the default setting.

radius-server timeout *seconds*

no radius-server timeout

Parameter Description

Parameter	Description
seconds	Timeout in the range from 1 to 1,000 in the unit of seconds.

Defaults

The default is 5 seconds.

Command Mode

Global configuration mode

Usage Guide

This command is used to change the timeout of packet retransmission.

Configuration Examples

The following example sets the timeout to 10 seconds.

```
FS(config)# radius-server timeout    10
```

Related Commands

Command	Description
radius-server host	Defines the RADIUS security server.
radius-server retransmit	Defines the number of the RADIUS packet retransmissions.
radius-server key	Defines a shared password for the RADIUS server.

Platform Description

N/A

2.21 Server Auth-port Acct-port

Use this command to add the server of the AAA server group.

Use the **no** form of this command to restore the default setting.

server { *ipv4-addr* | *ipv6-addr*} [**auth-port** *port1*] [**acct-port** *port2*]

no server { *ipv4-addr* | *ipv6-addr*} [**auth-port** *port1*] [**acct-port** *port2*]

Parameter Description

Parameter	Description
ip-addr	Server IP address
Ipv6-addr	Server IPv6 address
port1	Server authentication port
port2	Server accounting port

Defaults No server is configured by default.

Command Mode Server group configuration mode

Usage Guide N/A

Configuration Examples The following example adds server 192.168.4.12 to server group ss and sets the accounting port and authentication port to 5 and 6 respectively.

```
FS(config)# aaa group server radius ss
FS(config-gs-radius)# server 192.168.4.12 acct-port 5 auth-port 6
FS(config-gs-radius)# end
FS# show aaa group
Type          Reference    Name
---------- ---------- ----------
radius        1            radius
tacacs+       1            tacacs+
radius        1            ss
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.22 Show Radius Acct Statistics

Use this command to display RADIUS accounting statistics.

show radius acct statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Global configuration mode/Privileged EXEC mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays RADIUS accounting statistics.

```
FS#show radius acct statistics
Accounting Servers:

Server Index..................................... 1
Server Address................................... 192.168.1.1
Server Port...................................... 1813
Msg Round Trip Time............................... 0 (msec)
First Requests................................... 1
Retry Requests................................... 1
Accounting Responses............................. 0
Malformed Msgs................................... 0
Bad Authenticator Msgs........................... 0
Pending Requests.........
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.23 Show Radius Attribute

Use this command to display standard Radius attributes.

show radius attribute

Parameter Description

Parameter	Description
N/A	N/A

Command Mode Global configuration mode/Privileged EXEC mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays standard RADIUS attributes.

```
FS#sh radius attribute
type                implicate
----                ---------
```

```
 1..........User-Name
 2..........User-Password
 3..........Chap-Password
 4..........NAS-Ip-Addr
 5..........Nas-Ip-Port
 6..........Service-Type
 7..........Framed-Protocol
 8..........Frame-Ip-Address
 9..........Framed-Ip-Mask
10..........Framed-Routing
11..........Filter-Id
12..........Framed-Mtu
13..........Framed-Compress
14..........Login-Ip-Host
15..........Login-Service
16..........Login-Tcp-Port
18..........Reply-Message
19..........Callback-Num
20..........Callback-Id
22..........Framed-Route
23..........Framed-IPX-Network
24..........State
25..........Class
26..........Vendor-Specific
27..........Session-Timeout
28..........Idle-Timeout
29..........Termination-Action
30..........Called-Station-Id
31..........Calling-Station-Id
32..........Nas-Id
33..........Proxy-State
34..........Login-LAT-Service
35..........Login-LAT-Node
36..........Login-LAT-Group
37..........Framed-AppleTalk-Link
38..........Framed-AppleTalk-Net
39..........Framed-AppleTalk-Zone
40..........Acct-Status-Type
41..........Acct-Delay-Time
42..........Acct-Input-Octets
43..........Acct-Output-Octets
44..........Acct-Session-Id
45..........Acct-Authentic
46..........Acct-Session-Time
```

```
 47..........Acct-Input-Packet
 48..........Acct-Output-Packet
 49..........Acct-Terminate-Cause
 50..........Acct-Multi-Session-ID
 51..........Acct-Link-Count
 52..........Acct-Input-Gigawords
 53..........Acct-Output-Gigawords
 60..........Chap-Challenge
 61..........Nas-Port-Type
 62..........Port-Limit
 63..........Login-Lat-Port
 64..........Tunnel-Type
 65..........Tunnel-Medium-Type
 66..........Tunnel-Client-EndPoint
 67..........Tunnel-Service-EndPoint
 79..........eap msg
 80..........Message-Authenticator
 81..........group id
 85..........Acct-Interim-Interval
 87..........Nas-Port-Id
 89..........cui
 95..........Nas-Ipv6-Addr
 96..........Framed-Interface-Id
 97..........Framed-Ipv6-Prefix
 98..........Login-Ipv6-Host
 99..........Framed-Ipv6-Route
100..........Framed-Ipv6-Pool
168..........Framed-Ipv6-Addr
```

Platform Description N/A

2.24 Show Radius Auth Statistics

Use this command to display RADIUS authentication statistics.

show radius auth statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Global configuration mode/Privileged EXEC mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays RADIUS authentication statistics.

```
FS#show radius auth statistics
Authentication Servers:

Server Index..................................... 1
Server Address................................... 192.168.1.1
Server Port...................................... 1812
Msg Round Trip Time............................. 0 (msec)
First Requests................................... 0
Retry Requests................................... 0
Accept Responses................................. 0
Reject Responses................................. 0
Challenge Responses.............................. 0
Malformed Msgs................................... 0
Bad Authenticator Msgs........................... 0
Pending Requests................................. 0
Timeout Requests................................. 0
Unknowntype Msgs................................. 0
Other Drops...................................... 0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.25 Show Radius Group

Use this command to display RADIUS server group configuration.

show radius group

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Global configuration mode/Privileged EXEC mode/Interface configuration mode

Usage Guide N/A

Configuration Examples

The following example displays RADIUS server group configuration.

```
FS#show radius group
==========Radius group radius==========
Vrf:not-set
Server:192.168.1.1
  Server key:FS
  Authentication port:1812
  Accounting port:1813
  State:Active
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.26 Show Radius Parameter

Use this command to display global RADIUS server parameters.

show radius parameter

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Global configuration mode/Privileged EXEC mode/Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example displays global RADIUS server parameters.

```
FS# show radius parameter
Server Timout:      5 Seconds
Server Deadtime: 0 Minutes
Server Retries:    3
Server Dead Critera:
Time:              10 Seconds
Tries:             10
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.27 Show Radius Server

Use this command to display the configuration of the RADIUS server.

show radius server

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Global configuration mode/Privileged EXEC mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the configuration of the RADIUS server.

```
FS# show radius server
Server IP:        192.168.4.12
Accounting    Port:    23
Authen    Port:          77
Test Username:        viven
Test Idle Time:      10 Minutes
Test Ports:                Authen
Server State:          Active
        Current duration 765s, previous duration 0s
Dead: total time 0s, count 0
Statistics:
Authen: request 15, timeouts 1
Author: request 0, timeouts 0
Account: request 0, timeouts 0

Server IP:        192.168.4.13
Accounting Port:    45
Authen    Port:          74
Test Username:        <Not Configured>
Test Idle Time:      60 Minutes
Test Ports:                Authen and Accounting
```

```
Server State:        Active
Current duration 765s, previous duration 0s
Dead: total time 0s, count 0
Statistics:
Authen: request 0, timeouts 0
Author: request 0, timeouts 0
Account: request 20, timeouts 0
```

Related Commands

Command	Description
radius-server host	Defines the RADIUS security server.
radius-server retransmit	Defines the number of RADIUS packet retransmissions.
radius-server key	Defines a shared password for the RADIUS server.
radius-server timeout	Defines the packet transmission timeout.

Platform Description

N/A

2.28 Show Radius Vendor-specific

Use this command to display the configuration of the private vendors.

show radius vendor-specific

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the configuration of the private vendors.

```
FS#show radius vendor-specific
id      vendor-specific          type-value
----- -------------------- ----------
1       max-down-rate            1
2       port-priority            2
3       user-ip                  3
4       vlan-id                  4
5       last-supplicant-vers 5
        ion
```

6	net-ip	6
7	user-name	7
8	password	8
9	file-directory	9
10	file-count	10
11	file-name-0	11
12	file-name-1	12
13	file-name-2	13
14	file-name-3	14
15	file-name-4	15
16	max-up-rate	16
17	current-supplicant-version	17
18	flux-max-high32	18
19	flux-max-low32	19
20	proxy-avoid	20
21	dialup-avoid	21
22	ip-privilege	22
23	login-privilege	42
26	ipv6-multicast-address	79
27	ipv4-multicast-address	87

Related Commands

Command	Description
radius-server host	Defines the RADIUS security server.
radius-server retransmit	Defines the number of RADIUS packet retransmissions.
radius-server key	Defines a shared password for the RADIUS server.
radius-server timeout	Defines the packet transmission timeout.

Platform Description

N/A

3. TACACS+ Commands

3.1 Aaa Group Server Tacacs+

Use this command to configure different groups of TACACS+ server hosts.

Use the **no** form of this command to remove a specified TACACS server group.

aaa group server tacacs+ *group_name*

no aaa group server tacacs+ *group_name*

Parameter Description

Parameter	Description
group_name	TACACS+ server group name, which cannot be **radius** or **tacacs+** The two names are the built-in group name.

Defaults

No TACACS+ server group is configured.

Command Mode

Global configuration mode

Usage Guide

After you group different TACACS+ servers, the tasks of authentication, authorization and accounting can be implemented by different server groups.

Configuration Examples

The following example configures a TACACS+ server group named tac1, and configures a TACACS+ server with IP address 1.1.1.1 in this group:

```
FS(config)#aaa group server tacacs+ tac1
FS(config-gs-tacacs+)# server 1.1.1.1
```

Related Commands

Command	Description
server	Configures server list of TACACS+ server group.
ip vrf forwarding	Configures VRF name supported by TACACS+ server group.

Platform Description

N/A

3.2 Ip Tacacs Source-interface

Use this command to use the IP address of a specified interface for all outgoing TACACS+ packets. Use the **no** form of this command to disable use of the specified interface IP address.

ip tacacs source-interface *interface-name*

no ip tacacs source-interface *interface-name*

Parameter Description

Parameter	Description
interface-name	Interface for the outgoing TACACS+ packets

Defaults The source IP address of TACACS+ packets is set on the network layer.

Command Mode Global configuration mode

Usage Guide To decrease the work of maintaining massive NAS messages in TACACS+ server, use this command to use the IP address of a specified interface for all outgoing TACACS+ packets.
This command specifies the primary IP address of the specified interface as the source address of TACACS+ packets on Layer 3 devices.

Configuration Examples The following example specifies the IP address of GigabitEthernet 0/0 for the outgoing TACACS+ packets.

```
FS(config)# ip tacacs source-interface gigabitEthernet 0/0
```

Related Commands

Command	Description
tacacs-server host	Defines a TACACS+ server.
ip address	Configures the IP address of an interface.

Platform Description N/A

3.3 Server

Use this command to configure the IP address of the TACACS+ server for the group server.
Use the **no** form of this command to remove the TACACS+ server.
server { *ipv4-address* | *ipv6-address* }
no server { *ipv4-address* | *ipv6-address* }

Parameter Description

Parameter	Description
ipv4-address	IPv4 address of the TACACS+ server
ipv6-address	IPv6 address of the TACACS+ server

Defaults No TACACS+ server is configured by default.

Command Mode TACACS+ server group configuration mode

Usage Guide You must configure the **aaa group server tacacs+** command before configuring this command.
To configure server address in TACACS+ group server, you must use the **tacacs-server host** command in global configuration mode.
If there is no response from the first host entry, the next host entry is tried.

Configuration The following example configures a TACACS+ server group named tac1 and a TACACS+ server address 1.1.1.1 in

Examples

this group.

```
FS(config)#aaa group server tacacs+ tac1
FS(config-gs-tacacs+)# server 1.1.1.1
```

Related Commands

Command	Description
aaa group server tacacs+	Configures a TACACS+ server group.

Platform Description

N/A

3.4 Show Tacacs

Use this command to display the TACACS+ server configuration.

show tacacs

Parameter Description

Parameter	Description
N/A	N/A

Command Mode

Privileged EXEC mode/Global configuration/Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example displays the TACACS+ server configuration.

```
FS# show tacacs
Tacacs+ Server : 172.19.192.80/49
Socket Opens: 0
Socket Closes: 0
Total Packets Sent: 0
Total Packets Recv: 0
Reference Count: 0
```

Related Commands

Command	Description
tacacs-server host	Defines a TACACS+ secure server host.

Platform Description

N/A

3.5 Tacacs-server Host

Use this command to configure a TACACS+ host.

Use the **no** form of this command to remove the TACACS+ host.

tacacs-server host {*ipv4-address* | *ipv6-address*} [**port** *integer*] [**timeout** *integer*] [**key** [**0** | **7**] *text-string*]

no tacacs-server host { *ip-address* | *ipv6-address* }

Parameter Description

Parameter	Description
ip-address	IPv4 address of the TACACS+ host
ipv6-address	IPv6 address of the TACACS+ host
port *integer*	Port number of the server. The range is from 1 to 65,535. The default is 49.
timeout *integer*	Timeout time of TACACS+ host. The range is from 1 to 1,000.
key *string*	Configures an authentication and encryption key. The value can be 0 or 7. 0 indicates no encryption, while 7 indicates simple encryption. The default is 0.

Defaults No TACACS+ host is specified by default.

Command Mode Global configuration mode

Usage Guide The TACACS+ host must be configured to implement AAA security service You can use this command to configure one or multiple TACACS+ hosts.

Configuration Examples The following example configures a TACACS+ host.

```
FS(config)# tacacs-server host 192.168.12.1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

3.6 Tacacs-server Key

Use this command to configure the authentication encryption key used for TACACS+ communications between the access server and the TACACS+ server.

Use the **no** form of this command to remove the authentication encryption key.

tacacs-server key [**0** | **7**] *string*

no tacacs-server key

Parameter Description

Parameter	Description
string	Key string
0 | **7**	Encryption type of key 0 indicates no encryption; 7 indicate simple encryption.

Defaults No authentication encryption key is configured by default.

Command Mode Global configuration mode

Usage Guide Use command to configure a global authentication and encryption key for TACACS+ communication. Use the **key** parameter in the **tacacs-server host** command to configure a server-based key.

Configuration Examples The following example defines the authentication encryption key of TACACS+ server as aaa:

```
FS(config)# tacacs-server key aaa
```

Related Commands

Command	Description
tacacs-server host	Defines a TACACS+ host.

Platform Description N/A

3.7 Tacacs-server Timeout

Use this command to set the interval for which the server waits for a server host to reply. Use the **no** form of this command to restore the default timeout interval.

tacacs-server timeout *seconds*

no tacacs-server timeout

Parameter Description

Parameter	Description
seconds	Timeout interval in the range from 1 to 1,000 in the unit of seconds

Defaults The default is 5 seconds.

Command Mode Global configuration mode

Usage Guide Use command to configure a global timeout interval. Use the **timeout** parameter in the **tacacs-server host** command to configure a server-based interval.

Configuration Examples The following example configures the timeout interval to 10 seconds.

```
FS(config)# tacacs-server timeout 10
```

Related Commands

Command	Description
tacacs-server host	Defines a TACACS+ secure server host.

Platform N/A

Description

4. 802.1X Commands

4.1 Aaa Authorization Ip-auth-mode

Use this command to set the IP authorization mode.

aaa authorization ip-auth-mode { disable | supplicant | radius-server | dhcp-server | mixed }

Parameter Description

Parameter	Description
disable	Disables IP authorization mode.
supplicant	Enables suppliant authorization mode.
radius-server	Enables Radius server authorization mode.
dhcp-server	Enables DHCP server authorization mode.
mixed	Enables mixed authorization mode.

Defaults

IP authorization mode is disabled by default.

Command mode

Global configuration mode

Usage Guide

Supplicant authorization mode supports only FS supplicant.

Radius-server authorization mode requires the server to allocate IP addresses by framed-ip.

DHCP-server authorization mode requires the server to enable DHCP snooping or DHCP relay.

Mixed authorization mode supports multiple authorization methods.

Configuration Examples

The following example enables suppliant authentication mode.

```
FS(config)# aaa authorization ip-auth-mode supplicant
```

Related Commands

Command	Description
show running-config	Displays the IP authentication mode.

Platform Description

N/A

4.2 Clear Dot1x User All

Use this command to clear all the 802.1X authentication users.

clear dot1x user all

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide Use this command to clear all the 802.1X authentication users.

Configuration Examples The following example clears all the 802.1X authentication users.

```
FS#clear dot1x user all
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.3 Clear Dot1x User Id

Use this command to clear 802.1X authentication users according to session IDs.

clear dot1x user id *session-id*

Parameter Description

Parameter	Description
session-id	Session ID

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to clear 802.1X authentication users according to session IDs.

Configuration Examples The following example clears an 802.1X authentication user whose session ID is 12345678.

```
FS#clear dot1x user id 12345678
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.4 Clear Dot1x User Mac

Use this command to clear 802.1X authentication users according to MAC addresses.

clear dot1x user mac *mac-addr*

Parameter Description

Parameter	Description
mac-addr	MAC address

Defaults N/A

Command Privileged EXEC mode

Mode

Usage Guide Use this command to clear 802.1X authentication users according to MAC addresses.

Configuration Examples The following example clears an 802.1X authentication user whose MAC address is 0012.3456.789A.

```
FS#clear dot1x user mac 0012.3456.789A
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.5 Clear Dot1x User Name

Use this command to clear the 802.1 X authentication users according to the username.

clear dot1x user name *name-str*

Parameter Description

Parameter	Description
name-str	The username of the 802.1X authentication user

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to clear the 802.1 X authentication users according to the username.

Configuration Examples The following example clears the 802.1X authentication user named 802.1X-user.

```
FS#clear dot1x user name dot1x-user
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.6 Dot1x Accounting

Use this command to configure the accounting list.

dot1x accounting *list-name*

Parameter Description

Parameter	Description
list-name	The name of the accounting list

Defaults N/A

Command Mode Global configuration mode

Usage Guide If AAA does not adopts 802.1X accounting as the default accounting method. Use this command to configure the 802.1X accounting method.

Configuration Examples The following example configures the accounting list.

```
FS(config)# dot1x accounting dot1x-acct
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.7 Dot1x Auth-address-table Address

Use this command to configure the authentication address table.

dot1x auth-address-table address *mac-addr* **interface** *interface*

Parameter Description

Parameter	Description
mac-addr	The MAC address of the authentication host
interface	The interface of the authentication host

Defaults N/A

Command Mode Global configuration mode

Usage Guide Only the specified interface with the specified MAC address is able to pass the 802.1x authentication.

Configuration Examples The following example configures the authentication address table.

```
FS(config)# dot1x auth-address-table 00d0.f800.0cb2 interface fastethernet 0/1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.8 Dot1x Authentication

Use this command to configure the authentication method list.

dot1x authentication *list-name*

Parameter Description

Parameter	Description
list-name	Authentication method list

Defaults N/A

Command Mode Global configuration mode

Usage Guide If AAA does not adopt the default 802.1X authentication, use this command to configure the 802.1X authentication method.

Configuration Examples The following example configures the authentication method list

```
FS(config)# dot1x authentication dot1x-authen
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.9 Dot1x Auth-fail Max-attempt

Use this command to set the maximum auth-attempts.

Use the **no** form of this command to restore the default setting.

dot1x auth-fail max-attempt *value*

no dot1x auth-fail max-attempt

Parameter Description

Parameter	Description
value	The maximum auth-attempts

Defaults The default is 3.

Command Mode Global configuration mode

Usage Guide Use the **show dot1x** command to adjust the maximum authentication attempts for those failed users.

Configuration Examples The following example sets the maximum auth-attempts to 2.

```
FS(config)# dot1x auth-fail max-attempt 2
```

Related Commands

Command	Description
show dot1x	Displays the 802.1x configuration.

Platform Description N/A

4.10 Dot1x Auth-Fail Vlan

Use this command to enable the auth-fail VLAN.

Use the **no** form of this command to restore the default setting.

dot1x auth-fail vlan *vlan-id*

no dot1x auth-fail vlan

Parameter Description

Parameter	Description
vlan-id	Auth-fail VLAN ID

Defaults

No auth-fail VLAN is enabled by default.

Command Mode

Interface configuration mode

Usage Guide

Use this command to allow auth-fail users to access network by joining in a VLAN.

Configuration Examples

The following example enables the auth-fail VLAN.

```
FS(config-if)# dot1x auth-fail vlan 30
```

Related Commands

Command	Description
show dot1x interface	Displays the 802.1X configurations on the interface.

Platform Description

N/A

4.11 Dot1x Auth-mode

Use this command to specify the 802.1X authentication mode.

dot1x auth-mode { **eap** | **chap** | **pap** }

Parameter Description

Parameter	Description
eap	Enables EAP-MD5 authentication mode.
chap	Enables CHAP authentication mode.
pap	Enables PAP authentication mode.

Defaults

The default is EAP-MD5 authentication mode.

Command Mode

Global configuration mode

Usage Guide

The selection of authentication mode depends on the suppliant and portal server.

Configuration Examples

The following example enables CHAP authentication mode.

```
FS(config)# dot1x auth-mode chap
```

Related Commands

Command	Description
show dot1x	Displays the 802.1X information.

Platform Description N/A

4.12 Dot1x Auth-with-order

Use this command to set the order and precedence for authentication.

dot1x auth-with-order

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Interface configuration mode

Usage Guide With this command executed, MAB authentication is initiated after 802.1X authentication fails. Meanwhile, MAB authentication takes precedence over 802.1X authentication.

Configuration Examples The following example sets the order and precedence for authentication.

```
FS(config-if)# dot1x auth-with-order
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.13 Dot1x Auto-req

Use this command to configure auto-request 802.1X authentication.

Use the **no** form of this command to restore the default setting.

dot1x auto-req

no dot1x auto-req

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide Enable this function for MAB. If the authentication agent is already in the terminal system, enable it by clicking.

Configuration Examples The following example enables auto-request 802.1X authentication.

```
FS(config)# dot1x auto-req
```

Related Commands

Command	Description
show dot1x auto-req	Displays the automatic authentication request information.

Platform Description N/A

4.14 Dot1x Auto-req Packet-num

Use this command to set the number of auto-request authentication packets.

dot1x auto-req packet-num *num*

Parameter Description

Parameter	Description
num	The number of auto-request authentication packets in the range from 0 to 1,000,000

Defaults The default is 0.

Command Mode N/A

Usage Guide N/A

Configuration Examples The following example sets the number of auto-request authentication packets to 100.

```
FS(config)# dot1x auto-req packet-num 100
```

Related Commands

Command	Description
show dot1x auto-req	Displays the authentication request information.

Platform Description N/A

4.15 Dot1x auto-req req-interval

Use this command to set the auto-request authentication interval.

dot1x auto-req req-interval *time*

Parameter Description

Parameter	Description
time	The auto-request authentication interval, in the range from 10 to 3,600 in the unit of seconds

Defaults The default is 30 seconds.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example sets the auto-request authentication interval to 50 seconds.

```
FS(config)# dot1x auto-req req-interval 50
```

Related Commands

Command	Description
show dot1x auto-req	Displays the authentication request information.

Platform Description N/A

4.16 Dot1x auto-req User-detect

Use this command to enable online user detection for auto-request authentication.

Use the **no** form of this command to disable this function.

dot1x auto-req user-detect

no dot1x auto-req user-detect

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example enables online user detection for auto-request authentication.

```
FS(config)# dot1x auto-req user-detect
```

Related Commands

Command	Description
show dot1x auto-req	Displays the authentication request information.

Platform Description N/A

4.17 Dot1x Client-probe Enable

Use this command to enable online user probe function.

Use the **no** form of this command to restore the default setting.

dot1x client-probe enable

no do1x client-probe enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide Use this command to enable online user probe function.

Configuration Examples The following example enables online user probe function.

```
FS(config)# dot1x client-probe enable
```

Related Commands

Command	Description
show dot1x	Displays 802.1X configuration.

Platform Description N/A

4.18 Dot1x Critical

Use this command to enable the server IAB (Inaccessible Authentication Bypass) on the port.

Use the **no** form of this command to restore the default setting.

dot1x critical

no dot1x critical

Parameter Description

Parameter	Description
N/A	N/A

Defaults This functions is disabled by default.

Command Mode Interface configuration mode

Usage Guide With the IAB function enabled on the port, if there is only RADIUS authentication method in the 802.1X authentication method list and all RADIUS servers in this method list take no effect, the switch will set the network accessing authority for users by the IAB method, and send the EAPOL-SUCCESS packets to the users. Except for the RADIUS authentication method, if there are other authentication methods in the 802.1X authentication method list, the IAB function will take no effect. (Such as the **aaa authentication dot1x default group radius none,** there exists none authentication method after the RADIUS authentication method.

For the users of IAB authorized, as the user identity legality cannot be checked, no matter whether the accounting function is configured, they will not send the accounting request.

With the AAA multi-domain authentication enabled globally, the 802.1X user authentication will not use the

globally configured method list. After all RADIUS servers in the 802.1X globally configured method list are checked to be invalid, the IAB will directly send the successful authentication to the user with no need to enter the username, the AAA multi-domain authentication on this port is useless.

Configuration Examples

The following example enables the server IAB (Inaccessible Authentication Bypass) function on the port.

```
FS(config-if-GigabitEthernet 0/5)#dot1x critical
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.19 Dot1x Critical Recovery Action Reinitialize

Use this command to allow IAB users under the port to reinitialize authentication when the server has recovered.

Use the **no** form of this command to restore the default setting.

dot1x critical recovery action reinitialize

no dot1x critical recovery action reinitialize

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

After the port entering the inaccessible authentication bypass status, if the RADIUS server returns to normal, you need to reinitialize the authentication for all users that have accomplished the network access authorization through the inaccessible authentication bypass on ports in order to ensure the user legality.

Configuration Examples

The following example allows IAB users under the port to reinitialize authentication when the server has recovered.

```
FS(config-if-GigabitEthernet 0/5)#dot1x critical recovery action reinitialize
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.20 Dot1x Critical Vlan

Use this command to configure the port in IAB status to jump to a specified auth-fail VLAN.

Use the **no** form of this command to disable this function.

dot1x critical vlan

no dot1x critical vlan

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide With this function enabled, if no user authentication is performed on the ports initially, after all RADIUS servers are invalidated, the user will initiate the authentication and the port will enter the IAB status and to be added to the VLAN configured. If this function is disabled, the VLAN of the port is not changed when the port is in the IAB status.

Configuration Examples The following example configures the port in IAB status to jump to a specified auth-fail VLAN.

```
FS(config-if-GigabitEthernet 0/5)#dot1x critical vlan 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.21 Dot1x Dbg-Filter

Use this command to enable debug information print for a user with a specified MAC address.

Use the **no** form of this command to clear the debug information.

dot1x dbg-filter *H.H.H*

no dot1x dbg-filter *H.H.H*

Parameter Description

Parameter	Description
H.H.H	The MAC address of a user

Defaults Debug information of all authentication users is printed by default.

Command mode Global configuration mode

Usage Guide Use this command to print the debug information of a specific user If you want to locate the fault on the network where there are multiple users.

Configuration Examples The following example prints the debug information of the device with the specified MAC address.

```
FS(config)# dot1x dbg-filter 00d0.f800.0001
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.22 Dot1x Default

Use this command to restore 802.1X configuration to the default setting.

dot1x default

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Global configuration mode

Usage Guide This command is used to restore 802.1X configuration for quick re-configuration.

Configuration Examples The following example restores 802.1X configuration to the default setting.

```
FS(config)# dot1x default
```

Related Commands

Command	Description
show dot1x	Displays the 802.1X information.

Platform Description N/A

4.23 Dot1x Default-user-limit

Use this command to set the maximum auth-user number on controlled interfaces.

Use the **no** form of this command to restore the default setting.

dot1x default-user-limit *num*

no dot1x default-user-limit

Parameter Description

Parameter	Description
num	The maximum auth-user number allowed by a controlled interface, in the range from 1 to 1,000,000

Defaults The default is 1,000,000.

Command mode Interface configuration mode,

Usage Guide This command is used to limit the number of users to be authenticated on a specific port.

Configuration Examples The following example sets the maximum auth-user number on a controlled interface.

```
FS(config-if)# dot1x default-user-limit 10
```

Related Commands

Command	Description
show dot1x port-control interface fastEthernet 0/10	Displays the number of users allowed by a specific 802.1X interface.
show dot1x port-control interface fastEthernet 0/10	Displays the number of users allowed by a specific 802.1X interface.

Platform Description N/A

4.24 Dot1x Dynamic-vlan Enable

Use this command to enable dynamic VLAN.

Use the **no** form of this command to disable the function.

dot1x dynamic-vlan enable

no dot1x dynamic-vlan enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults Dynamic VLAN is disabled by default.

Command Mode Interface configuration mode

Usage Guide This command is used to assign VLANs to authenticated users dynamically.

Configuration Examples The following example enables dynamic VLAN.

```
FS(config-if)# dot1x dynamic-vlan enable
```

Related Commands

Command	Description
show dot1x	Displays the information about 802.1X.

Platform Description N/A

4.25 Dot1x Guest-vlan

Use this command to configure the guest VLAN for port-control.

Use the **no** form of the command to disable the function.

dot1x guest-vlan *vlan-id*

no dot1x guest-vlan

Parameter Description

Parameter	Description
vlan-id	Guest VLAN ID

Defaults The guest VLAN is not configured by default.

Command Mode Interface configuration mode

Usage Guide Before using guest VLAN, you need to execute **dot1x dynamic-vlan enable** command first, or the configured guest VLAN does not take effect.

When configuring guest VLAN, it is recommended not to modify L2 attribute of the port, especially not to add the port to a VLAN manually.

Configuration Examples The following example configures VLAN 20 as 802.1X guest VLAN.

```
FS(config-if)# dot1x guest-vlan 20
```

Related Commands

Command	Description
show running-config	Displays the 802.1X configuration.

Platform Description N/A

4.26 Dot1x Mac-auth-bypass

Use this command to configure single MAB authentication.

Use the **no** form of this command to restore the default setting.

dot1x mac-auth-bypass

no dot1x mac-auth-bypass

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide Use this command on a single dumb terminal.

Configuration Examples The following example configures single MAB authentication.

```
FS(config-if-GigabitEthernet 0/0)# dot1x mac-auth-bypass
```

Related Commands

Command	Description
show dot1x port-control interface	Displays the information about 802.1X on the interface.

Platform Description N/A

4.27 Dot1x Mac-auth-bypass Multi-user

Use this command to configure multiple MAB authentications.

Use the **no** form of this command to restore the default setting.

dot1x mac-auth-bypass multi-user

no dot1x mac-auth-bypass multi-user

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide Use this command when the interface is connected with multiple dumb terminals.

Configuration Examples The following example configures multiple MAB authentications.

```
FS(config-if-GigabitEthernet 0/0)# dot1x mac-auth-bypass multi-user
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.28 Dot1x Mac-auth-bypass Timeout-activity

Use this command to set the MAB authentication timeout interval.

dot1x mac-auth-bypass timeout-activity *time*

no dot1x mac-auth-bypass timeout-activity

Parameter Description

Parameter	Description
time	The online time, in the range from 1 to 65,535 in the unit of seconds

Defaults The default is 0 second.

Command Mode Interface configuration mode

Usage Guide Use this command to set the MAB authentication timeout interval for dumb terminals.

Configuration Examples The following example sets the MAB authentication timeout interval.

```
FS(config-if-GigabitEthernet 0/0)# dot1x mac-auth-bypass timeout-activity 3600
```

Related Commands

Command	Description
show dot1x port-control interface	Displays the 802.1X information.
show dot1x port-control interface	Displays the 802.1X information.

Platform Description N/A

4.29 Dot1x Mac-auth-bypass Violation

Use this command to configure the MAB violation.

Use the **no** form of this command to restore the default setting.

dot1x mac-auth-bypass violation

no dot1x mac-auth-bypass violation

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide This command is used to configure the MAB violation on the port with only one dumb terminal in single MAB environment.

Configuration Examples The following example configures the MAB violation.

```
FS(config-if-GigabitEthernet 0/0)# dot1x mac-auth-bypass violation
```

Related Commands

Command	Description
show dot1x port-control interface	Displays the 802.1X information.

Platform Description N/A

4.30 Dot1x Mac-auth-bypass Vlan

Use this command to configure the MAB VLAN function.

Use the **no** form of this command to restore the default setting.

dot1x mac-auth-bypass vlan *vlan-list*

no dot1x mac-auth-bypass vlan *vlan-list*

Parameter Description

Parameter	Description
vlan-list	Configures the MAB VLANs.

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide Use this command to allow users within specified VLANs on the port to perform MAB authentication.

Configuration Examples The following example configures MAB VLANs.

```
FS(config-if-GigabitEthernet 0/0)# dot1x mac-auth-bypass vlan 5，8-20
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.31 Dot1x Max-req

Use this command to set the maximum attempts of authentication requests.

dot1x max-req *num*

Parameter Description

Parameter	Description
num	Maximum attempts

Defaults The default is 3.

Command Mode Global configuration mode

Usage Guide Use the **show dot1x** command to display the 802.1X configuration.

Configuration Examples The following example sets the maximum attempts of authentication requests to 2.

```
FS(config)# dot1x max-req 2
```

Related Commands

Command	Description
show dot1x	Displays the information about 802.1X.

Platform Description N/A

4.32 Dot1x Multi-account Enable

Use this command to enable the user with one single MAC address to perform authentication with multiple accounts.

Use the **no** form of this command to restore the default setting.

dot1x multi-account enable

no dot1x multi-account enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

Use the command to enable the multiple-account authentication if you want to switch the username in the authentication or re-authentication, especially in the windows domain authentication.

Configuration Examples

The following example enables the multiple-account authentication.

```
FS(config)# dot1x multi-account enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4.33 Dot1x Multi-mab Quiet-period

Use this command to set the quiet time after the multiple MAB authentication failure.

dot1x multi-mab quiet-period *time*

Parameter Description

Parameter	Description
time	Sets the quiet period after the multiple MAB authentication failure, in the range from 0 to 65,535 in the unit of seconds.

Defaults

The default is 0 second, indicating no quiet period.

Command Mode

Global configuration mode

Usage Guide

The default setting is recommended.

Configuration Examples

The following example sets the quiet period after the multiple MAB authentication failure to 2 seconds.

```
FS(config)# dot1x multi-mab quiet-period 2
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.34 Dot1x Port-control Auto

Use this command to configure the 802.1X authentication on the port.

Use the **no** form of this command to restore the default setting.

dot1x port-control auto

no dot1x port-control

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide Use the **show dot1x** command to display the 802.1X configuration.

Configuration Examples The following example configures the 802.1X authentication on the port.

```
FS(config-if-GigabitEthernet 0/0)# dot1x port-control auto
```

Related Commands

Command	Description
show dot1x	Displays the 802.1X information.

Platform Description N/A

4.35 Dot1x Port-control-mode

By default, 802.1x adopts MAC address-based control mode. In this mode, only authenticated users have access to the network, while other users that connect to the same port cannot access the network. In the port-based control mode, however, if one user that connects to the port passes the authentication, this port becomes an authenticated port and all the users that connect to this port have access to the network. In the port-based single-user control mode, the port is authenticated when it allows only one authenticated user who is enable to use the network normally. If you find other users on the port, you should clear all the users on the port and re-authenticate. The authentication mode can be configured using the following commands

dot1x port-control-mode { mac-based | port-based | port-based single-host}

no dot1x port-control-mode

Parameter Description

Parameter	Description
mac-based	Enable the MAC address-based control.
port-based	Enable port-based control.
port-based single-host	Enable single host-based control.

Defaults

MAC address-based access control is used by default.

Command Mode

Interface configuration mode.

Usage Guide

Use the **show dot1x port-control** command to show the 802.1X configuration for the port.

Single-host is port-based single-user 802.1x access control. Use **show dot1x port-control** to display port-based and use **show running-config** to display dot1x port-control-mode port-based single-host.

Since single-host only supports the single-user form, setting default-user-limit on the port manually does not take effect in single-host mode. If you set default-user-limit on the port after setting single-host, only one user can be permitted to use the network still.

Configuration Examples

The following example sets the port to participate in authentication and enable port-based authentication.

```
FS(config-if-GigabitEthernet 0/0)# dot1x port-control-mode port-based
```

Related Commands

Command	Description
show dot1x port-control	Displays the port control mode.
Show running-config	Displays the configuration.

Platform Description

N/A

4.36 Dot1x Private-supplicant-only

Use this command to filter non-FS clients.

Use the **no** form of this command to restore the default setting.

dot1x private-supplicant-only

no dot1x private-supplicant-only

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function disabled by default.

Command Mode

Global configuration mode

Usage Guide

This command is used for authentication supporting only FS clients.

Configuration

The following example filters non-FS clients.

Examples

```
FS(config)# dot1x private-supplicant-only
```

Related Commands

Command	Description
show dot1x private-supplicant-only	Displays the information about the private supplicant.

Platform Description N/A

4.37 Dot1x Probe-timer Alive

Use this command to set the FS terminal alive interval.

dot1x probe-timer alive *time*

Parameter Description

Parameter	Description
time	Terminal alive interval, in the range from 1 to 65,535 in the unit of seconds

Defaults The default is 250 seconds.

Command Mode Global configuration mode

Usage Guide If the device does not receive the probe packet from the terminal when the terminal alive interval expires, the device is considered offline. The default setting is recommended.

Configuration Examples The following example sets FS terminal alive interval to 120 seconds.

```
FS(config)# dot1x probe-timer alive 120
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.38 Dot1x Probe-timer Interval

Use this command to set the FS terminal detection interval.

dot1x probe-timer interval *time*

Parameter Description

Parameter	Description
time	Terminal detection interval in the range from 1 to 65,535 in the unit of seconds

Defaults The default is 20 seconds.

Command Mode Global configuration mode

Usage Guide The default setting is recommended.

Configuration Examples The following example sets FS terminal detection interval to 30 seconds.

```
FS(config)# dot1x probe-timer interval 30
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.39 Dot1x Pseudo Source-mac

Use this command to use a virtual MAC address as the source MAC address of the 802.1X packets sent by the device.

Use the **no** form of this command to restore the default setting.

dot1x pseudo source-mac

no dot1x pseudo source-mac

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode Global configuration mode

Usage Guide By default, the device uses its own MAC address as the source MAC address of the EAP packets for the 802.1X authentication. Some versions of the FS supplicant judge whether the access device is a FS device based on the source MAC address of the EAP packets. If the access device is a FS device, the supplicant device performs some private features. Configure this command if you want to enable these features.

Configuration Examples The following example uses the virtual MAC address as the source MAC address of the 802.1X packets sent by the device:

```
FS(config)# dot1x pseudo source-mac
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.40 Dot1x Re-authentication

Use this command to enable timed re-authentication function.

Use the **no** form of the command to restore the default setting.

dot1x re-authentication

no dot1x re-authentication

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

This command will re-authenticate the supplicant periodically after he passes the authentication. Use the **show dot1x** command to display 802.1X configuration. The default setting is recommended.

Configuration Examples

The following example enables timed re-authentication function.

```
FS(config)# dot1x re-authentication
```

Related Commands

Command	Description
show dot1x	Displays the 802.1X information.

Platform Description

N/A

4.41 Dot1x Reauth-max

Use this command to set the maximum re-auth attempts.

dot1x reauth-max *num*

no dot1x reauth-max

Parameter Description

Parameter	Description
num,	Maximum re-auth attempts. The range is from 1 to 10.

Defaults

The default is 3.

Command Mode

Global configuration mode

Usage Guide

Use this command to specify the maximum number of supplicant re-authentications. Use the **show dot1x** command to display 802.1X configuration.

Configuration Examples

The following example sets the maximum re-auth attempts to 2.

```
FS(config)# dot1x reauth-max 2
```

Related Commands

Command	Description
show dot1x	Displays the 802.1X information.

Platform Description N/A

4.42 Dot1x Redirect

Use this command to enable the second generation SU upgrade function.

Use the **no** form of this command to restore the default setting.

dot1x redirect

no dot1x redirect

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide Redirect to the supplicant software download website through the browser. See *Web Authentication Configuration Guide* for details about parameters.

Configuration Examples The following example enables the second generation SU upgrade function,

```
FS(config)# dot1x redirect
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.43 Dot1x Stationarity Enable

In the port-based 802.1X control mode, dynamic users can transit freely among the ports by default. Use this command to prevent users from transition.

Use the **no** form of this command to restore the default setting.

dot1x stationarity enable

no dot1x stationarity enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide This command must be configured before user authentication. Otherwise, you need re-authenticate all the users.

Configuration Examples The following example prevents the user from transiting from 802.1X port to other port.

```
FS(config)# dot1x stationarity enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.44 Dot1x Timeout Quiet-period

Use this command to set the quiet period when authentication fails.

dot1x timeout quiet-period *time*

Parameter Description

Parameter	Description
time	Quiet period, in the range from 1 to 65,535 in the unit of seconds.

Defaults The default is 10 seconds.

Command Mode Global configuration mode

Usage Guide The default value is recommended.

Configuration Examples The following example sets the quiet period after failed authentication.

```
FS(config)# dot1x timeout quiet-period 60
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.45 Dot1x Timeout Re-authperiod

Use this command to set the re-authentication interval when re-authentication is enabled.

dot1x timeout re-authperiod *time*

Parameter Description

Parameter	Description
time	Authentication interval, in the range from 1 to 65,535 in the unit of seconds.

Defaults The default is 3,600 seconds.

Command Mode Global configuration mode

Usage Guide Use the **show dot1x** command to display the 802.1X configuration.

Configuration Examples The following example sets the re-authentication interval to 2,400 seconds.

```
FS(config)# dot1x timeout re-authperiod 2400
```

Related Commands

Command	Description
show dot1x	Displays the information about 802.1X.

Platform Description N/A

4.46 Dot1x Timeout Server-timeout

Use this command to set the server timeout interval.

dot1x timeout server-timeout *time*

Parameter Description

Parameter	Description
time	The server timeout interval, in the range from 1 to 65,535 in the unit of seconds

Defaults The default is 5 seconds.

Command Mode Global configuration mode

Usage Guide By default, the timeout of the 802.1X server is less than that of the Radius server. Use this command to raise the 802.1X timeout so as to exceed the Radius value. For details, see *Configuration Guide*.

Configuration Examples The following example set the server timeout interval to 10 seconds.

```
FS(config)# dot1x timeout server-timeout 10
```

Related Commands

Command	Description
show dot1x	Displays the 802.1X information.

Platform Description N/A

4.47 Dot1x Timeout Supp-timeout

Use this command to set the authentication timeout between the device and the supplicant.

dot1x timeout supp-timeout *time*

Parameter Description

Parameter	Description
time	Authentication timeout between the device and the supplicant The range is from 1 to 65,535 seconds.

Defaults The default is 3 seconds.

Command Mode Global configuration mode

Usage Guide Use the **show dot1x** command to show display 802.1X configuration.

Configuration Examples The following example sets the authentication timeout between the device and the supplicant to 10s:

```
FS(config)# dot1x timeout supp-timeout 10
```

Related Commands

Command	Description
show dot1x	Displays the information about 802.1x.

Platform Description N/A

4.48 Dot1x Timeout Tx-period

Use this command to set the request/id packet re-transmission interval.

dot1x timeout tx-period *time*

Parameter Description

Parameter	Description
time	The request/id packet re-transmission interval, in range from 1 to 65,535 in the unit of seconds

Defaults The default is 3 seconds.

Command Mode Global configuration mode

Usage Guide Use the **show dot1x** command to display 802.1X configuration.

Configuration Examples The following example sets the request/id packet re-transmission interval to 5 seconds.

```
FS(config)# dot1x timeout tx-period 5
```

Related Commands

Command	Description
show dot1x	Displays the information about 802.1X.

Platform Description N/A

4.49 Dot1x User-name Compatible

Use this command to configure the compatibility function for H3C 802.1X authentication clients and authentication servers.

Use the **no** form of this command to restore the default setting.

dot1x user-name compatible

no dot1x user-name compatible

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide Enable this function when the H3C authentication client and authentication server are used for 802.1X authentication or the H3C authentication server is used for MAB authentication.

Configuration Examples The following example configures the compatibility function for H3C 802.1X authentication clients and authentication servers.

```
FS(config)# dot1x user-name compatible
```

Platform Description N/A

4.50 Dot1x Valid-ip-acct Enable

Use this command to enable IP address-triggered accounting.

Use the **no** form of this command to restore the default setting.

dot1x valid-ip-acct enable

no dot1x valid-ip-acct enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide Use this command to enable accounting only when users obtain valid IP addresses.

Configuration Examples The following example enables IP address-triggered accounting.

```
FS(config)#dot1x valid-ip-acct enable
```

Platform Description N/A

4.51 Dot1x Valid-ip-acct Timeout

Use this command to configure IP address-triggered accounting timeout.

Use the **no** form of this command to restore the default setting.

dot1x valid-ip-acct timeout *time*

no dot1x valid-ip-acct timeout

Parameter Description

Parameter	Description
time	IP address-triggered accounting timeout in the unit of minutes

Defaults The default is 5 minutes.

Command Mode Global configuration mode

Usage Guide The SNMP server will not start accounting until users obtain IP addresses. In this case, use this command to configure the IP address-triggered accounting timeout.

Configuration Examples The following example configures IP address-triggered accounting timeout.

```
FS(config)# dot1x valid-ip-acct timeout 10
```

Platform Description N/A

4.52 Dot1x System Disable

Use this command to disable global 802.1x. Use the **no** form of this command to restore the default settings.

dot1x system disable

no dot1x system disable

Parameter Description

Parameter	Description
N/A	N/A

Defaults By default, global 802.1x is enabled.

Command Mode Global configuration mode

Usage Guide (Optional) When the server is unreachable, disable global 802.1x, so users can access the Internet without authentication. After the server resumes reachability, enable global 802.1x, and users have to pass authentication before accessing the Internet.

Configuration Examples The following example disables global 802.1x.

```
FS(config)# dot1x system disable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.53 Show Dot1x

Use this command to display the 802.1X setting.

show dot1x

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the 802.1X setting.

```
FS#show dot1x

802.1X basic information:
  802.1X Status ........................ enable
  Authentication Mode .................. eap
  Authorization mode ................... disable
  Total User Number ..................... 0 (exclude dynamic user)
  Authenticated User Number ............ 0 (exclude dynamic user)
  Dynamic User Number ................... 0
  Re-authentication ..................... disable
  Re-authentication Period ............. 3600 seconds
  Re-authentication max ................ 3 times
  Quiet Period ......................... 10 seconds
  Tx Period ............................ 30 seconds
  Supplicant Timeout ................... 3 seconds
```

```
Server Timeout ..................... 5 seconds
Maximum Request ..................... 3 times
Client Online Probe ................... disable
Eapol Tag ............................ enable
802.1x redirect ...................... disable
Private supplicant only ............... disable
```

Related Commands

Command	Description
dot1x auth-mode	Sets the 802.1X authentication mode.
dot1x max-req	Sets the maximum number of authentication request re-transmissions.
dot1x port-control auto	Sets the port to participate in authentication.
dot1x reauth-max	Sets the maximum number of the supplicant re-authentications.
dot1x re-authentication	Sets the re-authentication attribute.
dot1x timeout quiet-period	Sets the time the device waits before re-authentication.
dot1x timeout re-authperiod	Sets the re-authentication period for the supplicant.
dot1x timeout server-timeout	Sets the authentication timeout between the device and authentication server.
dot1x timeout supp-timeout	Sets the authentication timeout between the device and the supplicant.
dot1x timeout tx-period	Sets the re-transmission interval.

Platform Description

N/A

4.54 Show Dot1x Auth-address-table

Use this command to display 802.1X authentication address table.

show dot1x auth-address-table [**address** *addr* | **interface** *interface*]

Parameter Description

Parameter	Description
addr	Physical IP address that can be authenticated
interface	Interface number

Defaults

N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example displays the 802.1X authentication address table.

```
FS #show dot1x auth-address-table
Interface          Address
---------------- -------------------
Fa0/1              00d0.f800.0c0e
```

```
Fa0/2                    001a.c800.0102

FS #show dot1x auth-address-table interface fastEthernet 0/1
Interface                Address
---------------- -------------------
Fa0/1                    00d0.f800.0c0e

FS #show dot1x auth-address-table address 00d0.f8.00.0c0e
Interface                Address
---------------- -------------------
Fa0/1                    00d0.f800.0c0e
```

Related Commands

Command	Description
dot1x auth-mode	Sets the 802.1x authentication mode.
dot1x max-req	Sets the maximum number of authentication request re-transmissions.
dot1x port-control auto	Sets the port to participate in authentication.
dot1x reauth-max	Sets the maximum number of the supplicant re-authentications.
dot1x re-authentication	Sets the re-authentication attribute.
dot1x timeout quiet-period	Sets the time the device waits before re-authentication.
dot1x timeout re-authperiod	Sets the re-authentication period for the supplicant.
dot1x timeout server-timeout	Sets the authentication timeout between the device and authentication server.
dot1x timeout supp-timeout	Sets the authentication timeout between the device and the supplicant.
dot1x timeout tx-period	Sets the re-transmission interval.

Platform Description

N/A

4.55 Show Dot1x Auto-req

Use this command to display the auto-request authentication information.

show dot1x auto-req

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example displays the auto-request authentication information.

```
FS# show dot1x auto-req
```

```
Auto-Req: Enabled
User-Detect : Enabled
Packet-Num    : 0
Req-Interval: 30 Seconds
```

Related Commands

Command	Description
dot1x auth-mode	Sets the 802.1X authentication mode.
dot1x max-req	Sets the maximum number of authentication request re-transmissions.
dot1x port-control auto	Sets the port to participate in authentication.
dot1x reauth-max	Sets the maximum number of the supplicant re-authentications.
dot1x re-authentication	Sets the re-authentication attribute.
dot1x timeout quiet-period	Sets the time the device waits before re-authentication.
dot1x timeout re-authperiod	Sets the re-authentication period for the supplicant.
dot1x timeout server-timeout	Sets the authentication timeout between the device and authentication server.
dot1x timeout supp-timeout	Sets the authentication timeout between the device and the supplicant.
dot1x timeout tx-period	Sets the re-transmission interval.

Platform Description

N/A

4.56 Show Dot1x Max-req

Use this command to display the maximum number of request/challenge packet transmission.

show dot1x max-req

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example displays the maximum number of request/challenge packet transmission.

```
FS#show dot1x max-req

Max-Req: 3 Times
```

Related Commands

Command	Description
dot1x auth-mode	Sets the 802.1X authentication mode.
dot1x max-req	Sets the maximum number of authentication request re-transmissions.
dot1x port-control auto	Sets the port to participate in authentication.
dot1x reauth-max	Sets the maximum number of the supplicant re-authentications.
dot1x re-authentication	Sets the re-authentication attribute.
dot1x timeout quiet-period	Sets the time the device waits before re-authentication.
dot1x timeout re-authperiod	Sets the re-authentication period for the supplicant.
dot1x timeout server-timeout	Sets the authentication timeout between the device and authentication server.
dot1x timeout supp-timeout	Sets the authentication timeout between the device and the supplicant.
dot1x timeout tx-period	Sets the re-transmission interval.

Platform Description

N/A

4.57 Show Dot1x Port-control

Use this command to display the port-control information.

show dot1x port-control [**interface** *interface-type interface-number*]

Parameter Description

Parameter	Description
interface-type	Interface type
interface-number	Interface ID

Defaults

N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example displays the port-control information.

```
FS#show dot1x port-control
Interface Mode          Dynamic-User Static-User Max-User    Authened MAB
--------- ---------- ------------ ----------- --------- -------- ---------
Gi0/5     mac-based    0            0           unlimited no       disable
```

Related Commands

Command	Description
dot1x auth-mode	Sets the 802.1X authentication mode.
dot1x max-req	Sets the maximum number of authentication request re-transmissions.
dot1x port-control auto	Sets the port to participate in authentication.

dot1x reauth-max	Sets the maximum number of the supplicant re-authentications.
dot1x re-authentication	Sets the re-authentication attribute.
dot1x timeout quiet-period	Sets the time the device waits before re-authentication.
dot1x timeout re-authperiod	Sets the re-authentication period for the supplicant.
dot1x timeout server-timeout	Sets the authentication timeout between the device and authentication server.
dot1x timeout supp-timeout	Sets the authentication timeout between the device and the supplicant.
dot1x timeout tx-period	Sets the re-transmission interval.

Platform Description N/A

4.58 Show Dot1x Private-supplicant-only

Use this command to display the information about the private supplicant.

show dot1x private-supplicant-only

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the information about the private supplicant:

```
FS#show dot1x private-supplicant-only

private-supplicant-only: Disabled
```

Related Commands

Command	Description
dot1x auth-mode	Sets the 802.1X authentication mode.
dot1x max-req	Sets the maximum number of authentication request re-transmissions.
dot1x port-control auto	Sets the port to participate in authentication.
dot1x reauth-max	Sets the maximum number of the supplicant re-authentications.
dot1x re-authentication	Sets the re-authentication attribute.
dot1x timeout quiet-period	Sets the time the device waits before re-authentication.
dot1x timeout re-authperiod	Sets the re-authentication period for the supplicant.
dot1x timeout server-timeout	Sets the authentication timeout between the device and authentication server.

dot1x timeout supp-timeout	Sets the authentication timeout between the device and the supplicant.
dot1x timeout tx-period	Sets the re-transmission interval.

Platform Description N/A

4.59 Show Dot1x Probe-timer

Use this command to display the configuration of online user probe.

show dot1x probe-timer

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the configuration of online user probe.

```
FS#show dot1x probe-timer
Hello Interval      : 20
Hello Alive         : 60
```

Field Description

Command	Description
Hello Interval	Sets the probe period.
Hello Alive	Sets the probe alive interval.

Related Commands

Command	Description
N/A	N/A.

Platform Description N/A

4.60 Show Dot1x Re-authentication

Use this command to display re-authentication status.

show dot1x re-authentication

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays re-authentication status.

```
FS#show dot1x re-authentication

Reauth-Enabled: Disabled
```

Command	Description
Reauth-Enabled	Whether to enable re-authentication.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.61 Show Dot1x Reauth-max

Use this command to display the maximum re-auth attempts.

show dot1x reauth-max

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the maximum re-authentication attempts.

```
FS#show dot1x reauth-max

Reauth-Max: 3 Times
```

Command	Description
Reauth-Enabled	Sets the maximum re-authentication attempts.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.62 Show Dot1x Summary

Use this command to display the 802.1X authentication summary.

show dot1x summary

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide It is convenient to display the 802.1X authentication summary according to the MAC address or username.

Configuration Examples N/A

Related Commands

Command	Description
dot1x auth-mode	Sets the 802.1X authentication mode.
dot1x max-req	Sets the maximum number of authentication request re-transmissions.
dot1x port-control auto	Sets the port to participate in authentication.
dot1x reauth-max	Sets the maximum number of the supplicant re-authentications.
dot1x re-authentication	Sets the re-authentication attribute.
dot1x timeout quiet-period	Sets the time the device waits before re-authentication.
dot1x timeout re-authperiod	Sets the re-authentication period for the supplicant.
dot1x timeout server-timeout	Sets the authentication timeout between the device and authentication server.
dot1x timeout supp-timeout	Sets the authentication timeout between the device and the supplicant.
dot1x timeout tx-period	Sets the re-transmission interval.

Platform Description N/A

4.63 Show Dot1x Timeout Quiet-period

Use this command to display the time for the device to wait before re-authentication quiet period after the authentication failure.

show dot1x timeout quiet-period

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide Use this command to display the time for the device to wait before re-authentication quiet period after the authentication failure.

Configuration Examples The following example shows how to displays the quiet period the time for the device to wait before re-authentication after the authentication failure.

```
FS#show dot1x timeout quiet-period

Quiet-Period: 10 Seconds
```

Parameter Description:

Parameter	Description
Quiet-Period	The time for the device to wait before re-authentication after the authentication failure.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.64 Show Dot1x Timeout Re-authperiod

Use this command to display the re-authentication interval.

show dot1x timeout re-authperiod

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide Use this command to display the re-authentication interval.

Configuration Examples The following example displays the re-authentication interval.:

```
FS#show dot1x timeout re-authperiod

Reauth-Period: 3600 Seconds
```

Parameter Description:

Parameter	Description
Reauth-Period	Re-authentication interval.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.65 Show Dot1x Timeout Server-timeout

Use this command to display the authentication timeout period.

show dot1x timeout server-timeout

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide Use this command to display the authentication timeout period.

Configuration Examples Use this command to display the authentication timeout period:

```
FS#show dot1x timeout server-timeout

Server-Timeout: 5 Seconds
```

Parameter Description:

Parameter	Description
Server-Period	AuthenticationServer timeout periodinterval.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.66 Show Dot1x Timeout Supp-timeout

Use this command to display the request/challenge packets re-transmission interval.

show dot1x timeout supp-timeout

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide Use this command to display the request/challenge packets re-transmission interval.

Configuration Examples Use this command to display the request/challenge packets re-transmission interval:

```
FS#show dot1x timeout supp-timeout

Supp-Timeout: 3 Seconds
```

Field Description:

Field	Description
Server-Period	The request/challenge packets re-transmission interval.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.67 Show Dot1x Timeout Tx-period

Use this command to display the request/id packets re-transmission interval.

show dot1x timeout tx-period

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide Use this command to display the request/id packets re-transmission interval.

Configuration Examples Use this command to display the request/ id packets re-transmission interval:

```
FS#show dot1x timeout tx-period

Tx-Period: 30 Seconds
```

Parameter Description:

Parameter	Description
Tx-Period	Request/id packets re-transmission interval.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.68 Show Dot1x User Id

Use this command to display the information about 802.1X authentication users based on user IDs.

show dot1x user id *id*

Parameter Description

Parameter	Description
id	User ID

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide Use the **show dot1x summary** command to display 802.1X authentication summaries. And use this command to display detailed information of a specific user based on its ID.

Configuration Examples The following example displays the information about the 802.1X authentication user according to the user ID.

```
FS#show dot1x user id 16777225

User name: ts-user
User id: 16777225
Type: static
Mac address is 0023.aeaa.4286
Vlan id is 2
Access from port Gi0/5
Time online: 0days 0h 0m17s
User ip address is 192.168.3.21
Max user number on this port is 0
Authorization session time is 1000 seconds
Supplicant is private
Start accounting
Permit proxy user
Permit dial user
IP privilege is 0
 user acl-name ts-user_6_0_0 :
```

Parameter Description:

Parameter	Description
User name	User name
User id	User ID

Type	User type
Mac address	User's MAC address
Vlan id	User VLAN ID
Access from port	The port that user accesses from
Time online	User online time
User ip address	User IP address
Max user number on this port	The maximum number of users on the port
Authorization session time	The authorized session time
Supplicant is private	Whether the terminal is a FS device
Start accounting	The accounting is enabled
Permit proxy user	The user is allowed to use the proxy.
Permit dial user	The user is allowed to dial.
IP privilege	The IP privilege level
user acl-name	The ACL information

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.69 Show Dot1x User Mac

Use this command to display the information about 802.1X authentication users based on MAC addresses.

show dot1x user mac *mac-addr*

Parameter Description

Parameter	Description
mac-addr	MAC address

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide Use the **show dot1x summary** command to display 802.1X authentication summaries. And use this command to display detailed information of a specific user based on its MAC address.

Configuration Examples The following example displays the information about the 802.1X authentication user according to the user's MAC address.

```
FS#show dot1x user mac 0023.aeaa.4286

User name: ts-user
User id: 16777225
Type: static
Mac address is 0023.aeaa.4286
```

```
Vlan id is 2
Access from port Gi0/5
Time online: 0days 0h 0m17s
User ip address is 192.168.3.21
Max user number on this port is 0
Authorization session time is 1000 seconds
Supplicant is private
Start accounting
Permit proxy user
Permit dial user
IP privilege is 0
 user acl-name ts-user_6_0_0 :
```

Parameter Description:

Parameter	Description
User name	User name
User id	User ID
Type	User type
Mac address	User's MAC address
Vlan id	User VLAN ID
Access from port	The port that user access from
Time online	User online time
User ip address	User IP address
Max user number on this port	The maximum number of users on the port
Authorization session time	The authorized session time
Supplicant is private	Whether the terminal is a FS device
Start accounting	The accounting is enabled.
Permit proxy user	The user is allowed to use the proxy.
Permit dial user	The user is allowed to dial.
IP privilege	The IP privilege level
user acl-name	The ACL information

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.70 Show Dot1x User Name

Use this command to display information about 802.1X authentication users based on usernames.

show dot1x user name *name*

Parameter Description

Parameter	Description
name	User name

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide Use the **show dot1x summary** command to display 802.1X authentication summaries. And use this command to display detailed information of a specific user based on its username.

Configuration Examples The following example displays the information about the 802.1X authentication user according to the user name.

```
FS#show dot1x user name ts-user

User name: ts-user
User id: 16777225
Type: static
Mac address is 0023.aeaa.4286
Vlan id is 2
Access from port Gi0/5
Time online: 0days 0h 0m17s
User ip address is 192.168.3.21
Max user number on this port is 0
Authorization session time is 1000 seconds
Supplicant is private
Start accounting
Permit proxy user
Permit dial user
IP privilege is 0
 user acl-name ts-user_6_0_0 :
```

Parameter Description:

Parameter	Description
User name	User name
User id	User ID
Type	User type
Mac address	User's MAC address
Vlan id	User VLAN ID
Access from port	The port that user access from
Time online	User online time
User ip address	User IP address
Max user number on this port	The maximum number of users on the port
Authorization session time	The authorized session time
Supplicant is private	Whether the terminal is a FS device.
Start accounting	The accounting is enabled.
Permit proxy user	The user is allowed to use the proxy.

Permit dial user	The user is allowed to dial.
IP privilege	The IP privilege level.
user acl-name	The ACL information.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5. Web Authentication Commands

5.1 Accounting

Use this command to set an accounting method for the template.

Use the **no** form of this command to restore the default setting.

accounting { *method-list* }

no accounting

Parameter Description

Parameter	Description
method-list	Name of the method list

Defaults

N/A

Command Mode

Template configuration mode

Usage Guide

The *method-list* parameter in this command should be consistent with network accounting list name configured in AAA.

Configuration Examples

The following example sets the **mlist1** accounting method for the **eportalv2** template.

```
FS(config.tmplt.eportalv2)# accounting mlist1
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.2 Authentication

Use this command to set an authentication method for the template.

Use the **no** form of this command to restore the default setting.

authentication { *method-list* }

no authentication

Parameter Description

Parameter	Description
method-list	Name of the method list

Defaults

N/A

Command Mode

Template configuration mode

Usage Guide

The *method-list* parameter in this command should be consistent with the Web authentication method list configured in AAA.

The first generation authentication does not support the authentication method list configuration.

Configuration Examples

The following example sets the **mlist1** authentication method for the **eportalv2** template.

```
FS(config.tmplt.eportalv2)#authentication mlist1
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.3 Bindmode

Use this command to set a binding mode for the template.

Use the **no** form of this command to restore the default setting.

bindmode { **ip-mac-mode** | **ip-only-mode** }

no bindmode

Parameter Description

Parameter	Description
ip-mac-mode	IP+MAC mode. The device will write both the IP address information and the MAC address information into the forwarding entry.
ip-only-mode	IP only mode. The device writes only the IP address information into the forwarding entry. On the L3 network, it is recommended to adopt this mode in case that the MAC address is inaccurate.

Defaults

The default is **ip-mac-mode**.

Command Mode

Template configuration mode

Usage Guide

N/A

Configuration Examples

The following example adopts the IP only mode for the **eportalv2** template.

```
FS(config.tmplt.eportalv2)# bindmode ip-only-mode
```

Related Commands

Command	Description
N/A	N/A

Platform

N/A

Description

5.4 Clear Web-auth Direct Host

Use this command to clear all authentication-exempted users.

clear web-auth direct-host [range]

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example clears all authentication-exempted users.

```
FS# clear web-auth direct-host
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.5 Clear Web-auth Direct-site

Use this command to clear all authentication-exempted network resources.

clear web-auth direct-site [range]

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example clears all authentication-exempted network resources.

```
FS# clear web-auth direct-site
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.6 Clear Web-auth User

Use this command to force the user to go offline.

clear web-auth user { **all** | **ip** { *ip-address* | *ipv6-address* } | **mac** *mac-address* | **name** *name-string* }

Parameter Description

Parameter	Description
ip-address	Specifies the user's IPv4 address.
ipv6-address	Specifies the user's IPv6 address.
mac-address	Specifies the user's MAC address.
name-string	Specifies the user name.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example forces all users to go offline.

```
FS(config) clear web-auth user all
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.7 Fmt

Use this command to set the URL redirection format in the second template configuration mode.

fmt { cmcc-ext1 | cmcc-ext2 | cmcc-normal }

Parameter Description

Parameter	Description
cmcc-ext1	Extended CMCC format
cmcc-ext2	Liaoning CMCC format

cmcc-normal	Standard CMCC format

Defaults N/A

Command Mode Template configuration mode

Usage Guide Use this command to set the URL redirection format based on the corresponding portal standard.

Configuration Examples The following example sets the URL redirection format to extended CMCC format.

```
FS(config.tmplt.eportalv2)#fmt cmcc-ext1
```

Platform Description N/A

5.8 Http Redirect Direct-arp

Use this command to set the address range of the authentication-exempted ARP.

Use the **no** form of this command to restore the default setting.

http redirect direct-arp { *ip-address* [*ip-mask*] }

no http redirect direct- arp { *ip-address* [*ip-mask*] }

Parameter Description

Parameter	Description
ip-address	IPv4 address
ip-mask	(Optional) IPv4 mask

Defaults No authentication-exempted ARP resource is configured by default.

Command Mode Global configuration mode

Usage Guide The user cannot learn the ARPs of devices with the ARP CHECK function enabled. Use this command to enable the device to learn the ARP within a specified IP address range without authentication.

Configuration Examples The following example sets the IP address 172.16.0.1 as the authentication-exempted ARP resource.

```
FS(config)# http redirect direct-arp 172.16.0.1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.9 Http Redirect Direct-site

Use this command to set the range of authentication-exempted network resources.

Use the **no** form of this command to restore the default setting.

http redirect direct-site { *ipv6-address* | *ipv4-address* [*ip-mask*] [**arp**]

no http redirect direct-site { *ipv6-address* | *ipv4-address* [*ip-mask*] | *mac-address* | range *startip-address endip-address* }

Parameter Description

Parameter	Description
ipv6-address	IPv6 address of the authentication-exempted network resources
ip-address	IPv4 address of the authentication-exempted network resources
ip-mask	IPv4 address mask of the authentication-exempted network resources (optional)
arp	If the ARP Check is enabled on the access device, the keyword arp is needed for ARP binding of the authentication-exempted network resources (optional). It is necessary for IPv4 network resources only.

Defaults No authentication-exempted network resource is set.

Command Mode Global configuration mode

Usage Guide When Web/802.1x authentication is enabled, all users must pass Web/client authentication to access network resources. This command is used to make certain network resources available to unauthenticated users. All users can access the authentication-exempted Web sites.

Up to 50 authentication-exempted users are supported.

Configuration Examples The following example sets the Web site with IP address 172.16.0.1 as the authentication-exempted resource.

```
FS(config)# http redirect direct-site 172.16.0.1
```

Related Commands

Command	Description
show http redirect	Displays the HTTP redirection configuration.

Platform Description N/A

5.10 Http Redirect Port

Use this command to redirect users' HTTP redirection request to a certain destination port.

Use the **no** form of this command to restore the default setting.

http redirect port *port-num*

no http redirect port *port-num*

Parameter Description

Parameter	Description
port-num	Destination port of the HTTP request

Defaults

The default is port 80.

Command Mode

Global configuration mode

Usage Guide

When you access the network resource, you send HTTP packets. The access device can intercept such HTTP packets to detect your access. If the access device detects that an unauthenticated user is accessing the network resource, it stops the users with an authentication page/client download page.

By default, the access device intercepts users' HTTP packets with port 80 to check whether they are accessing network resources.

This command is used to change the destination port of HTTP packets that are intercepted by the access device. Up to 10 ports can be configured, excluding port 80 and port 443.

Configuration Examples

The following example redirects users' HTTP requests with port 8080.

```
FS(config)# http redirect port 8080
```

The following example does not redirect users' HTTP requests with port 80.

```
FS(config)# no http redirect port 80
```

Related Commands

Command	Description
show http redirect	Displays the HTTP redirection configuration.

Platform Description

N/A

5.11 Http Redirect Session-limit

Use this command to set the total number of HTTP sessions that can be originated by an unauthenticated user, or the maximum number of HTTP sessions that can be originated by an unauthenticated user connected to each port.

Use the **no** form of this command to restore the default setting.

http redirect session-limit *session-num* [**port** *port-session-num*]

no http redirect session-limit

Parameter Description

Parameter	Description
session-num	Total number of HTTP sessions that can be originated by an unauthenticated user, in the range from 1 to 255.
port-session-num	The maximum number of HTTP sessions that can be originated by an unauthenticated user connected to each port, in the range from 1 to 65535.

Defaults Totally 255 HTTP sessions can be originated by an unauthenticated user, and 300 HTTP sessions that can be originated by an unauthenticated user connected to each port.

Command Mode Global configuration mode

Usage Guide To prevent HTTP attacks caused by unauthenticated users from using up the TCP connections of the access device, the maximum number of HTTP sessions by unauthenticated users must be limited on the access device. In addition to authentication, other programs may also occupy HTTP sessions. Therefore, it is not recommended that the maximum number of HTTP sessions by unauthenticated users be 1

Configuration Examples The following example sets the maximum number of HTTP sessions originated by an unauthenticated user to 4.

```
FS(config)# http redirect session-limit 4
```

Related Commands

Command	Description
show http redirect	Displays the HTTP redirection configuration.

Platform Description N/A

5.12 Http Redirect Timeout

Use this command to set the timeout for the redirection connection maintenance.

Use the **no** form of this command to restore the default setting.

http redirect timeout *seconds*

no http redirect timeout

Parameter Description

Parameter	Description
seconds	Set the timeout for the redirection connection maintenance, in the range from 1 to 10 in the unit of seconds.

Defaults The default is 3 seconds.

Command Mode Global configuration mode

Usage Guide This command is used to set the timeout for the redirection connection maintenance. After the three-way handshake succeeds, the redirection connection is maintained until the user sends an HTTP GET/HEAD packet and the system returns an HTTP redirection packet. This timeout is set to prevent users from occupying TCP connections for long without sending any GET/HEAD packets.

Configuration Examples The following example sets the timeout for the redirection connection maintenance to 4 seconds.

```
FS(config)# http redirect timeout 4
```

Related Commands

Command	Description
show http redirect	Displays the HTTP redirection configuration.

Platform Description

N/A

5.13 Ip

Use this command to set an IP address for the portal server.

Use the **no** form of this command to restore the default setting.

port { *ip-address* }

no port

Parameter Description

Parameter	Description
ip-address	The IPv4 address of the portal server

Defaults

No IP address is set for the portal server by default.

Command Mode

Template configuration mode

Usage Guide

This command takes place of the **http redirect** [*ip-address*] command, which is now hidden as a compatible command.

Configuration Examples

The following example sets the IP address of the eportalv1 template to 172.16.0.1.

```
FS(config.tmplt.eportalv1)#ip 172.16.0.1
FS(config.tmplt.eportalv1)#
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.14 Ip Portal Source-interface

Use this command to specify a communication port for the portal server.

Use the **no** form of this command to restore the default setting.

ip portal source-interface *interface-type interface-num*

no ip portal source-interface

Parameter Description

Parameter	Description
interface-type	Port type
interface-num	Port No.

Defaults No communication interface is specified by default.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example specifies an aggregate port as the communication port.

```
FS (config)# ip portal source-interface Aggregateport 1
```

Platform Description N/A

5.15 Port

Use this command to set a surveillance port for the portal server.

Use the **no** form of this command to restore the default setting.

port { *port-num* }

no port

Parameter Description

Parameter	Description
port	The surveillance port of the portal server, which is on only the 2nd generation portal server,

Defaults The default is 50100 based on the UDP protocol.

Command Mode Template configuration mode

Usage Guide N/A

Configuration Examples The following example sets the surveillance port number of the eportalv2 server to 10000.

```
FS(config.tmplt.eportalv2)#port 10000
```

Related Commands

Command	Description
N/A	N/A

Platform N/A

Description

5.16 Show Web-auth Control

Use this command to display the authentication configuration.

show web-auth control

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the authentication configuration and statistics information on the interface.

```
FS(config)#show web-auth control
 Port                          Control   Server Name                Online User Count
 ------------------------- -------- --------------------- -----------------
 GigabitEthernet 0/1          On          <not configured>        0
FS(config)#
```

Field	Description
Port	Name of the authentication port.
Control	Displays whether the Web authentication is enabled on the port or not.
Server Name	The customized server name on the port. **<not configured>** indicates the server name has not been configured.
Online User Count	The number of online users on this port.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.17 Show Web-Auth Direct-arp

Use this command to display the address range of the authentication-exempted ARP.

show web-auth direct-arp

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide I N/A

Configuration Examples The following example displays the address range of the authentication-exempted ARP.

```
FS(config)#show web-auth direct-arp
Direct arps:
  Address          Mask
  --------------- ---------------
  1.1.1.1          255.255.255.255
  2.2.2.2          255.255.255.255
FS(config)#
```

Field	Description
Address	IPv4 address.
Mask	IPv4 mask.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.18 Show Web-Auth Direct-host

This command is used to display the Web authentication-exempted users.

show web-auth direct-host

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the Web authentication-exempted users.

```
FS# show web-auth direct-host
Direct hosts:
  Address          Mask             Port     ARP Binding   Group   Description
  ------- ---------------- ---------- ------------ ---------- -------------
  192.168.0.1      255.255.255.255  Gi0/2    On            N/A     N/A
  192.168.4.11     255.255.255.255  Gi0/10   On            N/A     N/A
  192.168.5.0      255.255.255.0    Gi0/16   Off           N/A     N/A
```

Field	Description
Address	IP address of the user free of authentication
Mask	IP address mask of the user free of authentication
Port	Access device port that is bound with the user's IP address
ARP Binding	Enable/Disable ARP binding

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.19 Show Web-auth Direct Site

Use this command to display the range of the Web authentication-exempted network resources.

show web-auth direct-site

Parameter Description

Parameter	Description
N/A	N/A

Defaults No network resource without authentication is set.

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration The following example displays the range of the Web authentication-exempted network resources without

Examples

authentication.

```
FS(config)#show web-auth direct-site
Direct sites:
  Address          Mask             ARP Binding
  --------------- --------------- -----------
  1.1.1.1          255.255.255.255 Off
  2.2.2.2          255.255.255.255 On
FS(config)#
```

Field	Description
Address	IP address.
Mask	IP mask.
ARP Binding	Displays whether the ARP binding function is enabled.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.20 Show web-auth ip-mapping

Use this command to display the portal-client mapping rule.

show web-auth ip-mapping

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the portal-client mapping rule.

```
FS(config)#show web-auth ip-mapping
-----------------------------------------------------------
  Name:        iportal
  Ip:          0.0.0.0
  Url:
  Ip-Mapping:
-----------------------------------------------------------
  Name:        eportalv1
```

```
  Ip:              172.18.105.9
  Url:             http://172.18.105.9:8080/eportal/index.jsp
  Ip-Mapping:
                     1.1.1.0-255.255.255.0                Global
FS(config)#
```

Platform Description

5.21 Show Web-auth Parameter

Use this command to display the HTTP redirect configuration.

show web-auth parameter

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the HTTP redirect configuration

```
FS# show web-auth parameter
  session-limit: 10
  timeout:          5
```

Field	Description
session-limit	Total number of HTTP sessions that are created by an unauthenticated user.
timeout	Timeout interval of the redirection connection.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.22 Show Web-auth Portal-check

Use this command to display the portal-check configuration.

show web-auth portal-check

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the portal-check configuration.

```
FS#sh web portal-check
Check:          Enable
  Interval:     3s
  Timeout:      5s
  Retransmit:   3
Escape:         Enable
Nokick:         Disable
```

Platform Description N/A

5.23 Show Web-auth Rdport

Use this command to display the TCP interception port.

show web-auth rdport

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the TCP interception port.

```
FS#show web-auth rdport
Rd-Port:
80 443
FS#
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.24 Show Web-auth Syslog Ip

Use this command to display online and offline records about users.

show web-auth syslog ip *ip-address*

Parameter Description

Parameter	Description
Ip-address	A user's IP address.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command cannot be used to save original data after hot backup.

Configuration Examples The following example displays online and offline records of users.

```
FS#show web-auth syslog ip 192.168.197.35
Address: 192.168.197.35    Core-index 0 Current index 2
Index:                 0
 Time:                  2015-10-16 20:37:34
 Behavior:             ONLINE
 Mac:                   00d0.f822.33e7
 Vid:                  101
 Port:                 Gi3/1
 Timeused:              0d 00:00:00
 Flow_up:               0
 Flow_down:              0

 Index:                1
 Time:                  2015-10-16 20:42:08
 Behavior:             OFFLINE
 Mac:                   00d0.f822.33e7
 Vid:                  101
 Port:                 Gi3/1
 Timeused:              0d 00:04:27
 Flow_up:               2107872
```

```
Flow_down:          2108224
```

Field	Description
Index	The number of the record.
Time	Time when the record is made.
Behavior	Online or offline behavior.
MAC	The Mac address of a user.
Vid	The VLAN ID of a user.
Port	The user port.
Timeused	The time when a user gets online.
Flow UP	The uplink traffic of a user.
Flow down	The downlink traffic of a user.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.25 Show Web-auth Template

Use this command to display the portal server configuration.

show web-auth template

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to display the portal server configuration.

Configuration Examples The following example displays the port server configuration.

```
FS#show web-auth template
Webauth Template Settings:
-----------------------------------------------------------
  Name:        eportalv1
  Url:         http://17.17.1.21:8080/eportal/index.jsp
```

```
  Ip:            17.17.1.21
  BindMode:   ip-mac-mode
  Type:         v1
-----------------------------------------------------------
  Name:          eportalv2
  Url:           http://17.17.1.21:8080/eportal/index.jsp
  Ip:            17.17.1.21
  BindMode:   ip-only-mode
  Type:         v2
  Port:         50100
  Acctmlist:
  Authmlist:
FS#
```

Field	Description
Name	Template name.
Url	Server homepage address.
Ip	Server IP address.
Type	Server type, including the first generation portal server v1, the second generation portal server v2.
Port	The protocol packet communication port of the server, which is on only the second generation portal server.
Acctmlist	Accounting method list name, which is on only the second generation portal server.
Authmlist	Authentication method list name. which is on only the second generation portal server.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.26 Show Web-auth User

Use this comma to display the online information, including IP address, interface, and online duration, of all users or the specified users.

show web-auth user { **all** | **ip** *ip-address* | **mac** *mac-address* | **name** *name-string* }

Parameter Description

Parameter	Description
ip-address	IPv4 address of the user.
mac-address	MAC address of the user.

name-string	User name.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the global Web authentication configuration and statistics.

```
FS# show web-auth user all
Current user num :    4, online 2

Address                Online     Time Limit        Time Used       Status    Name
---------------- -------    ------------- --------------- -------- ---------
192.168.0.11       On            0d 01:00:00     0d 00:15:10       Active
192.168.0.13       On            0d 01:00:00     0d 00:00:59       Active      111
192.168.0.25       Off           0d 01:00:00     0d 00:00:59       Create
192.168.0.46       Off           0d 01:00:00     0d 01:00:00       Destroy    222

FS# show web-auth user ip 192.168.0.11
Address            :     192.168.0.11
 Mac                  :     00d0.f800.2233
 Port                 :     Gi0/2
 Online               :     On
 Time Limit     :     0d 01:00:00
 Time Used       :     0d 00:15:10
 Time Start     :     2009-02-22 20:05:10
 Status               :     Active
```

Field	Description
Address	IP address of the user
Mac	MAC address of the user
Port	Access device port connected to the user
Online	Whether the user is online
Time Limit	Available duration of the user. 0 means unlimited.
Time Used	Online duration of the user
Time Start	Time when the user passes authentication and gets online
Status	User status. Active means the user is normally online, Create means the user is created without any settings, Destroy means the user is deleted with its settings not cleared.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.27 Url

Use this command to set the portal server URL.

Use the **no** form of this command to restore the default setting.

url *url-string*

no url

Parameter Description

Parameter	Description
url-string	Portal server URL, starting with **http://** or **https://**. The maximum length of this address is 255 bytes.

Defaults

No portal server URL is set by default.

Command Mode

Template configuration mode

Usage Guide

This command takes place of the **http redirect homepage** [*url-string*] command, which is now hidden as a compatible command.,

If no URL is specified, the default URL in the **http://[ip-address]** format will be adopted, among which **ip-address** is the IP address of the server.

Configuration Examples

The following example sets the eportalv1 template URL to **http://www.web-auth.net/login**.

```
FS(config.tmplt.eportalv1)#url http://www.web-auth.net/login
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.28 Web-auth Dhcp-check

Use this command to enable DHCP IP address check.

Use **no** form of this command to restore the default setting.

web-auth dhcp-check

no web-auth dhcp-check

Parameter Description

Parameter	Description
N/A	N/A

Defaults DHCP IP address check is disabled by default.

Command Mode Global configuration mode

Usage Guide Only users whose IP addresses are allocated by DHCP are allowed to take authentication.

Configuration Examples The following example enables DHCP IP address check.

```
FS (config)# web-auth dhcp-check
```

Platform Description N/A

5.29 Web-auth Direct-host

Use this command to set the authentication-exempted IP/MAC address range.

Use the **no** form of this command to restore the default setting.

web-auth direct-host { *ipv4-address* [i*p-mask*] [**arp**] | *ipv6-address*}

no web-auth direct-host { *ipv4-address* [i*p-mask*] | *ipv6-address* | *mac-address* | range *starip-address endip-address* }

Parameter Description

Parameter	Description
Ipv4-address	IPv4 address of authentication-exempted user
Ipv6-address	IPv6 address of authentication-exempted user
ip-mask	Mask of the IPv4 address free of authentication (optional).
arp	If ARP CHECK is enabled on the access device, keyword arp is needed for ARP binding of the IP address used by users free of authentication (optional). It is necessary for IPv4 addresses only.

Defaults No user is exempted from authentication. All users must pass the Web authentication to access the restricted network resources.

Command Mode Global configuration mode

Usage Guide When a user is set to be exempted from authentication, it can access all reachable network resources without Web authentication.

Up to 50 users can be set to be exempted from authentication.

Configuration The following example sets the user with the IP address 172.16.0.1 to be exempted from authentication.

Examples

```
FS(config)# web-auth direct-host 172.16.0.1
```

Related Commands

Command	Description
show web-auth direct-host	Displays the users free of Web authentication.

Platform Description

N/A

5.30 Web-auth Enable

Use this command to enable the Web authentication function on a port. This command is compatible with the **web-auth port-control** command.

Use the **no** form of this command to restore the default setting.

web-auth enable [**eportalv1 | eportalv2 |** *template-name*]

no web-auth enable

Parameter Description

Parameter	Description
eportalv1	Applies the first generation authentication template.
eportalv2	Applies the second generation authentication template.
template-name	Customized template.

Defaults

The Web authentication function is disabled on the port by default.

The **default** template is eportalv1.

Command Mode

Interface configuration mode

Usage Guide

To ensure the Web authentication function, the authentication page URL should be configured.

Because template applications are integrated into the controlled switch, the template or the server applications of the interface where the Web authentication function is disabled will be automatically cleared. This command is compatible with the original command that used to apply the template or server application in the global configuration mode.

Configuration Examples

The following example enables the Web authentication function on gigabitEthernet 0/14.

```
FS(config)# interface GigabitEthernet 0/14
FS(config-if-GigabitEthernet 0/14)# web-auth enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.31 Web-auth Linkdown-timeout

Use this command to set the link-down timeout.

Use the **no** form of this command to restore the default setting.

web-auth linkdown-timeout { *timeout* }

no web-auth linkdown-timeout

Parameter Description

Parameter	Description
timeout	Link-down timeout

Defaults

By default, the timeout is 60 seconds.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the link-down timeout to 30 seconds.

```
FS (config)# web-auth linkdown-timeout 30
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.32 Web-auth Logging Enable

Use this command to enable the Web authentication syslog function.

Use the **no** form of this command to restore the default setting.

web-auth logging enable { *num* }

no web-auth logging enable

Parameter Description

Parameter	Description
num	The syslog printing rate, indicating how many syslog entries can be printed in a second. The value is in the range from 0 to 65535. 0 indicates no limit.

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

This command is used to limit the syslog printing rate for only the functional module.

Configuration Examples

The following example enables the syslog printing with no rate limit.

```
FS(config)# web-auth logging enable 0
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.33 Web-auth Portal Key

Use this command to set the communication key between the access device and the authentication server.

Use the **no** form of this command to clear the communication key between the redirected Web request of a user and the authentication server.

web-auth portal key *key-string*

no web-auth portal key

Parameter Description

Parameter	Description
key-string	Communication key between the access device and the authentication server. The maximum length of the key is 255 bytes.

Defaults

No key is set by default.

Command Mode

Global configuration mode

Usage Guide

To use the Web authentication function, the communication key between the access device and the authentication server must be set.

Configuration Examples

The following example sets the communication key between the access device and the authentication server to web-auth.

```
FS(config)# web-auth portal key web-auth
```

Related Commands

Command	Description
http redirect	Sets the IP address of the authentication server.
http redirect homepage	Sets the address of the authentication homepage.
web-auth port-control	Enables the Web authentication on the port.

Platform Description

N/A

5.34 Web-auth Portal-check

Use this command to enable portal server check.

Use the **no** form of this command to restore the default setting.

web-auth portal-check [**interval** *intsec*] [**timeout** *tosec*] [**retransmit** *retires*]

no web-auth porta-check

Parameter Description

Parameter	Description
Intsec	Check interval in the range from 1 to 1,000 in the unit of seconds. The default is 10 seconds.
tosec	Timeout interval in the range from 1 to 1,000 in the unit of seconds. The default is 5 seconds.
retries	Retry count in the range from 1 to 100. The default is 3.

Defaults Portal server check is disabled by default.

Command Mode Global configuration mode

Usage Guide It is recommended to use this command when there are multiple servers.

Configuration Examples The following example enables portal server check.

```
FS (config)# web-auth portal-check interval 20 timeout 2 retransmit 2
```

Platform Description N/A

5.35 Web-auth Portal-escape

Use this command to enable portal-escape function.

Use the **no** form of this command to restore the default setting.

web-auth portal-escape

no web-auth portal-escape

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide Use this command together with **web-auth portal-check** command to sustain key services when the portal server is abnormal.

Configuration Examples

The following example enables portal-escape function.

```
FS (config)# web-auth portal-escape
```

Platform Description

N/A

5.36 Web-auth Template

Use this command to create the first generation authentication template and enter its configuration mode.

web-auth template eportalv1

Use this command to create the customized first generation authentication template and enter its configuration mode.

web-auth template { template-name } **v1**

Use this command to create the second generation authentication template and enter its configuration mode.

web-auth template eportalv2

Use this command to create the customized second generation authentication template and enter its configuration mode.

web-auth template { *template-name* } **v2**

Use this command to remove the template.

no web-auth template { *template-name* }

Parameter Description

Parameter	Description
eportalv1	Applies the first generation authentication template.
eportalv2	Applies the second generation authentication template.
template-name	Sets the name of the customized authentication template.

Defaults

No template is configured by default.

Command Mode

Global configuration mode

Usage Guide

You can enter the **eportalv1** template mode to configure the IP address and URL instead of executing the **http redirect** and **http redirect homepage** commands**.** The **http redirect** and **http redirect homepage** commands are compatible on the device, which will be converted to this command.

The original command **portal-server** is compatible on the device, which will be converted to this command.

To ensure the Web authentication function, configure and apply a functional portal server. The **eportalv1** template is applied by default. The IP address, the URL and the communication secret key of the **eportalv1** template should be configured. If no URL format is specified, the default **http://[ip-address]** format will be adopted. The IP address of the portal server is the network resource exempted from authentication, so the unauthenticated user can access it. The device limits the uplink traffic that accesses the IP address to prevent

attacks. The upper limit is proportionate to the number of the physical ports.

Configuration Examples

The following example configures the **eportalv1** template.

```
FS(config)# web-auth template eportalv1
FS(config.tmplt.eportalv1)#
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.37 Web-auth Update-interval

Use this command to set the interval at which the online user information is updated.

Use the **no** form of this command to restore the default setting.

web-auth update-interval {*seconds*}

no web-auth update-interval

Parameter Description

Parameter	Description
seconds	Update interval in seconds, in the range from 30 to 3,600 in the unit of seconds.

Defaults

The default is 180 seconds.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the interval at which the online user information is updated to 60 seconds.

```
FS(config)# web-auth update-interval 60
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

5.38 Web-auth Vlan-control

Use this command to configure the authenticable VLAN list.

Use the **no** form of this command to restore the default setting.

web-auth vlan-control *vlan-list*

no web-auth vlan-control

Parameter Description

Parameter	Description
vlan-list	Authenticable VLAN list

Defaults The default is port-control authentication.

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples Use this command to configure the authenticable VLAN list.

```
FS (config-if-GigabitEthernet 0/1)# web-auth vlan-control 1
```

Platform Description N/A

5.39 Web-auth Station-move Arp-detect

Use this command to disable STA-move ARP detection.

no web-auth station-move arp-detect

Use this command to restore the default setting.

default web-auth station-move arp-detect

Parameter Description

Parameter	Description
N/A	N/A

Defaults The STA-move ARP detection is enabled by default.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example disables STA-move ARP detection.

```
FS (config)# no web-auth station-move arp-detect
```

Platform Description N/A

5.40 Web-auth Station-move Auto

Use this command to enable smart station-move function.

Use the **no** form of this command to restore the default setting.

web-auth station-move auto

no web-auth station-move auto

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example enables smart station-move function.

```
FS (config)# web-auth station-move auto
```

Platform Description

N/A

6. SCC Commands

6.1 Identifier Description

The following is a list of command identifiers used in commands for reference:

Identifier	Description
vlanlist	Authentication-exemption VLAN list
interval	Authenticated-user online-status detection interval
thredshold	The traffic threshold of authenticated-user online-status detection

6.2 Direct-vlan

Use this command to configure authentication-exemption VLANs.

direct-vlan *vlanlist*

Use this command to delete the authentication-exemption VLAN configuration.

no direct-vlan *vlanlist*

Parameter Description

Parameter	Description
vlanlist	VLAN list, which can be a VLAN or a group of VLANs.

Defaults

By default, no authentication-exemption VLANs are configured.

Command Mode

Global configuration mode

Default Level

14

Usage Guide

You can use this command to configure authentication-exemption VLANs, so that users in specified VLANs can access the Internet without experiencing dot1x or Web authentication.

Configuration Examples

The following example configures the VLAN2 as an authentication-exemption VLAN.

```
FS(config)# direct-vlan 2
```

Verification

Use the **show direct-vlan** command to display the authentication-exemption VLAN configuration.

Prompt Messages

N/A

Common Errors

N/A

Platforms

N/A

6.3 Nac-author-user Maxinum

Use this command to configure the limit on IPv4 user capacity on a port.

nac-author-user maxinum *max-user-num*

Use this command to remove the limit on the IPv4 user capacity on a port.

no nac-author-user maxinum

Parameter Description

Parameter	Description
max-user-num	Defines the maximum number of IPv4 access users. The range is from 1 to 1,024.

Defaults By default, the number of IPv4 access users is not limited.

Command Mode Interface configuration mode

Default Level 14

Usage Guide Use this command to configure the maximum number of IPv4 access users on a port.

Configuration Examples The following example restricts the maximum number of IPv4 users to 100 on interface Gi 0/1.

```
FS(config)#int gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)#nac-author-user maxinum 100
```

Verification

1. Use the **show nac-author-user** command to display the current and the maximum numbers of IPv4 access users on all ports.
2. Use the **show nac-author-user interface** *interface-name* command to display the current and the maximum numbers of IPv4 access users on the specified port.

Prompt Messages N/A

Common Errors N/A

Platforms N/A

6.4 Offline-detect Interval Threshold

Use this command to configure user online-status detection, so that a user is disconnected when its traffic is lower than a specified threshold or is zero in a specified interval.

offline-detect interval *interval* **threshold** *thredshold*

Use this command to restore the default user online-status detection configuration.

default offline-detect

Use this command to disable user online-status detection.

no offline-detect

Parameter Description

Parameter	Description
interval	Indicates the interval of traffic detection (in minutes). The range is from 6 to 65,535 in minutes.
threshold	Indicates the traffic threshold (in bytes). The range depends on the chip. The value of 0 indicates that the user is disconnected when no traffic of the user is detected.

Defaults By default, the detection interval is 8 hours and the traffic threshold is 0.

Command Mode Global configuration mode

Default Level 14

Usage Guide You can use this command to configure user online-status detection to enable the device to disconnect the authenticated user whose traffic is lower than a specified value and end accounting process.

Configuration Examples The following example directly disconnects a user for the user's traffic is lower than 5 Kbytes within 5 minutes.

```
FS(config)#offline-detect interval 5 threshold 5120
```

Verification Use the **show running** command to display the configuration of online-status detection for authenticated users.

Prompt Messages N/A

Common Errors N/A

Platforms N/A

6.5 Show Direct-vlan

Use this command to display the authentication-exemption VLAN configuration.

show direct-vlan

Parameter Description

Parameter	Description
interface-name	Interface name

Command Mode Privileged EXEC mode

Level 14

Usage Guide N/A

Configuration Examples The following example displays the authentication-exemption VLAN configuration.

```
FS #show direct-vlan
direct-vlan 5,7,100
```

Prompt Messages N/A

Platforms N/A

6.6 Show Nac-author-user Interface

Use this command to display the capacity limit and current number of IPv4 users on all interfaces or a specified interface.

show nac-author-user [**interface** *interface-name*]

Parameter Description

Parameter	Description
interface-name	Interface name

Command Mode Privileged EXEC mode

Level 14

Usage Guide N/A

Configuration Examples The following example displays the current number and capacity limit of IPv4 users on interface Gi 0/1.

```
FS#show nac-author-user interface gi 0/1
 Port        Cur_num   Max_num
 --------   -------   -------
 Gi0/1       0          100
```

Prompt Messages N/A

Platforms N/A

6.7 Station-move Permit

Use this command to enable authenticated-user migration.

station-move permit

Use this command to disable authenticated-user migration.

no station-move permit

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Authenticated-user migration is not permitted by default.

Command Mode

Global configuration mode

Level

14

Usage Guide

You can enable the authenticated-user migration function to allow the online users to be authenticated again and get online from different physical locations (different ports or VLANs).

Configuration Examples

The following examples enables authenticated-user migration.

```
FS(config)#station-move permit
```

Verification

Use the **show running** command to check whether the authenticated-user migration function is enabled.

Prompt Messages

N/A

Common Errors

N/A

Platforms

N/A

7. Global IP-MAC Binding Commands

7.1 Address-bind

Use this command to configure global IP-MAC address binding. Use the **no** form of this command to restore the default setting.

address-bind { *ip-address* | *ipv6-address* } *mac-address*

no address-bind { *ip-address* | *ipv6-address* } *mac-address*

Parameter Description

Parameter	Description
ip-address	IPv4 address to be bound
ipv6-address	IPv6 address to be bound
mac-address	MAC address to be bound

Defaults N/A

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example configures global IP-MAC address binding.

```
FS# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
FS(config)# address-bind 192.168.5.1 00d0.f800.0001
```

Related Commands

Command	Description
show address-bind	Displays the IP address-MAC address binding table.

Platform Description N/A

7.2 Address-bind Binding-filter Logging

Use this command to enable the logging filter. Use the **no** form of this command to restore the default setting.

address-bind binding-filter logging [**rate-limit** *rate*]

no address-bind binding-filter logging

Parameter Description

Parameter	Description
rate-limit *rate*	Printing rate of the logging filter of global IPv4 MAC binding. By default, the rate is 10 logs per minute. The configurable range is from 1 to 120 logs per minute.

Defaults Logging filter is disabled.

Command Global configuration mode

Mode

Usage Guide

By default, the rate is 10 logs per minute.

When a logging filter is configured, alert logs are printed if IP packets not containing matched IP address and MAC address are detected.

When a logging filter is configured, the number of non-printed logs is prompted if the actual printing rate exceeds the set rate.

Configuration Examples

The following example enables logging filter:

```
FS# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
FS(config)# address-bind binding-filter logging
FS(config)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7.3 Address-bind Install

Use this command to enable a binding policy globally. Use the **no** form of this command to restore the default setting.

address-bind install

no address-bind install

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

If you bind an IP address to a MAC address, run this command to make the installation policy take effect.

Configuration Examples

The following example enables a binding policy.

```
FS# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
FS(config)# address-bind 192.168.5.1 00d0.f800.0001
FS(config)# address-bind install
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

7.4 Address-bind Ipv6-mode

This command is used to set the IPv6 address binding mode. Use the **no** form of this command to restore the default setting.

This command is also used to set the compatible mode.

address-bind ipv6-mode { **compatible** | **loose** | **strict** }

no address-bind ipv6-mode

Parameter Description

Parameter	Description
compatible	Compatible mode
loose	Loose mode
strict	Strict mode

Defaults The default is strict mode.

Command Mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example configures the IPv6 address binding mode.

```
FS# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
FS(config)# address-bind ipv6-mode compatible
```

Related Commands

Command	Description
show address-bind uplink	Displays the exceptional port of the address binding.

Platform Description N/A

7.5 Address-bind Uplink

This command is used to configure the exception port. Use the **no** form of this command to restore the default setting.

address-bind uplink *interface-id*

no address-bind uplink *interface-id*

Parameter Description

Parameter	Description
interface-id	Switching port or layer 2 aggregate port.

Defaults All ports are non-exception ports by default.

Command Mode Global configuration mode.

Usage Guide If you have bound an IP address and a MAC address, the switch will discard the packets that have the same source IP address but different source MAC address.

If the port is an exceptional port and is installed (see address-bind install), this binding policy does not take effect.

Configuration Examples The following example configures the exception port.

```
FS# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
FS(config)# address-bind uplink GigabitEthernet 0/1
```

Related Commands

Command	Description
show address-bind uplink	Displays the exceptional port of address binding.

Platform Description N/A

7.6 Show Address-bind

Use this command to display global IP address-MAC address binding.

show address-bind

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The following example displays global IPv4 address-MAC address binding.

```
FS#show address-bind
Total Bind Addresses in System : 1
IP Address              Binding MAC Addr
---------------      ----------------
192.168.5.1             00d0.f800.0001
```

Field	Description
Total Bind Addresses in System	IPv4 address-MAC address binding count
IP Address	Bound IP address

Binding MAC Addr	Bound MAC address

Related Commands

Command	Description
address-bind	Enables IP address-MAC address binding.

Platform Description N/A

7.7 Show Address-bind Uplink

Use this command to display the exception port.

show address-bind uplink

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command mode N/A

Usage Guide N/A

Configuration Examples The following example displays the exception port.

```
FS#show address-bind uplink
Port          State
---------- ---------
Gi0/1         Enabled
Default       Disabled
```

Field	Description
Port	Short for exception ports. All ports are non-exception ports by default.
State	Indicates whether the port is exception port. State Enabled indicates that it is an exception port while state Disabled indicates that it it not.

Related Commands

Command	Description
address-bind uplink	Sets the exception port.

Platform Description N/A

8. Password-Policy Commands

8.1 Password Policy Life-cycle

Use this command to set the password lifecycle. Use the **no** form of this command to restore the default setting.

password policy life-cycle *days*

no password policy life-cycle

Parameter Description

Parameter	Description
days	Sets the password lifecycle, in the range from 1 to 65,535 in the unit of days.

Defaults

No password lifecycle is set by default.

Command Mode

Global configuration mode

Usage Guide

This command is used to set the password lifecycle. After the password lifecycle expires, the system reminds you to change the password when you login next time.

This function is valid for the global password (the enable password and the enable secret commands) and the local user password (the username *name* password *password* command) while not valid for the password in line mode.

Configuration Examples

The following example sets the password lifecycle to 90 days.

```
FS(config)# password policy life-cycle 90
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.2 Password Policy Min-size

Use this command to set the minimum length of the password. Use the **no** form of this command to restore the default setting.

password policy min-size *length*

no password policy min-size

Parameter Description

Parameter	Description
length	Sets the minimum length of the password, in the range from 1 to 31.

Defaults

No minimum length of the password is set by default.

Command Mode Privileged EXEC mode

Usage Guide This command is used to set the minimum length of the password,

This function is valid for the global password (the enable password and the enable secret commands) and the local user password (the username *name* password *password* command) while not valid for the password in line mode.

Configuration Examples The following example sets the minimum length of the password to 8.

```
FS(config)# password policy min-size 8
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

8.3 Password Policy No-repeat-times

Use this command to ban the use of passwords used in the past several times. Use the no form of this command to restore the default setting.

password policy no-repeat-times *times*

no password policy no-repeat-times

Parameter Description

Parameter	Description
times	The past several times when passwords are configured, in the range from 1 to 31.

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide After this function is enabled, passwords used in the past several times are recorded. If the new password has been used, the alarm message is displayed and password configuration fails.

This command is used to set the maximum number of password entries. When the actual number of password entries exceeds the configured number, the new password overwrites the oldest password.

This function is valid for the global password (the enable password and the enable secret commands) and the local user password (the username *name* password *password* command) while not valid for the password in line mode.

Configuration The following example bans the use of passwords used in the past five times.

Examples

```
FS(config)# password policy no-repeat-times 5
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

8.4 Password Policy Strong

Use this command to enable strong password check.

password policy strong

no password policy strong

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide If the following two kinds of passwords are set not matching the strength policy, the alarm message is displayed.

1. The password the same as the username.
2. The simple password containing only characters or numbers.

This function is valid for the global password (the enable password and the enable secret commands) and the local user password (the username *name* password *password* command) while not valid for the password in line mode.

Configuration Examples The following example configures the strong password check.

```
FS(config)# password policy strong
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

8.5 Password Policy Forced-password-modify

Use this command to enable mandatory modification of weak passwords. Use the **no** form of this command to restore default setting.

password policy forced-password-modify

no password policy forced-password-modify

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

After mandatory modification of weak passwords is enabled, users have to change their passwords if the passwords are the same as corresponding accounts or contain characters or digits only.

After this command is executed, this function takes effect when the **enable password**, **enable secret**, and **username** *name* **password** *password* commands are run.

Configuration Examples

The following example enables mandatory modifucation of weak passwords.

```
FS(config)# password policy forced-password-modify
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.6 Service Password-encryption

Use this command to encrypt a password. Use the **no** form of this command to restore default setting.

service password-encryption

no service password-encryption

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

This command is disabled by default. Various passwords are displayed in plain text, unless they are encrypted. After you run the **service password-encryption** and **show running** or **write** command to save your configuration, the password changes into cipher text. If you disable the command, the password in cipher text

cannot be restored to plain text.

Configuration Examples

The following example encrypts the password:

```
FS(config)# service password-encryption
```

Related Commands

Command	Description
enable password	Sets passwords of different privileges.

Platform Description

N/A

8.7 Show Password Policy

Use this command to display the password security policy set by the user.

show password policy

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

This command is used to display the password security policy set by the user.

Configuration Examples

The following example displays the password security policy set by the user.

```
FS#show password policy
Global password policy configurations:
 Password encryption:          Enabled
 Password strong-check:        Enabled
 Password min-size:            Enabled (6 characters)
 Password life-cycle:          Enabled (90 days)
 Password no-repeat-times:     Enabled (max history record: 5)
```

Field	Description
Password encryption	Whether to encrypt the password.
Password strong-check	Whether to enable password strong-check.
Password min-size	Whether to set the minimum length of the password.
Password life-cycle	Whether to set the password lifecycle.
Password no-repeat-times	

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9. Port Security Commands

9.1 Show Port-security

Use this command to display the port security configuration and the secure address.

show port-security [**address** [**interface** *interface-id*] | **binding** [**interface** *interface-id*] | **interface** *interface-id* | **all**]

Parameter Description

Parameter	Description
address	Displays all secure addresses, or the secure address of the specified port.
binding	Displays all port security bindings, or the port security bindings of the specified port.
interface *interface-id*	Displays the port security configuration of the specified port.
all	Displays all valid secure addresses and valid port security bindings.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide To display all port security configuration and violation management, execute the command without any parameter. To display the security configuration, the secure address, or the port security binding of the specified interface, execute the command with the corresponding parameter.

Configuration Examples The following example displays the port security statistics.

```
FS#show port-security
NO.    SecurePort MaxSecureAddr CurrentAddr CurrentIpBind CurrentIpMacBind SecurityAction
                  (Count)        (Count)      (Count)        (Count)
---- ---------- ------------- ----------- ------------- ---------------- -------------
1    Gi0/1      128           2           2             1                protect
-----------------------------------------------------------------------------------------
Total secure addresses in System : 2
Total secure bindings   in System : 3
```

Field	Description
NO.	Serial number.
Secure Port	Port name
MaxSecureAddr(count)	The maximum number of secure addresses on the port.
CurrentAddr(count)	The current number of secure addresses on the port.
CurrentIpBind (count)	The current number of IP addresses bindings on the port.
CurrentIpMacBind (count)	The current number of IP-MAC address bindings on the port.
Security Action	Violation management.

Total secure addresses in System	The total number of secure addresses on the device.
Total secure bindings in System	The total number of port security bindings on the device,

The following example displays the port security configuration on interface Gigabitethernet 0/1.

```
FS#show port-security interface gigabitEthernet 0/1
Interface                          : GigabitEthernet 0/1
Port status                        : down
Port Security                      : enabled
SecureStatic address aging         : disabled
Sticky dynamic address             : disabled
Violation mode                     : protect
Maximum MAC Addresses              : 128
Total MAC Addresses                : 2
Configured MAC Addresses           : 2
Dynamic MAC Addresses              : 0
Sticky MAC Addresses               : 0
Total security binding             : 3
IPv4-ONLY Binding Addresses        : 1
IPv6-ONLY Binding Addresses        : 1
IPv4-MAC Binding Addresses         : 1
IPv6-MAC Binding Addresses         : 0
Aging time(min)                    : 0
```

Field	Description
Interface	Port name.
Port status	Port status.
Port Security	Displays whether the port security is enabled.
SecureStatic address aging	Displays whether the static secure address aging is enabled.
Sticky dynamic address	Displays whether the dynamic secure address is converted to the sticky secure address,
Violation mode	Port violation management.
Maximum MAC Addresses	The maximum number of secure addresses on the port.
Total MAC Addresses	The number of valid secure addresses on the port.
Configured MAC Addresses	The number of static secure addresses.
Dynamic MAC Addresses	The number of dynamic secure addresses.
Sticky MAC Addresses	The number of sticky secure addresses,
Total security binding	The number of valid port security bindings.
IPv4-ONLY Binding Addresses	The number of IPv4 addresses bindings.
IPv6-ONLY Binding Addresses	The number of IPv6 addresses bindings.
IPv4-MAC Binding Addresses	The number of IPv4-MAC address bindings.
IPv6-MAC Binding Addresses	The number of IPv6-MAC address bindings.
Aging time(min)	The aging time of the secure address.

The following example displays all secure addresses on the device.

```
FS#show port-security address
NO.   VLAN   MacAddress        PORT                          TYPE          RemainingAge(mins)   STATUS
---- ----- ---------------- ------------------------- ---------- ------------------   ---------
1     1      00d0.f800.073c   GigabitEthernet 0/1          Configured          --              active
2     1      00d0.f800.073d   GigabitEthernet 0/1          Configured          --              active
```

Field	Description
NO.	Serial number.
Vlan	VLAN ID.
Mac Address	MAC address.
Port	Port name.
Type	Secure address type.
Remaining Age(mins)	The aging time of the secure address.
STATUS	The secure address status.

The following example displays all port security bindings on the device.

```
FS#show port-security binding
NO.   VLAN MacAddress        PORT          IpAddress                                    FilterType FilterStatus
---- ---- -------------- ---------- ---------------------------------------- ---------- ------------
1     1     00d0.f800.073c Gi0/1        192.168.12.202                                ipv4-mac     active
2      --          --          Gi0/1        192.168.0.1                                   ipv4-only    active
3      --          --          Gi0/1        ffaa:ddcc::1                                 ipv6-only    activ
```

Field	Description
NO.	Serial number.
Vlan	VLAN ID.
Mac Address	MAC address.
Port	Port name.
IpAddress	IP address.
FilterType	The filtering type of the port security binding.
FilterStatus	The status of the port security binding.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.2 Switchport Port-security

Use this command to configure port security and the way to deal with violation.

Use the **no** form of this command to restore the default setting.

switchport port-security [**violation** { **protect** | **restrict** | **shutdown** }]

no switchport port-security [**violation**]

Parameter Description

Parameter	Description
protect	Discards the packets breaching security.
restrict	Discards the packets breaching security and sends the Trap message.
shutdown	Discards the packets breaching the security, sends the Trap message and disables the interface.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

With port security, you can strictly control the input on a specific port by restricting access to the MAC address and IP address (optional) of the port on the switch. After you configure some secure addresses for the port security-enabled port, only the packets from these addresses can be forwarded. In addition, you can also restrict the maximum number of secure addresses on a port. If you set the maximum value to 1 and configure one secure address for this port, the workstation (whose address is the configured secure Mac address) connected to this port will occupy all the bandwidth of this port exclusively.

If the violation handling mode is changed after violation occurs, the new mode takes effect only after the violation mode is restarted.

Configuration Examples

The following example enables port security on interface gigabitethernet 1/1, and the way to deal with violation is **shutdown**:

```
FS(config)#interface gigabitethernet 1/1
FS(config-if)# switchport port-security
FS(config-if)# switchport port-security violation shutdown
```

Related Commands

Command	Description
show port-security	Displays port security settings.

Platform Description

N/A

9.3 Switchport Port-security Aging

Use this command to set the aging time for all secure addresses on an interface.

Use the **no** form of this command to restore the default setting.

switchport port-security aging {**static** | **time** *time* }

no switchport port-security aging {**static** | **time** }

Parameter Description

Parameter	Description
static	Applies the aging time to both manually configured secure addresses and automatically learned addresses. Otherwise, apply it to only the automatically learned secure addresses.
time *time*	Specifies the aging time for the secure address on this port. Its range is 0-1,440 in minutes. If you set it to 0, the aging function is disabled actually.

Defaults

No secure address is aged by default.

Command Mode

Interface configuration mode

Usage Guide

In interface configuration mode, use the **no switchport port-security aging time** command to disable the aging for security addresses on the port. Use the **no switchport port-security aging static** command to apply the aging time to only the dynamically learned security address.

Use the **show port-security** command to display configuration.

When both port security and 802.1X authentication functions are enabled, 802.1X clients must get re-authenticated for network access once the secure addresses are aged.

To enable this function, you need to set the maximum number of secure addresses. In this way, you can make the switch automatically add or delete the secure addresses on the interface.

Configuration Examples

The following example sets the aging time for all secure addresses on interface gigabitethernet 1/1 to eight minutes.

```
FS# configure terminal
FS(config)# interface gigabitethernet 1/1
FS(config-if)# switchport port-security aging time 8
FS(config-if)# switchport port-security aging static
FS(config-if)# end
```

Related Commands

Command	Description
show port-security	Displays port security settings.

Platform Description

N/A

9.4 Switchport Port-security Binding

Use these commands to configure secure address binding manually in the interface configuration mode through performing the source IP address plus source MAC address binding or only the source IP address binding. With this binding configured, only the packets match the binding secure address could enter the switch, others will be discarded.

Use the **no** form of these commands to remove the binding addresses.

switchport port-security binding [*mac-address* **vlan** *vlan_id*] { *ipv4-address* | *ipv6-address* }
switchport port-security binding { *ipv4-address* | *ipv6-address* }
no switchport port-security binding [*mac-address* **vlan** *vlan_id*] { *ipv4-address* | *ipv6-address* }
no switchport port-security binding { *ipv4-address* | *ipv6-address* }

Parameter Description

Parameter	Description
mac-address	The source MAC addresses to be bound
vlan_id	VLAN ID of the binding source MAC address
ipv4-address	Binds IPv4 addresses.
ipv6-address	Binds IPv6 addresses.

Defaults

N/A

Command Mode

Interface configuration mode

Usage Guide

1. For packets complying with IP/IP-MAC binding, they can be forwarded only if MAC addresses are secure addresses.
2. For dynamic secure addresses, packets cannot be forwarded before bound even if their addresses comply with the binding list.

Network is often accessible to static users with secure addresses without authorization. If authorization is configured, these users must comply with it.

Configuration Examples

The following example binds the IP address 192.168.1.100 on interface g 0/10:

```
FS# configure terminal
FS(config)#interface gigabitethernet 0/10
FS(config-if)# switchport port-security binding 192.168.1.100
FS(config-if)# end
```

The following example binds the IP address 192.168.1.100 and MAC address 00d0.f800.5555 with VLAN ID 1 on interface g 0/10.

```
FS# configure terminal
FS(config)#interface gigabitethernet 0/10
FS(config-if)# switchport port-security binding 00d0.f800.5555 vlan 1 192.168.1.100
FS(config-if)# end
```

Related Commands

Command	Description
show port-security	Displays port security settings.
switchport port-security	Enables the port-security.
switchport port-security binding interface	Configures the secure address binding in privileged EXEC mode.

switchport port-security mac-address	Sets the static secure address.
switchport port-security aging	Sets the aging time for secure address.

Platform Description N/A

9.5 Switchport Port-security Binding-filter Logging

Use this command to enable binding filter logging.

Use the **no** form of these commands to restore the default setting.

switchport port-security binding-filter logging [**rate-limit** *rate*]

no switchport port-security binding-filter logging

Parameter Description

Parameter	Description
rate-limit *rate*	Indicates the printing rate of binding filter logging. The default rate is 10logs/minute. The configurable range is from 1 to 120 logs per minute.

Defaults By default, binding filter logging is disabled.

Command Mode Global configuration mode

Usage Guide

1. If you run the **switchport port-security binding-filter logging** command without configuring the *rate* parameter, binding filter logging is enabled and the default printing rate, 10logs/minute, is adopted.
2. After binding filter logging is enabled, for packets that do not comply with IP/IP-MAC binding, warmings are printed.
3. After binding filter logging is enabled, if the printing rate exceeds the configured rate, the number of suppressed packets is displayed.

Configuration Examples

The following example enables binding filter logging.

```
FS# configure terminal
FS(config)# switchport port-security binding-filter logging
FS(config)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.6 Switchport Port-security Interface Binding

Use these commands to configure secure address binding manually in the privileged EXEC mode through performing the source IP address plus source MAC address binding or only the source IP address binding. With

this binding configured, only the packets match the binding secure address could enter the switch, others will be discarded.

Use the **no** form of these commands to remove the binding addresses.

switchport port-security interface *interface-id* **binding** [*mac-address* **vlan** *vlan_id*] {*ipv4-address* | *ipv6-address* }

switchport port-security interface *interface-id* **binding** { *ipv4-address* | *ipv6-address* }

no switchport port-security interface *interface-id* **binding** [*mac-address* **vlan** *vlan_id*] { *ipv4-address* | *ipv6-address* }

no switchport port-security interface *interface-id* **binding** { *ipv4-address* | *ipv6-address* }

Parameter Description

Parameter	Description
interface-id	Binds interface ID.
mac-address	Binds source MAC address.
vlan_id	VLAN ID of the binding source MAC address
ipv4-address	Binds IPv4 address.
ipv6-address	Binds IPv6 address .

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

1. For packets complying with IP/IP-MAC binding, they can be forwarded only if MAC addresses are secure addresses.
2. For dynamic secure addresses, packets cannot be forwarded before bound even if their addresses comply with the binding list.

Configuration Examples

The following example binds the IP address 192.168.1.100 on the interface g 0/10.

```
FS# configure terminal
FS(config)# switchport port-security binding interface g0/10    binding 192.168.1.100
FS(config)# end
```

The following example binds the IP address 192.168.1.100 and MAC address 00d0.f800.5555 with VLAN ID 1 on the interface g 0/10.

```
FS# configure terminal
FS(config)# switchport port-security binding interface g0/10 binding 00d0.f800.5555 vlan 1 192.168.1.100
FS(config)# end
```

Related Commands

Command	Description
show port-security	Displays port security settings.
switchport port-security	Enables the port-security.
switchport port-security binding	Configures the secure address binding in interface

	configuration mode.
switchport port-security mac-address	Sets the static secure address.
switchport port-security aging	Sets the aging time for secure address.

Platform Description N/A

9.7 Switchport Port-security Interface Mac-address

Use this command to configure the static secure address.

Use the **no** form of this command to remove the configuration.

switchport port-security interface *interface-id* **mac-address** *mac-address* [**vlan** *vlan-id*]

no switchport port-security interface *interface-id* **mac-address** *mac-address* [**vlan** *vlan-id*]

Parameter Description

Parameter	Description
interface-id	Interface ID
mac-address	Static secure address
vlan-id	VLAN ID of the MAC address The configuration of vlan-id is only supported on the TRUNK port.

Defaults N/A

Command Mode Glocal configuration mode

Usage Guide N/A

Configuration Examples The following example sets the static secure address and VLAN ID of TRUNK port 10 to 00d0.f800.5555 and 2 respectively.

```
FS# configure terminal
FS(config)# switchport port-security interface g0/10 mac-address 00d0.f800.5555 vlan 2
FS(config)# end
```

Related Commands

Command	Description
show port-security	Displays port security settings.
switchport port-security	Enables the port-security.
switchport port-security binding	Configures the secure address binding.
switchport port-security mac-address	Sets the static secure address in interface configuration mode.
switchport port-security aging	Sets the aging time for the secure address.

Platform N/A

Description

9.8 Switchport Port-security Mac-address

Use this command to configure the static secure address.

Use the **no** form of this command to remove the configuration.

switchport port-security mac-address *mac-address* [**vlan** *vlan-id*]

no switchport port-security mac-address *mac-address* [**vlan** *vlan-id*]

Parameter Description

Parameter	Description
mac-address	Static secure MAC address
vlan-id	VLAN ID of the MAC address The configuration of vlan-id is only supported on the TRUNK port.

Defaults N/A

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example sets the static secure address and VLAN ID of TRUNK port 10 to 00d0.f800.5555 and 2 respectively.

```
FS# configure terminal
FS(config)#interface gigabitethernet 0/10
FS(config-if)# switchport port-security mac-address 00d0.f800.5555 vlan 2
FS(config-if)# end
```

Related Commands

Command	Description
show port-security	Displays port security settings.
switchport port-security	Enables the port-security.
switchport port-security binding	Configures the secure address binding.
switchport port-security mac-address interface	Sets the static secure address in privileged EXEC mode.
switchport port-security aging	Sets the aging time for the secure address.

Platform Description N/A

9.9 Switchport Port-security Mac-address Sticky

Use this command to configure the Sticky MAC secure address.

Use the **no** form of this command to restore the default setting.

switchport port-security mac-address sticky *mac-address* [**vlan** *vlan-id*]

no switchport port-security mac-address sticky *mac-address* [**vlan** *vlan-id*]

Use the command without parameters to enable the Sticky MAC address learning.

Use the **no** form of this command to disable the Sticky MAC address learning.

switchport port-security mac-address sticky

no switchport port-security mac-address sticky

Parameter Description

Parameter	Description
mac-address	Static secure address
vlan-id	Vlan ID of the MAC address The configuration of vlan-id is only supported on the TRUNK port.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

Sticky MAC addresses, either static or dynamic, are special addresses free from aging.

Configuration Examples

The following example sets the MAC address and VLAN ID of TRUNK port 10 to 00d0.f800.5555 to 2 respectively.

```
FS# configure terminal
FS(config)#interface gigabitethernet 0/10
FS(config-if)# switchport port-security mac-address 00d0.f800.5555 vlan 2
FS(config-if)# end
```

The following example enables the Sticky MAC address learning on interface g0/10.

```
FS# configure terminal
FS(config)#interface gigabitethernet 0/10
FS(config-if)# switchport port-security sticky mac-address
FS(config-if)# end
```

Related Commands

Command	Description
show port-security	Displays port security settings.
switchport port-security	Enables the port-security.
switchport port-security binding	Configures the secure address binding.
switchport port-security mac-address interface	Sets the static secure address in privileged EXEC mode.
switchport port-security mac-address	Sets the static secure address in interface configuration mode.
switchport port-security aging	Sets the aging time for the secure address.

Platform

N/A

Description

9.10 Switchport Port-security Maximum

Use this command to set the maximum number of port secure addresses.

Use the **no** form of this command to restore the default setting.

switchport port-security maximum *value*

no switchport port-security maximum

Parameter Description

Parameter	Description
value	Maximum number of the secure address, in the range from 1 to 128.

Defaults

The default is 128.

Command Mode

Interface configuration mode

Usage Guide

The number of the secure address contains the sum of static secure address and dynamically learnt secure address, 128 by default.

If the number of the secure address you set is less than current number, it will prompt this setting failure.

Configuration Examples

The following example sets the maximum number of the secure address to 2 for interface g 0/10.

```
FS# configure terminal
FS(config)#interface gigabitethernet 0/10
FS(config-if)# switchport port-security maximum 2
FS(config-if)# end
```

Related Commands

Command	Description
show port-security	Displays port security settings.
switchport port-security	Enables the port-security.
switchport port-security binding	Configures the secure address binding.
Switchport port-security mac-address	Sets the static secure address in the interface configuration mode.
switchport port-security aging	Sets the aging time for the port secure address.

Platform Description

N/A

10. Storm Control Commands

10.1 Show Storm-control

Use this command to display storm suppression information.

show storm-control [*interface-type interface-number*]

Parameter Description

Parameter	Description
interface-type interface-number	Specifies an interface.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays storm control configuration on FastEthernet 0/1.

```
FS# show storm-control fastEthernet 0/1
Interface                    Broadcast Control Multicast Control Unicast Control Action
------------------------- ----------------- ----------------- ---------------- --------
FastEthernet 0/1             1%                50%               1%               none
```

Related Commands

Command	Description
storm-control	Enables storm suppression.

Platform Description N/A

10.2 Storm-control

Use this command to enable the storm suppression for unknown unicast packets.

Use the **no** or **default** form of this command to restore the default setting.

storm-control unicast [{ **level** *percent* | **pps** *packets* | *rate-bps* }]

no storm-control unicast

default storm-control unicast

Use this command to enable the storm suppression for multicast packets.

Use the **no** or **default** form of this command to restore the default setting.

storm-control multicast [{ **level** *percent* | **pps** *packets* | *rate-bps* }]

no storm-control multicast

default storm-control multicast

Use this command to enable the storm suppression for broadcast packets.

Use the **no** or **default** form of this command to restore the default setting.

storm-control broadcast [{ **level** *percent* | **pps** *packets* | *rate-bps* }]

no storm-control broadcast

default storm-control broadcast

Parameter Description

Parameter	Description
level *percent*	Sets the bandwidth percentage, for example, 20 means 20%.
pps *packets*	Sets the pps, which means packets per second.
rate-bps	Rate allowed

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

Too many broadcast, multicast or unicast packets received on a port may cause storm and thus slow network and increase timeout. Protocol stack implementation errors or wrong network configuration may also lead to such storms.

A device can implement the storm suppression to a broadcast, a multicast, or a unicast storm respectively. When excessive broadcast, multicast or unknown unicast packets are received, the switch temporarily prohibits forwarding of relevant types of packets till data streams are recovered to the normal state (then packets will be forwarded normally).

Configuration Examples

The following example enables the multicast storm suppression on FastEthernet 0/1 and sets the allowed rate to 4M.

```
FS(config)# int fastEthernet 0/1
FS(config-if-FastEthernet 0/1)# storm-control multicast 4096
```

Related Commands

Command	Description
show storm-control	Displays storm suppression information.

Platform Description

N/A

11. SSH Commands

11.1 Crypto Key Generate

Use this command to generate a public key to the SSH server.

crypto key generate { **rsa** | **dsa** }

Parameter Description

Parameter	Description
rsa	Generates an RSA key.
dsa	Generates a DSA key.

Defaults

By default, the SSH server does not generate a public key.

Command Mode

Global configuration mode

Usage Guide

When you need to enable the SSH SERVER service, use this command to generate a public key on the SSH server and enable the SSH SERVER service by command **enable service ssh-server** at the same time. SSH 1 uses the RSA key; SSH 2 uses the RSA or DSA key. Therefore, if a RSA key has been generated, both SSH1 and SSH2 can use it. If only a DSA key is generated, only SSH2 can use it.

Only DSA/RSA authentication is available for one connection. Also, the key algorithm may differ in different client. Thus, it is recommended to generate both RSA and DSA keys so as to ensure connection with the portal server.

RSA has a minimum modulus of 512 bits and a maximum modulus of 2,048 bits; DSA has a minimum modulus of 360 bits and a maximum modulus of 2,048 bits. For some clients like SCP clients, a 768-bit or more key is required. Thus, it is recommended to generate the key of 768 bits or more.

A key can be deleted by using the **no crypto key generate** command. The **no crypto key zeroize** command is not available.

Configuration Examples

The following example generates an RSA key to the SSH server.

```
FS# configure terminal
FS(con fig)# crypto key generate rsa
```

Related Commands

Command	Description
show ip ssh	Displays the current status of the SSH server.
crypto key zeroize { **rsa** | **dsa** }	Deletes DSA and RSA keys and disables the SSH server function.

Platform Description

N/A

11.2 Crypto Key Zeroize

Use this command to delete a public key to the SSH server.

crypto key zeroize { **rsa** | **dsa** }

Parameter Description

Parameter	Description
rsa	Deletes the RSA key.
dsa	Deletes the DSA key.

Defaults N/A

Command Mode Global configuration mode

Usage Guide This command deletes the public key to the SSH server. After the key is deleted, the SSH server state becomes DISABLE. If you want to disable the SSH server, run the **no enable service ssh-server** command.

Configuration Examples The following example deletes a RSA key to the SSH server.

```
FS# configure terminal
FS(config)# crypto key zeroize rsa
```

Related Commands

Command	Description
show ip ssh	Displays the current status of the SSH server.
crypto key generate { **rsa** | **dsa** }	Generates DSA and RSA keys.

Platform Description N/A

11.3 Disconnect Ssh

Use this command to disconnect the established SSH connection.

disconnect ssh [**vty**] *session-id*

Parameter Description

Parameter	Description
vty	Established VTY connection
session-id	ID of the established SSH connection, in the range from 0 to 35

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide You can disconnect a SSH connection by entering the ID of the SSH connection or disconnect a SSH connection by entering the specified VTY connection ID. Only connections of the SSH type can be disconnected.

Configuration Examples The following example disconnects the established SSH connection by specifying the SSH session ID.

```
FS# disconnect ssh 1
```

The following example disconnects the established SSH connection by specifying the VTY session ID.

```
FS# disconnect ssh vty 1
```

Related Commands

Command	Description
show ssh	Displays the information about the established SSH connection.
clear line vty *line_number*	Disconnects the current VTY connection.

Platform Description N/A

11.4 Disconnect Ssh Session

Use this command to disconnect the suspended SSH client session.

disconnect ssh-session *session-id*

Parameter Description

Parameter	Description
session-id	ID of the suspended SSH client session

Defaults N/A

Command Mode User EXEC mode

Usage Guide This command is used to disconnect the suspended SSH client session by specifying its session ID.

Configuration Examples The following example disconnects a SSH client session by specifying its session ID.

```
FS# disconnect ssh-session 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.5 Ip Scp Server Enable

Use this command to enable the SCP server function on a network device.

Use the **no** form of this command to restore the default setting.

ip scp server enable

no ip scp server enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Global configuration mode

Mode

Usage Guide Secure Copy (SCP) enables an authenticated user to transfer files to/from a remote device in an encrypted way, with high security and guarantee.

Configuration Examples The following example enables the SCP server function.

```
FS# configure terminal
FS(config)# ip scp server enable
```

Related Commands

Command	Description
show ip ssh	Displays the current status of the SSH server.

Platform Description N/A

11.6 Ip Ssh Authentication-retries

Use this command to set the authentication retry times of the SSH server.

Use the **no** form of this command to restore the default setting.

ip ssh authentication-retries *retry times*

no ip ssh authentication-retries

Parameter Description

Parameter	Description
retry times	Authentication retry times, ranging from 0 to 5

Defaults The default is 3.

Command Mode Global configuration mode

Usage Guide User authentication is considered failed if authentication is not successful when the configured authentication retry times on the SSH server is exceeded. Use the **show ip ssh** command to display the configuration of the SSH server

Configuration Examples The following example sets the authentication retry times to 2.

```
FS# configure terminal
FS(config)# ip ssh authentication-retries 2
```

Related Commands

Command	Description
show ip ssh	Displays the current status of the SSH server.

Platform Description N/A

11.7 Ip Ssh Cipher-mode

Use this command to set the SSH server encryption mode.

Use the **no** form of this command to restore the default setting.

ip ssh cipher-mode { **cbc** | **ctr** | **others** }

no ip ssh cipher-mode

Parameter Description

Parameter	Description
cbc	Encryption mode: CBC (Cipher Block Chaining) Encryption algorithm: DES-CBC, 3DES-CBC, AES-128-CBC, AES-192-CBC, AES-256-CBC, Blow fish-CBC
ctr	Encryption mode: CTR (Counter) Encryption algorithm: AES128-CTR, AES192-CTR, AES256-CTR
others	Encryption mode: Others Encryption algorithm: RC4

Defaults All encryption modes are supported by default.

Command Mode Global configuration mode

Usage Guide This command is used to set the SSH server encryption mode.

For FS Networks, the SSHv1 server supports DES-CBC, 3DES-CBC, and Blowfish-CBC; the SSHv2 server supports AES128-CTR, AES192-CTR, AES256-CTR, DES-CBC, 3DES-CBC, AES-128-CBC, AES-192-CBC, AES-256-CBC, Blowfish-CBC, and RC4. All these algorithms can be grouped into CBC, CTR and Other as shown above.

With the advancement of cryptography study, CBC and Others encryption modes are proved to easily decipher. It is recommended to enable the CTR mode to raise assurance for organizations and enterprises demanding high security.

Configuration Examples The following example enables CTR encryption mode.

```
FS# configure terminal
FS(config)# ip ssh cipher-mode ctr
```

Platform Description N/A

11.8 Ip Ssh Hmac-algorithm

Use this command to set the algorithm for message authentication.

Use the **no** form of this command to restore the default setting.

ip ssh hmac-algorithm { **md5** | **md5-96** | **sha1** | **sha1-96** }

no ip ssh hmac-algorithm

Parameter Description

Parameter	Description
md5	MD5 algorithm
md5-96	MD5-96 algorithm
sha1	SHA1 algorithm

sha1-96	SHA1-96 algorithm

Defaults

SSHv1: all the algorithms are not supported.

SSHv2: all the algorithms are supported.

Command Mode

Global configuration mode

Usage Guide

FS SSHv1 servers do not support algorithms for message authentication.

For FS Networks, the SSHv1 server does not support message authentication algorithms; the SSHv2 server supports MD5, MD5-96, SHA1, and SHA1-96 algorithms. Set the algorithm on your demand.

Configuration Examples

The following example sets the algorithm for message authentication to SHA1.

```
FS# configure terminal
FS(config)# ip ssh hmac-algorithm sha1
```

Platform Description

N/A

11.9 Ip Ssh Peer

Use this command to associate the public key file and the user name on the client. During client login authentication, you can specify a public key file based on the user name.

Use the **no** form of this command to restore the default setting.

ip ssh peer *username* **public-key** { **rsa** | **dsa** } *filename*

no ip ssh peer *username* **public-key** { **rsa** | **dsa** } *filename*

Parameter Description

Parameter	Description
username	User name
filename	Name of a public key file
rsa	The public key is a RSA key
dsa	The public key is a DSA key

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets RSA and DSA key files associated with user **test**.

```
FS# configure terminal
FS(config)# ip ssh peer test public-key rsa flash:rsa.pub
FS(config)# ip ssh peer test public-key dsa flash:dsa.pub
```

Related Commands

Command	Description
show ip ssh	Displays the current status of the SSH server.

Platform Description N/A

11.10 Ip Ssh Port

Use this command to set a monitoring port ID for the SSH server.

ip ssh port *port*

Use either of the following commands to restore the monitoring port ID of the SSH server to the default value.

no ip ssh port

ip ssh port 22

Parameter Description

Parameter	Description
port	Monitoring port ID of the SSH server. The value ranges from 1025 to 65535.

Defaults N/A

Command Mode Global configuration mode

Default Level 14

Usage Guide N/A

Configuration Examples The following example sets the monitoring port ID of the SSH server to 10000.

```
FS# configure terminal
FS(config)# ip ssh port 10000
```

Verification Run the **show ip ssh** command to display the configured monitoring port ID of the SSH server.

Prompts 1. If the required port ID is the same as the current value, a prompt is displayed, indicating that the current port ID is the required value.

```
FS(config)# ip ssh port 22
% SSH tcp-port has been 22
```

2. If a port in the monitoring state is configured as the monitoring port of the SSH server, a prompt is displayed, indicating that the port is already in the monitoring state and you are required to set another port ID, and the SSH server still uses the previous port ID.

```
FS(config)# ip ssh port 10000
% SSH open tcp-port(10000) failed, please use another tcp-port, otherwise the system will use the old tcp-port(22)!
```

3. If a monitoring error occurs after a monitoring port ID is configured for the SSH server, a port ID configuration

failure prompt is displayed.

```
FS(config)# ip ssh port 10000
% SSH change to tcp-port(10000) fail!
```

4. If a port ID is configured successfully, a port ID configuration success prompt is displayed.

```
FS(config)# ip ssh port 10000
% SSH change to tcp-port(10000) success!
```

11.11 Ip Ssh Source-interface

Use this command to specify a source interface for the SSH client. Use the **no** form of this command to remove the setting.

ip ssh source-interface *interface-name*

no ip ssh source-interface

Parameter Description

Parameter	Description
interface-name	Specifies a source interface for the SSH client, indicating that the SSH client takes the interface IP address as its source address.

Defaults The IP address of the interface that sends the SSH packet is taken as its source address by default.

Command Mode Global configuration mode

Usage Guide This command is used to specify the IP address of the specified interface as the source address of the SSH client.

Configuration Examples The following example specifies the IP address of interface Loopback 1 as the source address of the global SSH session.

```
FS(config)# ip ssh source-interface Loopback 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.12 Ip Ssh Time-out

Use this command to set the authentication timeout for the SSH server.

Use the **no** form of this command to restore the default setting.

ip ssh time-out *time*

no ip ssh time-out

Parameter Description

Parameter	Description
time	Authentication timeout, in the range from 1 to 120 in the unit of seconds

Defaults The default is 120 seconds.

Command Mode Global configuration mode

Usage Guide The authentication is considered timeout and failed if the authentication is not successful within 120 seconds starting from receiving a connection request. Use the **show ip ssh** command to display the configuration of the SSH server.

Configuration Examples The following example sets the timeout value to 100 seconds.

```
FS# configure terminal
FS(config)# ip ssh time-out 100
```

Related Commands

Command	Description
show ip ssh	Displays the current status of the SSH server.

Platform Description N/A

11.13 Ip Ssh Version

Use this command to set the version of the SSH server.

Use the **no** form of this command to restore the default setting.

ip ssh version { **1** | **2** }

no ip ssh version

Parameter Description

Parameter	Description
1	Supports the SSH1 client connection request.
2	Supports the SSH2 client connection request.

Defaults SSH1 and SSH2 are compatible by default.

Command Mode Global configuration mode

Usage Guide This command is used to configure the SSH connection protocol version supported by SSH server. By default, the SSH server supports SSH1 and SSH2. If Version 1 or 2 is set, only the SSH client of this version can connect to the SSH server. Use the **show ip ssh** command to display the current status of SSH server.

Configuration Examples The following example sets the version of the SSH server.

```
FS# configure terminal
FS(config)# ip ssh version 2
```

Related Commands

Command	Description
show ip ssh	Displays the current status of the SSH server.

Platform Description N/A

11.14 Show Crypto Key Mypubkey

Use this command to display the information about the public key part of the public key to the SSH server.

show crypto key mypubkey { **rsa** | **dsa** }

Parameter Description

Parameter	Description
rsa	Displays the RSA key.
dsa	Displays the DSA key.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode

Usage Guide This command is used to show the information about the public key part of the generated public key on the SSH server, including key generation time, key name, contents in the public key part, etc.

Configuration Examples The following example displays the information about the public key part of the public key to the SSH server.

```
FS(config)#show crypto key mypubkey rsa
% Key pair was generated at: 7:1:25 UTC Jan 16 2013
 Key name: RSA1 private
 Usage: SSH Purpose Key
 Key is not exportable.
 Key Data:
        AAAAAwEA AQAAAEEA 2m6H/J+2 xOMLW5MR 8tOmpW1I XU1QItVN mLdR+G7O Q10kz+4/
        /lgYR0ge 1sZNg32u dFEifZ6D zfLySPqC MTWLfw==

% Key pair was generated at: 7:1:25 UTC Jan 16 2013
 Key name: RSA private
 Usage: SSH Purpose Key
 Key is not exportable.
 Key Data:
        AAAAAwEA AQAAAEEA 0E5w2H0k v744uTIR yZBd/7AM 8pLltnW3 XH3LhEEi BbZGZvn3
        LEYYfQ9s pgYL0ZQf S0s/GY0X gJOMsc6z i8OAkQ==
```

Related Commands

Command	Description
crypto key generate { **rsa** | **dsa** }	Generates DSA and RSA keys.

Platform N/A

Description

11.15 Show Ip Ssh

Use this command to display the information of the SSH server.

show ip ssh

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode

Usage Guide This command is used to display the information of the SSH server, including version, enablement state, authentication timeout, and authentication retry times.

Note: If no key is generated for the SSH server, the SSH version is still unavailable even if this SSH version has been configured.

Configuration Examples The following example displays the information of the SSH server.

```
SSH and SCP disabled:
FS(config)#show ip ssh
SSH Disable - version 1.99
please generate rsa and dsa key to enable SSH
Authentication timeout: 120 secs
Authentication retries: 3
SSH SCP Server: disabled

SSH and SCP enabled:
FS(config)#show ip ssh
SSH Enable - version 1.99
Authentication timeout: 120 secs
Authentication retries: 3
SSH SCP Server: enabled
```

Related Commands

Command	Description
ip ssh version {**1** | **2**}	Configures the version for the SSH server.
ip ssh time-out time	Sets the authentication timeout for the SSH server.
ip ssh authentication-retries	Sets the authentication retry times for the SSH server.

Platform Description N/A

11.16 Show Ssh

Use this command to display the information about the established SSH connection.

show ssh

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode

Usage Guide This command is used to display the information about the established SSH connection, including VTY number of connection, SSH version, encryption algorithm, message authentication algorithm, connection status, and user name.

Configuration Examples The following example displays the information about the established SSH connection:

```
FS#show ssh
Connection Version Encryption      Hmac       Compress   State              Username
         0     1.5 blowfish                   zlib       Session started test
         1     2.0 aes256-cbc     hmac-sha1  zlib       Session started test
```

Field Description

Field	Description
Connection	VTY number
Version	SSH version
Encryption	Encryption algorithm
Hmac	Message authentication algorithm
Compress	Compress algorithm
State	Connection state
Username	Username

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.17 Show Ssh Session

Use this command to display the SSH Client session.

show ssh-session

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode User EXEC mode

Usage Guide Use this command to display the established SSH client session information, including the VTY number, SSH version, encryption algorithm, message authentication algorithm, connection state, and username.

Configuration Examples The following example display the established SSH client session.

```
FS#show ssh-session
Connect No.    SSH Version    Server Address
-----------    -----------    ---------------
0              2.0            192.168.23.122
1              1.5            192.168.23.122
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

11.18 Ssh

Use this command to establish an encrypted session with a remote device.

ssh [**-v** { **1** | **2** }] [**-c** { **3des** | **aes128-cbc** | **aes192-cbc** | **aes256-cbc** | **aes128-ctr** | **aes192-ctr** | **aes256-ctr** }] [**-l** *username*] [**-m** { **hmac-md5-96** | **hmac-md5-128** | **hmac-sha1-96** | **hmac-sha1-160** }] [**-p** *port-num*] { *ip-addr* | *hostname* } [**via** *mgmt-name*] [**/source** { **ip** *A.B.C.D* | **ipv6** *X:X:X:X::X* | **interface** *interface-name* }]

Parameter Description

Parameter	Description
-v	(Optional) The version of the SSH that is used to connect to the server, By default, it is SSHv2 ● Connect to the server via SSHv1. ● Connect to the server via SSHv2.
-c { **3des** | **aes128-cbc** | **aes192-cbc** | **aes256-cbc** | **aes128-ctr** | **aes192-ctr** | **aes256-ctr** }	(Optional) Specifies the encryption algorithm. The available encryption includes Data Encryption Standard (DES), Triple Data Encryption Algorithm (3DES), and Advantaged Encryption Standard (AES). Based on the length of the secret key, AES can be further divided into three types: aes128-cbc (128-bit secret key), aes192-cbc (192-bit secret key), aes256-cbc (256-bit secret key), aes128-ctr (128-bit secret key), aes192-ctr (192-bit secret key), and aes256-ctr (256-bit secret key).

	If no encryption algorithm is specified, the SSH client will send the supported encryption algorithm list to the server for algorithm negotiation, Otherwise, the SSH client will sent only the specified encryption algorithm to the server, If the server does not support the encryption algorithm, the session will be closed.
-l *username*	(Mandatory) The login username.
-m { **hmac-md5-96 | hmac-md5-128 | hmac-sha1-96 | hmac-sha1-160** }	(Optional) Specifies a Hash-based message authentication code (HMAC). SSHv1 does not support HMACs. If the user specifies SSHv1 and HMACs at the same time, the HMACs configuration does not take effect. If no algorithm is specified, the SSH client will send the supported HMAC algorithm list to the server for algorithm negotiation, Otherwise, the SSH client will sent only the specified HMAC algorithm to the server, If the server does not support the HMAC algorithm, the session will be closed.
-p *port-num*	(Optional) Specifies the port number that is used to connect to the SSH server. The port number is 22 by default.
ip-addr | *hostname*	(Mandatory) Specifies the IPv4/IPv6 address or host name for the SSH server,
via *mgmt-name*	Specifies the MGMT interface for the **oob** parameter.
/source	Specifies the source IP address or the source interface for the SSH client.
ip A.B.C.D	Specifies the source IPv4 address for the SSH client.
ipv6 X:X:X:X::X	Specifies the source IPv6 address for the SSH client.
interface *interface-name*	Specifies the source interface for the SSH client.

Defaults

N/A

Command Mode

User EXEC mode

Usage Guide

Use the **ssh** command to create a secure and encrypted session between the current device (SSH client) and the other device (SSH server, or the server that supports SSHv1 or SSHv2). This session is similar to the Telnet session except that the SSH session is encrypted. Therefore, the SSH client can create a secure session on the insecure network based on authentication and encryption.

- SSHv1 supports only DES (56-bit key) and 3DES (168-bit key).
- SSHv2 supports the following AES algorithm: ase128-cbc, aes192-cbc, aes256-cbc, ase128-ctr, aes192-ctr, and aes256-ctr.
- SSHv1 does not support HMAC algorithm.
- If the specified SSH version is incompatible with the specified encryption algorithm or authentication algorithm, the algorithm configuration does not take effect.

Configuration Examples

The following example creates a session with the username **admin** to the SSH server whose IP address is 192.168.23.122 via SSH.

```
FS#ssh -l admin 192.168.23.122
```

The following example creates a session with the username admin to the SSH server whose IP address is 192.168.23.122 via SSHv2, setting aes128-cbc and hmac-md5-128 as encryption algorithm and authentication algorithm respectively.

```
FS#ssh -v 2 -c aes128-cbc    -m hmac-md5-128 -l admin 192.168.23.122
```

Related Commands

Command	Description
N/A	N/A

11.19 Ssh Session

Use this command to restore the suspended SSH client session.

ssh-session *session-id*

Parameter Description

Parameter	Description
session-id	ID of the SSH client session to be restored

Defaults

N/A

Command Mode

User EXEC mode

Usage Guide

After creating the SSH client session via the **SSH** command, you can use the hot key (ctrl+shift+6 x) to temporarily suspend the session, If you want to restore the suspended SSH client session, run the **ssh-session** command. Use the **show ssh-session** command to display the established session.

Configuration Examples

The following example restores the suspended SSH client session:

```
FS# ssh-session 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

12. URPF Commands

12.1 clear ip urpf

Use this command to clear IPv4 URPF packet drop statistics.

clear ip urpf [**interface** *interface-name*]

Parameter Description

Parameter	Description
interface *interface-name*	Clears statistics on the specified interface.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

If no interface is specified, IPv4 URPF packet drop statistics on all interfaces are cleared by default.

Configuration Examples

The following example clears IPv4 URPF packet drop statistics on port GigabitEthernet 0/1.

```
FS# clear ip urpf interface gigabitEthernet0/1
```

The following example clears IPv4 URPF packet drop statistics on all interfaces.

```
FS# clear ip urpf
```

Related Commands

Command	Description
showip urpf	Displays the URPF configuration and statistics.

Platform Description

N/A

12.2 ip verify unicast source reachable-via (Interface Configuration Mode)

Use this command to enable the IPv4 URPF feature in the interface configuration mode.

Use the **no** form of this command to restore the default setting.

ip verify unicast source reachable-via { **rx | any** } [**allow-default**]

no ip verify unicast

Parameter Description

Parameter	Description
rx	URPF check in the strict mode. In the strict mode, the egress port for the forwarding entry in the forwarding list found through the source address for the IP packet shall be matched with the ingress port.
any	URPF check in the loose mode. In the loose mode, the forwarding entry for the source address for the IP packet can be found in the forwarding list.
allow-default	(Optional) Allows using the default route to check URPF.

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide To determine whether the route for the source address is in the forwarding list or not and the packet validity, enable the URPF feature to check the source address for the received IP packets. If no forwarding entry is matched, the packets are illegal.

Enabling URPF feature in the interface configuration mode enables URPF check for the received packets on the interface.

By default, the default route is not used for URPF check. Use the keyword allow-default to enable the URPF check.

By default, the packets that failed to pass the URPF check are dropped. With ACL (acl-name) configured, the ACL matching continues when the routing fails. The packets will be dropped if the ACL is inexistent or the deny ACE is matched; otherwise, if the permit ACE is matched, the packets will be forwarded.

After this command is used, URPF check on IPv4 packets will be enabled.

This function is supported only on routed and Layer 3 interfaces, and have the following restrictions:

- Not support the ACL association;
  Not support to use the IPv6 route with prefix in 65 to 127 bits for the URPF check;
- After enabling the URPF feature, the range of packets received on the interface will be expanded, that is, the URPF feature is enabled for all packets received on the physical ports.
- After enabling the URPF feature, it halves the route forwarding capacity.
- After enabling the URPF feature in the strict mode, the user can match the equivalent route when URPF check is enabled for the packets received on the interface.

URPF feature cannot be configured in the global configuration mode and in the interface configuration mode at the same time.

URPF feature cannot be configured on range interface.

Configuration Examples The following example checks the URPF feature of the received packets in the strict mode on the interface GigabitEthernet 0/1.

```
FS(config)# interface gigabitEthernet0/1
FS(config-if-GigabitEthernet 0/1)# ip verify unicast source reachable-via rx
```

Related Commands

Command	Description
show ip urpf	Displays the URPF information.

Platform Description N/A

12.3 ip verify urpf drop-rate compute interval

Use this command to set the URPF drop-rate compute interval.

Use the **no** form of this command to restore the default setting.

ip verify urpf drop-rate compute interval *seconds*

no ip verify urpf drop-rate compute interval

Parameter Description

Parameter	Description
seconds	Sets the URPF drop-rate compute interval, in the range from 30 to 300 in the unit of seconds.

Defaults The default is 30 seconds.

Command Mode Global configuration mode

Usage Guide The URPF drop-rate is computed globally for both IPv4 and IPv6 packets on interfaces enabled with URPF.

Configuration Examples The following example sets the URPF drop-rate compute interval as 60 seconds.

```
FS(config)# ip verify urpf drop-rate compute interval 60
```

Related Commands

Command	Description
ip verify urpf drop-rate notify	Sets the URPF drop-rate information monitoring.
ip verify urpf drop-rate notify hold-down	Sets the URPF drop-rate warning interval.
ip verify urpf notification threshold	Sets the URPF drop-rate threshold.

Platform Description N/A

12.4 ip verify urpf drop-rate notify

Use this command to enable the URPF drop-rate monitoring.

Use the **no** or **default** form of this command to restore the default setting.

ip verify urpf drop-rate notify

no ip verify urpf drop-rate notify

default ip verify urpf drop-rate notify

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide This command is used to enable the URPF drop-rate monitoring, notifying the user of the URPF packet drop information by means of Syslog or Trap for the convenience of the user network monitoring.
URPF feature cannot be configured on range interface.

Configuration Examples The following example enables the URPF drop-rate monitoring on port GigabitEthernet 0/1.

```
FS(config)# interface gigabitEthernet0/1
FS(config-if-GigabitEthernet 0/1)# ip verify urpf drop-rate notify
```

Related Commands

Command	Description
ip verify urpf drop-rate compute interval	Sets the URPF drop-rate compute interval.
ip verify urpf drop-rate notify hold-down	Sets the URPF drop-rate warning interval.
ip verify urpf notification threshold	Sets the URPF drop-rate threshold.

Platform Description N/A

12.5 ip verify urpf drop-rate notify hold-down

Use this command to set the URPF drop-rate notification interval.
Use the **no** form of this command to restore to the default setting.
ip verify urpf drop-rate notify hold-down *seconds*
no ip verify urpf drop-rate notify hold-down

Parameter Description

Parameter	Description
seconds	Sets the URPF drop-rate notification interval, in the range from 30 to 300 in the unit of seconds.

Defaults The default is 300 seconds.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example sets the URPF drop-rate notification interval as 60 seconds.

```
FS(config)# ip verify urpf drop-rate notify hold-down 60
```

Related Commands

Command	Description
ip verify urpf drop-rate compute interval	Sets the URPF drop-rate computing interval.
ip verify urpf drop-rate notify	Sets the URPF drop-rate monitoring.
ip verify urpf notification threshold	Sets the URPF drop-rate threshold.

Platform Description N/A

12.6 ip verify urpf notification threshold

Use this command to set the URPF drop-rate threshold.

Use the **no** form of this command to restore the default setting.

ip verify urpf notification threshold *rate-value*

no ip verify urpf notification threshold

Parameter Description

Parameter	Description
threshold *rate-value*	Sets the URPF drop-rate threshold, in the range from 0 to 4,294,967,295 in the unit of packets per second (pps).

Defaults The default is 1,000 pps.

Command Mode Interface configuration mode

Usage Guide The threshold 0 indicates that once the device detects a dropped packet due to the IPv4 URPF check, the notification is sent.

The user can adjust the drop-rate threshold value according to the actual network performance.

URPF feature cannot be configured on range interface.

Configuration Examples The following example sets the URPF drop-rate threshold 10pps on the interface GigabitEthernet 0/1.

```
FS(config)# interface gigabitEthernet0/1
FS(config-if-GigabitEthernet 0/1)# ipv6 verify urpf drop-rate notify
FS(config-if-GigabitEthernet 0/1)# ipv6 verify urpf notification threshold 10
```

Related Commands

Command	Description
ip verify urpf drop-rate compute interval	Sets the URPF drop-rate computing interval.
ip verify urpf drop-rate notify	Sets the URPF drop-rate information monitoring.
ip verify urpf drop-rate notify hold-down	Sets the URPF drop-rate notification interval.

Platform Description N/A

12.7 show ip urpf

Use this command to display the IPv4 URPF configuration and statistics.

show ip urpf [**interface** *interface-name*]

Parameter

Parameter	Description

Description

interface *interface-name*	Displays the configuration and statistics on the specified interface.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide The global configuration and statistics of all interfaces are displayed by default.

Configuration Examples The following example displays IPv4 URPF configuration and statistics on port GigabitEthernet 0/1.

```
FS# show ip urpf interface gigabitEthernet0/21
IP verify source reachable-via RX
IP verify URPF drop-rate notify disabled
IP verify URPF notification threshold is 1000pps
Number of drop packets in this interface is 124
Number of drop-rate notification counts in this interface is 0
```

Field	Description
IP verify source reachable-via xx	xx in strict mode is displayed as RX and in loose mode as ANY.
IP verify URPF drop-rate notify xx	If drop rate notification is enabled, xx is displayed as enabled. Otherwise, it is displayed as disabled.
IP verify URPF notification threshold is xxpps	The threshold of URPF drop rate, in the range from 0 to 4294967295 in the unit of packets per second (pps). The default is 1000.
Number of drop packets in this interface is x	The number of drop packets
Number of drop-rate notification counts in this interface is x	The URPF drop-rate notification counts

The following example displays IPv4 URPF configuration and statistics.

```
FS# show ip urpf
IP verify URPF drop-rate compute interval is 30s
IP verify URPF drop-rate notify hold-down is 300s

Interface GigabitEthernet 0/1
IP verify source reachable-via RX
IP verify URPF drop-rate notify disabled
IP verify URPF notification threshold is 1000pps
Number of drop packets in this interface is 124
Number of drop-rate notification counts in this interface is 2
```

Field	Description
IP verify URPF drop-rate compute interval is x	Drop-rate computing interval
IP verify URPF drop-rate notify hold-down is x	Drop-rate notification interval
Interface interface-name	interface-name is the name of the interface on which URPF is applied. Configuration and statistics on this

	interface are displayed.

Related Commands

Command	Description
ip verify unicast source reachable-via	Enables the URPF features.
ip verify urpf drop-rate compute interval	Sets the URPF drop-rate compute interval.
ip verify urpf drop-rate notify hold-down	Sets the URPF drop-rate warning interval.
ip verify urpf notification threshold	Sets the URPF drop-rate threshold.
clear ip urpf	Clears the URPF statistical information.

Platform Description

N/A

13. GSN Commands

13.1 Security Address-bind Enable

Use this command to enable GSN address binding on an interface.

Use the **no** form of this command to disable this function.

security address-bind enable

no security address-bind enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

GSN address binding is disabled.

Command Mode

Interface configuration mode

Usage Guide

This command takes effect only when the global security network (GSN) function is enabled and the interface is authenticated.

802.1x IP authorization should be disabled when the GSN address binding policy is applied.

Configuration Examples

The following example enables GSN address binding on GigabitEthernet 0/3.

```
FS# configure terminal
FS(config)# interface gigabitEthernet 0/3
FS(config-if-GigabitEthernet 0/3)# security address-bind enable
FS(config)# exit
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

13.2 Security Community

Use this command to configure the security community to communicate with the SMP server.

Use the **no** form of this command to remove the security community setting.

security { [**v1 | v2**] **community** *community* | **v3 user** *username* }

no security { [**v1 | v2**] **community** *community* | **v3 user** *username* }

Parameter Description

Parameter	Description
community	Community string containing up to 32 characters.
username	V3 security community username, containing up to 32 characters.

Defaults No security community is configured by default.

Command Mode Global configuration mode

Usage Guide When you are configuring the communication between the device and the server, configure an appropriate authentication name of the appropriate protocol version according to the server settings if it is necessary. If you choose v3, use the **snmp-server** command to set the v3 username. For the detailed information, please refer to *SNMP command reference*.

Configuration Examples The following example sets the v1 community:

```
FS(config)# security v1 community public
```

The following example sets the v3 username as start:

```
FS(config)# security v3 user start
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

13.3 Security Event Interval

Use this command to set the sending interval of security events.

Use the **no** form of this command to restore the default value.

security event interval *interval*

no security event interval

Parameter Description

Parameter	Description
interval	Configures the security event interval. The range is from 1 to 65,535 seconds.

Defaults The default interval is 5 seconds.

Command Mode Global configuration mode

Usage Guide Take care to set the sending interval of security events properly. Too small value may cause the drop of security event messages, and too large value may cause that the security event messages cannot be received in a long period.

Configuration The following example configures the sending interval for security events to 10.

Examples

```
FS# security event interval 10
```

The following example restores the sending interval for security events to the default setting.

```
FS(config)# no security event interval
```

Related Commands

Command	Description
show security event interval	Displays the interval of security event.

Platform Description

N/A

13.4 Security Gsn Enable

Use this command to enable GSN.

Use the **no** form of this command to disable GSN.

security gsn enable

no security gsn enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

GSN is disabled by default.

Command Mode

Global configuration mode

Usage Guide

Use this command to enable GSN on the device.

Configuration Examples

The following example enables GSN.

```
FS(config)# security gsn enable
```

The following example disables GSN.

```
FS(config)# security gsn enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

13.5 Show Security Event Interval

Use this command to display the sending interval of security events.

show security event interval

Parameter Description

Parameter	Description
N/A*x*	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the sending interval of security events.

```
FS# show security event interval
Event sending interval(seconds): 10
```

Related Commands

Command	Description
security event interval *interval*	Configures the sending interval of security events.

Platform Description N/A

13.6 Show Smp-server

Use this command to display the IP address of the SMP server.

show smp-server

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the IP address of the SMP server.

```
FS# show smp-server
smp-server IP: 192.168.30.9
```

Related Commands

Command	Description
smp-server host	Configures the IP address for the SMP server.

Platform Description N/A

13.7 Smp-server Host

Use this command to configure the IP address for the SMP server.

Use the **no** form of this command to remove the IP address of the SMP server.

smp-server host *ip-address*

no smp-server host

Parameter Description

Parameter	Description
ip-address	IP address of the SMP server.

Defaults No SMP server address is configured by default.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example configures the IP address of the SMP server to 192.168.30.9.

```
FS(config)# smp-server host 192.168.30.9
```

The following example removes the IP address of the SMP server.

```
FS(config)# smp-server host 192.168.30.9
```

Related Commands

Command	Description
show smp-server	Displays the SMP server configuration.

Platform Description N/A

14. CPU Protection Commands

14.1 Clear Cpu-protect-counters

Use this command to clear the CPP statistics.

clear cpu-protect counters [**device** *device_num*]

Parameter Description

Parameter	Description
device_num	As a single physical device, there is no device parameter; As a stacking, the device parameter indicates the chassis or the box-type device. If no device parameter is specified, that indicates this command takes effect to the master chassis or the master box-type device.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example clears the CPP statistics.

```
FS(config)#show cpu-protect type bpdu
Packet Type          Traffic-class   Bandwidth(pps)   Rate(pps)   Drop(pps)   Total      Total Drop
------------------   -------------   --------------   ---------   ---------   --------   ----------
bpdu                     6                200              0           0          600        50
FS#clear cpu-protect counters
FS(config)#show cpu-protect type bpdu
Packet Type          Traffic-class   Bandwidth(pps)   Rate(pps)   Drop(pps)   Total      Total Drop
------------------   -------------   --------------   ---------   ---------   --------   ----------
bpdu                     6                200              0           0          0          0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

14.2 Clear Cpu-protect-counters Mboard

Use this command to clear the CPP statistics on the supervisor module.

clear cpu-protect counters mboard

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example clears the CPP statistics on the supervisor module.

```
FS(config)#show cpu-protect type bpdu
Packet Type          Traffic-class   Bandwidth(pps)   Rate(pps)   Drop(pps)   Total      Total Drop
------------------   -------------   --------------   ---------   ---------   --------   ----------
bpdu                     6                200              0           0          600         50
FS#clear cpu-protect counters mboard
FS(config)#show cpu-protect type bpdu
Packet Type          Traffic-class   Bandwidth(pps)   Rate(pps)   Drop(pps)   Total      Total Drop
------------------   -------------   --------------   ---------   ---------   --------   ----------
bpdu                     6                200              0           0           0          0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

14.3 Cpu-protect Cpu Bandwidth

Use this command to configure the bandwidth for the CPU port. Use the **no** form of this command to restore the default setting.

cpu-protect cpu bandwidth *bandwidth_value*

no cpu-protect cpu bandwidth

Parameter Description

Parameter	Description
bandwidth_value	An integer number ranges from 0 to 100000 (PPS). Indicates the bandwidth value of the CPU port.

Defaults The default CPU port bandwidth varies with products.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example sets the CPU port bandwidth to 32000pps.

```
FS# configure terminal
FS(config)# cpu-protect cpu bandwidth 32000
FS#show cpu-protect cpu
%cpu port bandwidth: 32000(pps)
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

14.4 Cpu-protect Traffic-class Bandwidth

Use this command to configure the bandwidth for each priority queue. Use the **no** form of this command to restore the default setting.

cpu-protect traffic-class *traffic-class-num* **bandwidth** *bandwidth_value*

no cpu-protect traffic-class *traffic-class-num* **bandwidth**

Parameter Description

Parameter	Description
traffic-class-num	A default integer that varies with products, indicating the queue priority
bandwidth_value	An integer number ranges from 0 to 100000 (pps). Indicates the bandwidth value of the CPU port.

Defaults The default bandwidth of each priority queue varies with products.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example s sets the priority queue 5 to 3500 pps.

```
FS# configure terminal
FS(config)# cpu-protect traffic-class 5 bandwidth 3500
FS#show cpu-protect traffic-class 5
Traffic-class     Bandwidth(pps)    Rate(pps)          Drop(pps)
-------------     --------------    ---------          ---------
 5                     3500                0                   0
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

14.5 Cpu-protect Type Bandwidth

Use this command to configure the bandwidth of a specific packet.

Use the **no** form of this command to restore the default setting.

cpu-protect type *packet-type* **bandwidth** *bandwidth_value*

no cpu-protect type *packet-type* **bandwidth**

Parameter Description

Parameter	Description
packet-type	Packet type, which varies with products
bandwidth_value	An integer number ranges from 0 to 32000 (pps). Indicates the bandwidth value of the CPU port.

Defaults

The default CPU port bandwidth varies with products.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the BPDU bandwidth to 200 pps.

```
FS# configure terminal
FS(config)# cpu-protect type bpdu bandwitdth 200
FS(config)#show cpu-protect type bpdu
Packet Type          Traffic-class   Bandwidth(pps)   Rate(pps)   Drop(pps)   Total       Total Drop
------------------   -------------   --------------   ---------   ---------   --------    ----------
bpdu                     6                200              0           0           0           0
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

14.6 Cpu-protect Type Traffic-class

Use this command to set the priority queue (PQ) of the packet.

Use the **no** form of this command to restore the default setting.

cpu-protect type *packet-type* **traffic-class** *traffic-class-num*

no cpu-protect type *packet-type* **traffic-class**

Parameter Description

Parameter	Description
packet-type	Packet type, which varies with products
traffic-class-num	An integer number varying with products. Indicates the bandwidth value of the CPU port.

Defaults The default PQ varies with products.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example sets the PQ of BPDU packets to 5.

```
FS# configure terminal
FS(config)# cpu-protect type bpdu traffic-class 5
FS(config)#show cpu-protect type bpdu
Packet Type          Traffic-class   Bandwidth(pps)   Rate(pps)   Drop(pps)   Total       Total Drop
------------------   -------------   --------------   ---------   ---------   --------    ----------
bpdu                       5                200              0           0          0           0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

14.7 Show Cpu-protect

Use this command to display all CPP configuration and statistics.

show cpu-protect [**device** *device_num*]

Parameter Description

Parameter	Description
device_num	As a single physical device, there is no device parameter; As a stacking, the device parameter indicates the chassis or the box-type device. If no device parameter is specified, that indicates this command takes effect to the master chassis or the master box-type device.

Defaults N/A

Command Mode All configuraiton mode

Usage Guide N/A

Configuration Examples N/A

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

14.8 Show Cpu-protect Cpu

Use this command to display the configurations of the CPU port.

show cpu-protect cpu

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode All configuration modes

Usage Guide N/A

Configuration Examples The following example displays the configuration of the CPU port.

```
FS#show cpu-protect cpu
%cpu port bandwidth: 32000(pps)
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

14.9 Show Cpu-protect Mboard

Use this command to display the statistics of various packets of CPU protection on the management board.

show cpu-protect mboard

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode All configuration modes

Usage Guide This command displays the statistics of the packets received by CPU on the management board.

Configuration Examples The following example displays the CPP configuration and statistics of the master device.

```
FS#show cpu-protect mboard
%cpu port bandwidth: 80000(pps)
Traffic-class     Bandwidth(pps)    Rate(pps)          Drop(pps)
-------------     --------------    ---------          ---------
 0                 8000              0                  0
 1                 8000              0                  0
 2                 8000              0                  0
 3                 8000              0                  0
 4                 8000              0                  0
 5                 8000              0                  0
 6                 8000              0                  0
 7                 8000              0                  0
Packet Type          Traffic-class    Bandwidth(pps)    Rate(pps)    Drop(pps)    Total        Total Drop
------------------   -------------    --------------    ---------    ---------    --------     ----------
bpdu                  6                128               0            0            0            0
arp                   3                10000             0            0            0            0
arp-dai               3                10000             0            0            0            0
arp-proxy             3                10000             0            0            0            0
tpp                   7                128               0            0            0            0
dot1x                 4                128               0            0            0            0
gvrp                  5                128               0            0            0            0
rldp                  6                128               0            0            0            0
lacp                  6                128               0            0            0            0
rerp                  6                128               0            0            0            0
reup                  6                128               0            0            0            0
lldp                  5                128               0            0            0            0
cdp                   5                128               0            0            0            0
dhcps                 4                128               0            0            0            0
dhcps6                4                128               0            0            0            0
dhcp6-client          4                128               0            0            0            0
dhcp6-server          4                128               0            0            0            0
```

dhcp-relay-c	4	128	0	0	0	0
dhcp-relay-s	4	128	0	0	0	0
option82	4	128	0	0	0	0
tunnel-bpdu	5	128	0	0	0	0
tunnel-gvrp	5	128	0	0	0	0
unknown-v6mc	3	128	0	0	0	0
known-v6mc	3	128	0	0	0	0
xgv6-ipmc	3	128	0	0	0	0
stargv6-ipmc	3	128	0	0	0	0
unknown-v4mc	3	128	0	0	0	0
known-v4mc	3	128	0	0	0	0
xgv-ipmc	3	128	0	0	0	0
sgv-ipmc	3	128	0	0	0	0
udp-helper	4	128	0	0	0	0
dvmrp	5	128	0	0	0	0
igmp	4	128	0	0	0	0
icmp	4	128	0	0	0	0
ospf	5	128	0	0	0	0
ospf3	5	128	0	0	0	0
pim	6	128	0	0	0	0
pimv6	6	128	0	0	0	0
rip	6	128	0	0	0	0
ripng	6	128	0	0	0	0
vrrp	6	128	0	0	0	0
vrrp6	6	128	0	0	0	0
ttl0	6	128	0	0	0	0
ttl1	6	128	0	0	0	0
err_hop_limit	1	800	0	0	0	0
local-ipv4	6	128	0	0	0	0
local-ipv6	6	128	0	0	0	0
route-host-v4	0	4096	0	0	0	0
route-host-v6	0	4096	0	0	0	0
mld	0	1000	0	0	0	0
nd-snp-ns-na	6	128	0	0	0	0
nd-snp-rs	6	128	0	0	0	0
nd-snp-ra-redirect	6	128	0	0	0	0
nd-non-snp	6	128	0	0	0	0
erps	4	128	0	0	0	0
mpls-ttl0	6	128	0	0	0	0
mpls-ttl1	6	128	0	0	0	0
mpls-ctrl	6	128	0	0	0	0
isis	5	2000	0	0	0	0
bgp	1	128	0	0	0	0
cfm	0	128	0	0	0	0

```
fcoe-fip        6        128        0        0        0        0
fcoe-local      6        128        0        0        0        0
bfd-echo        6        5120       0        0        0        0
bfd-ctrl        6        5120       0        0        0        0
madp            7        1000       0        0        0        0
ip4-other       6        128        0        0        0        0
ip6-other       6        128        0        0        0        0
non-ip-other    6        20000      0        0        0        0
trill           2        1000       0        0        0        0
trill-oam       2        1000       0        0        0        0
efm             2        1000       0        0        0        0
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

14.10 Show Cpu-protect Summary

Use this command to display the CPP configuration and statistics of the master device.

show cpu-protect summary

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

All configuration modes

Usage Guide

N/A

Configuration Examples

```
FS#show cpu-protect summary
%cpu port bandwidth: 100000(pps)
Traffic-class     Bandwidth(pps)    Rate(pps)    Drop(pps)
-------------     --------------    ---------    ---------
 0                 6000              0            0
 1                 6000              0            0
 2                 6000              0            0
 3                 6000              0            0
 4                 6000              0            0
 5                 6000              0            0
```

```
 6                    6000                 0              0
 7                    6000                 0              0
Packet Type             Traffic-class   Bandwidth(pps)   Rate(pps)   Drop(pps)   Total            Total Drop
------------------   -------------   --------------   ---------   ---------   ---------        -----------
bpdu                      6                 128              0           0           0                0
arp                       1                3000              0           0           0                0
tpp                       6                 128              0           0           0                0
dot1x                     2                1500              0           0           0                0
gvrp                      5                 128              0           0           0                0
rldp                      5                 128              0           0           0                0
lacp                      5                 256              0           0           0                0
rerp                      5                 128              0           0           0                0
reup                      5                 128              0           0           0                0
lldp                      5                 768              0           0           0                0
cdp                       5                 768              0           0           0                0
dhcps                     2                1500              0           0           0                0
dhcps6                    2                1500              0           0           0                0
dhcp6-client              2                1500              0           0           0                0
dhcp6-server              2                1500              0           0           0                0
dhcp-relay-c              2                1500              0           0           0                0
dhcp-relay-s              2                1500              0           0           0                0
option82                  2                1500              0           0           0                0
tunnel-bpdu               2                 128              0           0           0                0
tunnel-gvrp               2                 128              0           0           0                0
unknown-v6mc              1                 128              0           0           0                0
xgv6-ipmc                 1                 128              0           0           0                0
stargv6-ipmc              1                 128              0           0           0                0
unknown-v4mc              1                 128              0           0           0                0
xgv-ipmc                  2                 128              0           0           0                0
stargv-ipmc               2                 128              0           0           0                0
udp-helper                1                 128              0           0           0                0
dvmrp                     4                 128              0           0           0                0
igmp                      2                1000              0           0           0                0
icmp                      3                1600              0           0           0                0
ospf                      4                2000              0           0           0                0
ospf3                     4                2000              0           0           0                0
pim                       4                1000              0           0           0                0
pimv6                     4                1000              0           0           0                0
rip                       4                 128              0           0           0                0
ripng                     4                 128              0           0           0                0
vrrp                      6                 256              0           0           0                0
vrrpv6                    6                 256              0           0           0                0
ttl0                      0                 128              0           0           0                0
ttl1                      0                2000              0           0           0                0
```

hop-limit	0	800	0	0	0	0
local-ipv4	3	4000	0	0	0	0
local-ipv6	3	4000	0	0	0	0
v4uc-route	1	800	0	0	0	0
v6uc-route	1	800	0	0	0	0
rt-host	4	3000	0	0	0	0
mld	2	1000	0	0	0	0
nd-snp-ns-na	1	3000	0	0	0	0
nd-snp-rs	1	1000	0	0	0	0
nd-snp-ra-redirect	1	1000	0	0	0	0
erps	5	128	0	0	0	0
mpls-ttl0	4	128	0	0	0	0
mpls-ttl1	4	128	0	0	0	0
mpls-ctrl	4	128	0	0	0	0
isis	4	2000	0	0	0	0
bgp	4	2000	0	0	0	0
cfm	5	512	0	0	0	0
web-auth	2	2000	0	0	0	0
fcoe-fip	4	1000	0	0	0	0
fcoe-local	4	1000	0	0	0	0
bfd	6	5120	0	0	0	0
micro-bfd	6	5120	0	0	0	0
micro-bfd-v6	6	5120	0	0	0	0
dldp	6	3200	0	0	0	0
other	0	4096	0	0	0	0
trill	4	1000	0	0	0	0
efm	5	1000	0	0	0	0
ipv6-all	0	2000	0	0	0	0
ip-option	0	800	0	0	0	0
mgmt	-	4000	4	0	4639	0
dns	2	200	0	0	0	0
sdn	0	5000	0	0	0	0
sdn_of_fetch	0	5000	0	0	0	0
sdn_of_copy	0	5000	0	0	0	0
sdn_of_trap	0	5000	0	0	0	0
vxlan-non-uc	1	512	0	0	0	0
local-telnet	3	1000	0	0	0	0
local-snmp	3	1000	0	0	0	0
local-ssh	3	1000	0	0	0	0

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

14.11 Show Cpu-protect Traffic-class

Use this command to display the summarized configuration and statistics of priority queues.

show cpu-protect traffic-class {*traffic-class-num* | **all**} [**device** *device_num*]

Parameter Description

Parameter	Description
traffic-class-num	A default integer that varies with products, indicating the queue priority.
all	Displays configurations and statistics of all priority queues.
device_num	As a single physical device, there is no device parameter; As a stacking, the device parameter indicates the chassis or the box-type device. If no device parameter is specified, that indicates this command takes effect to the master chassis or the master box-type device.

Defaults N/A

Command Mode All configuration modes

Usage Guide N/A

Configuration Examples The following example displays the summarized configuration and statistics of priority queues.

```
FS#show cpu-protect traffic-class all
Traffic-class     Bandwidth(pps)    Rate(pps)          Drop(pps)
-------------     --------------    ---------          ---------
 0                      8000              0                  0
 1                      8000              0                  0
 2                      8000              0                  0
 3                      8000              0                  0
 4                      8000              0                  0
 5                      3200              0                  0
 6                      8000              0                  0
 7                      8000              0                  0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

14.12 Show Cpu-protect Type

Use this command to display the statistics of the specified type of packets

show cpu-protect type *packet-type* [**device** *device_num*]

Parameter Description

Parameter	Description
packt-type	Packet type, which varies with products
all	Displays the configurations and statistics of all packet types.
device_num	As a single physical device, there is no device parameter; As a stacking, the device parameter indicates the chassis or the box-type device. If no device parameter is specified, that indicates this command takes effect to the master chassis or the master box-type device.

Defaults N/A

Command Mode All configuration modes

Usage Guide N/A

Configuration Examples The following example displays the statistics of the ICMP packets.

```
FS(config)#show cpu-protect type icmp
Packet Type          Traffic-class   Bandwidth(pps)   Rate(pps)   Drop(pps)   Total      Total Drop
------------------   -------------   --------------   ---------   ---------   --------   ----------
icmp                 5               1500             50          0           10000      100
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

15. DHCP Snooping Commands

15.1 Clear Ip Dhcp Snooping Binding

Use this command to delete the dynamic user information from the DHCP Snooping binding database.

clear ip dhcp snooping binding [*ip*] [*mac*] [**vlan** *vlan-id*] [**interface** *interface-id*]

Parameter Description

Parameter	Description
mac	Specifies the user MAC address to be cleared.
vlan-id	Specifies the ID of the VLAN to be cleared.
ip	Specifies the IP address to be cleared.
interface-id	Specifies the ID of the interface to be cleared.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command to clear the current dynamic user information from the DHCP Snooping binding database.

After this command is used, all the DHCP clients connecting interfaces with IP Source Guard function enabled should request IP addresses again, or they cannot access network.

Configuration Examples The following example clears the dynamic database information from the DHCP Snooping binding database.

```
FS# clear ip dhcp snooping binding
FS# show ip dhcp snooping binding
Total number of bindings: 0
MacAddress IpAddress Lease(sec) Type VLAN Interface
---------- ---------- ---------- -------- ---- ---------
```

Related Commands

Command	Description
show ip dhcp snooping binding	Displays the information of the DHCP Snooping binding database.

Platform Description N/A

15.2 Ip Dhcp Snooping

Use this command to enable the DHCP Snooping function globally.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping

no ip dhcp snooping

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide The **show ip dhcp snooping** command is used to display whether the DHCP Snooping function is enabled.

Configuration Examples The following example enables the DHCP Snooping function.

```
FS# configure terminal
FS(config)# ip dhcp snooping
FS(config)# end
```

Related Commands

Command	Description
show ip dhcp snooping	Displays the configuration information of DHCP Snooping.
ip dhcp snooping vlan	Configures DHCP Snooping enabled VLAN.

Platform Description N/A

15.3 Ip Dhcp Snooping Bootp-bind

Use this command to enable DHCP Snooping BOOTP-bind function.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping bootp-bind

no ip dhcp snooping bootp-bind

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide By default, the DHCP Snooping only forwards BOOTP packets. With this function enabled, it can Snoop BOOTP packets. After the BOOTP client requests an address successfully, the DHCP Snooping adds the BOOTP user to the static binding database.

Configuration Examples

The following example enables the DHCP Snooping BOOTP-bind function.

```
FS# configure terminal
FS(config)# ip dhcp snooping bootp-bind
FS(config)# end
```

Related Commands

Command	Description
show ip dhcp snooping	Displays the DHCP Snooping configuration.

Platform Description

N/A

15.4 Ip Dhcp Snooping Check-giaddr

Use this command to enable DHCP Snooping to support the function of processing Relay requests.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping check-giaddr

no ip dhcp snooping check-giaddr

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

After the feature is enabled, services using DHCP Snooping binding entries generated based on Relay requests, such as IP Source Guard/802.1x authentication, cannot be deployed. Otherwise, users fail to access the Internet.

After the feature is enabled, the **ip dhcp snooping verify mac-address** command cannot be used. Otherwise, DHCP Relay requests will be discarded and as a result, users fail to obtain addresses.

Configuration Examples

The following example enables DHCP Snooping to support the function of processing Relay requests.

```
FS# configure terminal
FS(config)# ip dhcp snooping check-giaddr
FS(config)# end
```

Related Commands

Command	Description
show ip dhcp snooping	Displays the configuration information of the DHCP Snooping.

Platform

N/A

Description

15.5 Ip Dhcp Snooping Database Write-delay

Use this command to configure the switch to write the dynamic user information of the DHCP Snooping binding database into the flash periodically.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping database write-delay *time*

no ip dhcp snooping database write-delay

Parameter Description

Parameter	Description
time	The interval at which the system writes the dynamic user information of the DHCP Snooping database into the flash, in the range from 600 to 86,400 in the unit of seconds

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

This function writes user information into flash in case of loss after restart. In that case, users need to obtain IP addresses again for normal communication.

Too fast writing will reduce flash durability.

Configuration Examples

The following example sets the interval at which the switch writes the user information into the flash to 3,600 seconds.

```
FS# configure terminal
FS(config)# ip dhcp snooping database write-delay 3600
FS(config)# end
```

Related Commands

Command	Description
show ip dhcp snooping	Displays the configuration information of the DHCP Snooping.

Platform Description

N/A

15.6 Ip Dhcp Snooping Database Write-to-flash

Use this command to write the dynamic user information of the DHCP binding database into flash in real time.

ip dhcp snooping database write-to-flash

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Global configuration mode

Usage Guide This command is used to write the dynamic user information of the DHCP binding database into flash in real time.

Configuration Examples The following example writes the dynamic user information of the DHCP binding database into flash.

```
FS# configure terminal
FS(config)# ip dhcp snooping database write-to-flash
FS(config)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

15.7 Ip Dhcp Snooping Information Option

Use this command to add option82 to the DHCP request message.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping information option [**standard-format| dot1x-format**]

no ip dhcp snooping information option [**standard-format| dot1x-format**]

Parameter Description

Parameter	Description
standard-format	The option82 uses the standard format.
dot1x-format	The option uses the dot1x format.

Defaults This function is disabled by default,

Command Mode Global configuration mode

Usage Guide This command adds option82 to the DHCP request messages based on which the DHCP server assigns IP addresses.

By default, this function is in extended mode.

DHCP Relay function adds option82 by default. Therefore, it is unnecessary to enable functions of DHCP

Snooping option82 and DHCP Relay at the same time.

Configuration Examples

The following example adds option82 to the DHCP request message.

```
FS# configure terminal
FS(config)# ip dhcp snooping information option
FS(config)# end
```

Related Commands

Command	Description
show ip dhcp snooping	Displays the DHCP Snooping configuration.

Platform Description

N/A

15.8 Ip Dhcp Snooping Information Option Format Remote-id

Use this command to set the option82 sub-option remote-id as the customized character string.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping information option format remote-id { **string** *ascii-string* | **hostname** }

no ip dhcp snooping information option format remote-id { **string** *ascii-string* | **hostname** }

Parameter Description

Parameter	Description
string *ascii-string*	The content of the option82 remote-id extension format is customized character string.
hostname	The content of the option82 remote-id extension format hostname

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

This command sets the remote-id in the option82 to be added to the DHCP request message as the customized character string. The DHCP server will assign the IP address according to the option82 information.

Configuration Examples

The following example adds the option82 into the DHCP request packets with the content of remote-id as hostname.

```
FS# configure terminal
FS(config)# ip dhcp snooping information option format remote-id hostname
```

Related Commands

Command	Description
N/A	N/A

Platform

N/A

Description

15.9 Ip Dhcp Snooping Information Option Strategy

Use this command to configure Option82 strategy.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping information option strategy {keep | drop | replace}

no ip dhcp snooping information option strategy

Parameter Description

Parameter	Description
keep	Indicates reception of request packets with Option82. Option82 is kept and the packets are forwarded.
drop	Indicates reception of request packets with Option82. The packets are dropped.
replace	Indicates reception of request packets with Option82. Option82 of the packets are replaced with Option82 configured latest. The packets are forwarded.

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide This command only works for request packets with Option82.

If strategy is “keep” or “drop”, trailing padding is not needed for request packets with Option82.

If strategy is “replace”, trailing padding is needed for request packets with Option82.

Request packets without Option82 are padded with trailing.

Configuration Examples The following example sets “keep” as strategy.

```
FS# configure terminal
FS(config)# ip dhcp snooping information option strategy keep
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

15.10 Ip Dhcp Snooping Loose-forward

Use this command to enable DHCP Snooping loose forwarding.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping loose-forward

no ip dhcp snooping loose-forward

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide After this feature is enabled, when the capacity of DHCP Snooping binding entries is reached, DHCP packets of new users are forwarded and obtain addresses, but DHCP Snooping does not record binding entries of new users.

Configuration Examples The following example enables DHCP Snooping loose forwarding.

```
FS# configure terminal
FS(config)# ip dhcp snooping loose-forward
FS(config)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

15.11 Ip Dhcp Snooping Suppression

Use this command to set the port to be the suppression status.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping suppression

no ip dhcp snooping suppression

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide This command denies all DHCP request messages under the port, that is, all the users under the port are prohibited to request IP addresses through DHCP.

This command is only supported on Layer 2 switch interfaces and aggregate ports (APs).

Configuration Examples

The following example sets **fastethernet** 0/2 to be in the suppression status.

```
FS# configure terminal
FS(config)# interface fastEthernet 0/2
FS(config-if)# ip dhcp snooping suppression
FS(config-if)# end
```

Related Commands

Command	Description
show ip dhcp snooping	Displays the DHCP Snooping configuration.

Platform Description

N/A

15.12 Ip Dhcp Snooping Trust

Use this command to set the trusted ports for DHCP Snooping.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping trust

no ip dhcp snooping trust

Parameter Description

Parameter	Description
N/A	N/A

Defaults

All ports are untrusted by default.

Command Mode

Interface configuration mode

Usage Guide

Use this command to set a port as a trusted port. The DHCP response messages received under the trust port are forwarded normally, but the response messages received under the untrusted port will be discarded. This command is only supported on Layer 2 switch interfaces and aggregate ports (APs).

Configuration Examples

The following example sets fastEthernet 0/1 as a trusted port:

```
FS# configure terminal
FS(config)# interface fastEthernet 0/1
FS(config-if)# ip dhcp snooping trust
FS(config-if)# end
```

Related Commands

Command	Description
show ip dhcp snooping	Displays the DHCP Snooping configuration.

Platform Description

N/A

15.13 Ip Dhcp Snooping Verify Mac-address

Use this command to check whether the source MAC address of the DHCP request message matches against the **client addr** field of the DHCP message.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping verify mac-address

no ip dhcp snooping verify mac-address

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

Use this command to check the source MAC address of the DHCP request message. If the MAC address in the link-layer header is different from the CHADDR (Client MAC Address), the check fails ,and the packets will be discarded.

Configuration Examples

The following example enables the check of the source MAC address of the DHCP request message.

```
FS# configure terminal
FS(config)# ip dhcp snooping verify mac-address
FS(config)# end
```

Related Commands

Command	Description
show ip dhcp snooping	Displays the DHCP Snooping configuration.

Platform Description

N/A

15.14 Ip Dhcp Snooping Vlan

Use this command to enable DHCP Snooping for the specific VLAN.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping vlan {*vlan-rng* | { *vlan-min* [*vlan-max*] } }

no ip dhcp snooping vlan {*vlan-rng* | { *vlan-min* [*vlan-max*] } }

Parameter Description

Parameter	Description
vlan-rng	VLAN range of effective DHCP Snooping
vlan-min	Minimum VLAN of effective DHCP Snooping
vlan-max	Maximum VLAN of effective DHCP Snooping

Defaults By default, once the DHCP Snooping is enabled globally, it takes effect for all VLANs.

Command Mode Global configuration mode

Usage Guide Use this command to enable DHCP Snooping for specified VLANs globally.

Configuration Examples The following example enables the DHCP Snooping function in VLAN 1000.

```
FS# configure terminal
FS(config)# ip dhcp snooping vlan 1000
FS(config)# end
```

The following example enables the DHCP Snooping function from VLAN1 to VLAN10.

```
FS# configure terminal
FS(config)# ip dhcp snooping vlan 1-10
FS(config)# end
```

Related Commands

Command	Description
ip dhcp snooping	Enables DHCP Snooping globally.

Platform Description N/A

15.15 Ip Dhcp Snooping Vlan Max-user

Use this command to set the maximum number of users bound with the VLAN.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping vlan *vlan-word* **max-user** *user-number*

no ip dhcp snooping vlan *vlan-word* **max-user** *user-number*

Parameter Description

Parameter	Description
vlan-word	The VLAN range
user-number	The maximum number of users bound with the VLAN

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide Use this command to set the maximum number of users bound with the VLAN. This function combined with the corresponding topology can prevent illegal DHCP packet attacks.

Configuration Examples

The following example sets the maximum number of users bound with VLAN 1 to 10 and VLAN 20 to 30 respectively.

```
FS# configure terminal
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# ip dhcp snooping vlan 1-10,20 max-user 30
FS(config-if-GigabitEthernet 0/1)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

15.16 Ip Dhcp Snooping Vlan Information Option Change-vlan-to Vlan

Use this command to enable the option82 sub-option circuit-id and change the VLAN in the circuit-id into the specified VLAN.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping vlan *vlan-id* **information option change-vlan-to vlan** *vlan-id*

no ip dhcp snooping vlan *vlan-id* **information option change-vlan-to vlan** *vlan-id*

Parameter Description

Parameter	Description
vlan-id	The ID of the VLAN to be replaced

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

With this command configured, the option82 is added to the DHCP request packets, the circuit-id in the option82 information is the specified VLAN and the DHCP server will assign the addresses according to the option82 information.

Configuration Examples

The following adds the option82 to the DHCP request packets and changes the VLAN 4094 in the option82 sub-option circuit-id to VLAN93:

```
FS# configure terminal
FS(config)# interface fastEthernet 0/1
FS(config-if)# ip dhcp snooping vlan 4094 information option change-vlan-to vlan 4093
FS(config-if)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

15.17 Ip Dhcp Snooping Vlan Information Option Format-type Circuit-id String

Use this command to configure the option82 sub-option circuit-id as user-defined (the storage format is ASCII) and to perform the packet forwarding.

Use the **no** form of this command to restore the default setting.

ip dhcp snooping vlan *vlan-id* **information option format-type circuit-id string** *ascii-string*

no ip dhcp snooping vlan *vlan-id* **information option format-type circuit-id string** *ascii-string*

Parameter Description

Parameter	Description
vlan-id	The VLAN where the DHCP request packets are
ascii-string	The user-defined content to fill to the Circuit ID

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide This command is used to add the option82 to the DHCP request packets. The content of the sub-option circuit-id is customized with 3 to 63 bytes, and the DHCP server will assign the addresses according the option82 information.

Configuration Examples The following example adds the option82 to the DHCP request packets with the content of the sub-option circuit-id as *port-name*.

```
FS# configure terminal
FS(config)# interface fastEthernet 0/1
FS(config-if)# ip dhcp snooping vlan 4094 information option format-type circuit-id string port-name
FS(config-if)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

15.18 Renew Ip Dhcp Snooping Database

Use this command to import the information in current flash to the DHCP Snooping binding database manually as needed.

renew ip dhcp snooping database

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to import the flash file information to the DHCP Snooping database in real time.

Records out of lease time and repeated will be neglected.

Configuration Examples The following example imports the flash file information to the DHCP Snooping database.

```
FS# renew ip dhcp snooping database
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

15.19 Show Ip Dhcp Snooping

Use this command to display the DHCP Snooping configuration.

show ip dhcp snooping

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the DHCP Snooping configuration.

```
FS# show ip dhcp snooping
Switch DHCP snooping status :ENABLE
Verification of hwaddr field status :DISABLE
DHCP snooping database write-delay time: 0 seconds
DHCP snooping option 82 status: ENABLE
```

```
DHCP snooping Support Bootp bind status: ENABLE
Interface                                    Trusted          Rate limit(pps)
------------------------                 ----------------    ----------------
GigabitEthernet 0/4                          YES              unlimited
Default                                       No
```

Related Commands

Command	Description
ip dhcp snooping	Enables the DHCP Snooping globally.
ip dhcp snooping verify mac-address	Enables the check of source MAC address of DHCP Snooping packets.
ip dhcp snooping write-delay	Sets the interval of writing user information to FLASH periodically.
ip dhcp snooping information option	Adds option82 to the DHCP request message.
ip dhcp snooping bootp-bind	Enables the DHCP Snooping bootp bind function.
ip dhcp snooping trust	Sets the port as a trust port.

Platform Description

N/A

15.20 Show Ip Dhcp Snooping Binding

Use this command to display the information of the DHCP Snooping binding database.

show ip dhcp snooping binding

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

This command is used to display all the information of the DHCP Snooping binding database.

Configuration Examples

For products supporting QINQ termination, the following example displays the information of the inner VLAN.

```
FS# show ip dhcp snooping binding
Total number of bindings: 1
NO.    MACADDRESS          IPADDRESS        LEASE(SEC)    TYPE            VLAN    INNER-VLAN
INTERFACE
----- ------------------ --------------- ------------ ------------- ----- ---------- --------------------
1      0000.0000.0001      1.1.1.1          78128          DHCP-Snooping 1      10
```

```
GigabitEthernet 0/1
```

Parameter	Description
Total number of bindings	The total number of bindings in the DHCP Snooping database.
NO.	The record order.
MacAddress	The MAC address of the user.
IpAddress	The IP address of the user.
Lease(sec)	The lease time of the record.
Type	The record type.
VLAN	The VLAN where the user belongs.
Interface	The user's connection interface. It is a wired access interface.

Related Commands

Command	Description
ip dhcp snooping binding	Adds the static user information to the DHCP Snooping database.
clear ip dhcp snooping binding	Clears the dynamic user information from the DHCP Snooping binding database.

Platform Description

N/A

16. DHCPv6 Snooping Commands

16.1 Clear Ipv6 Dhcp Snooping Binding

Use this command to clear all the user information in the DHCPv6 Snooping binding database.

clear ipv6 dhcp snooping binding [*mac* | **vlan** *vlan-id* | *ipv6-address* | **interface** *interface-id*]

Parameter Description

Parameter	Description
mac	Specifies the MAC address to be deleted.
vlan-id	Specifies the ID of the VLAN to be cleared.
ipv6-address	Specifies the IPv6 address to be cleared.
interface-id	Specifies the interface to be cleared.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to clear the generated user information in the DHCPv6 Snooping binding database.

Configuration Examples The following example clears all the user information in the DHCPv6 Snooping binding database.

```
FS# clear ipv6 dhcp snooping binding
FS# show ipv6 dhcp snooping binding
NO.   MacAddress        IPv6 Address   Lease(sec)   VLAN   Interface                FilterType   FilterStatus
---   -------------     ------------   ---------    ----   --------------------     ----------   ----------------------
Total number of bindings: 0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.2 Clear Ipv6 Dhcp Snooping Prefix

Use this command to clear all the user information in the DHCPv6 Snooping prefix list.

clear ipv6 dhcp snooping prefix [*mac* | **vlan** *vlan-id* | *ipv6-prefix* | **interface** *interface-id*]

Parameter Description

Parameter	Description
mac	Specifies the MAC address to be deleted.
vlan-id	Specifies the ID of the VLAN to be cleared.
ipv6-address	Specifies the IPv6 address to be cleared.
interface-id	Specifies the interface to be cleared.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to clear the generated user information in the DHCPv6 Snooping prefix list.

Configuration Examples The following example clears all the user information in the DHCPv6 Snooping binding database

```
FS# clear ipv6 dhcp snooping prefix
FS# show ipv6 dhcp snooping prefix
NO.   MacAddress        IPv6 Prefix   Lease(sec)   VLAN   Interface                    FilterType   FilterStatus
---   -------------     ------------  ---------    ----   --------------------         ----------   ----------------------
Total number of prefixes: 0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.3 Clear Ipv6 Dhcp Snooping Statistics

Use this command to clear the statistical information of the DHCPv6 packets.

clear ipv6 dhcp snooping statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to clear the statistical information of the DHCPv6 packets.

Configuration Examples The following example clears the statistical information of the DHCPv6 packets.

```
FS# clear ipv6 dhcp snooping statistics
FS# show ipv6 dhcp snooping statistics
Packets Processed by DHCPv6 Snooping = 0
Packets Dropped Because
Received on untrusted ports          = 0
Relay forward                        = 0
```

```
No binding entry                    = 0
Binding fail                        = 0
Unknown packet                      = 0
Unknown output interface            = 0
No enough memory                    = 0
Admin filter-dhcpv6-pkt             = 0
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.4 Ipv6 Dhcp Snooping

Use this command to enable the DHCPv6 Snooping function globally.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp snooping

no ipv6 dhcp snooping

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide The **show ip dhcpv6 snooping** command is used to display whether the DHCPv6 Snooping function is enabled.

Configuration Examples The following example enables the DHCPv6 Snooping function globally.

```
FS# configure terminal
FS(config)# ipv6 dhcp snooping
FS(config)# end
```

Related Commands

Command	Description
show ipv6 dhcp snooping	Displays the DHCPv6 Snooping .

Platform Description N/A

16.5 Ipv6 Dhcp Snooping Binding-delay

Use this command to add the dynamic binding entry to the hardware filtering list after the delay.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp snooping binding-delay *seconds*

no ipv6 dhcp snooping binding-delay

Parameter Description

Parameter	Description
seconds	Sets the binding delay time.

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide By default, the dynamic binding entries are added to the hardware filtering list in real time. With this command configured, if no IPv6 address conflict is detected within the specified time, the dynamic binding entries are added to the hardware filtering list.

Configuration Examples The following example sets the delay to 10 seconds.

```
FS(config)# ipv6 dhcp snooping binding-delay 10
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.6 Ipv6 Dhcp Snooping Database Write-delay

Use this command to write the dynamic user information of the DHCPv6 Snooping binding database into the flash periodically.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp snooping database write-delay *time*

no ipv6 dhcp snooping database write-delay

Parameter Description

Parameter	Description
time	The interval ranging from 600 to 86,400 in the unit of seconds, at which the system writes the dynamic user information of the DHCP Snooping database into the flash.

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide This function writes user information into flash and can avoid loss after restart. In that case, users need to obtain IP addresses again for normal communication.

Too fast writing will reduce flash durability.

Configuration Examples The following example sets the interval at which the switch writes the user information into the flash to 3,600 seconds.

```
FS# configure terminal
FS(config)# ip dhcp snooping database write-delay 3600
FS(config)# end
```

Related Commands

Command	Description
show ipv6 dhcp snooping	Displays the DHCPv6 Snooping configuration.

Platform Description N/A

16.7 Ipv6 Dhcp Snooping Database Write-to-flash

Use this command to write the dynamic user information of the DHCPv6 binding database into flash in real time.

ipv6 dhcp snooping database write-to-flash

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Global configuration mode

Usage Guide Use this command to write the dynamic user information of the DHCPv6 binding database into flash in real time.

Configuration Examples The following example writes the dynamic user information of the DHCPv6 binding database into flash.

```
FS# configure terminal
FS(config)# ipv6 dhcp snooping database write-to-flash
FS(config)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.8 Ipv6 Dhcp Snooping Filter-dhcp-pkt

Use this command to filter all received DHCPv6 request packets.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp snooping filter-dhcp-pkt

no ipv6 dhcp snooping filter-dhcp-pkt

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide Use this command to filter all received DHCPv6 request packets, that is, to avoid all the DHCPv6 users on this interface to apply for the addresses.

This command is valid only on 2-layer wired switch ports, aggregate ports and sub interfaces as well as in air interfaces.

Configuration Examples The following example filters all DHCPv6 request packets on interface FastEthernet 0/1 and WLAN 1.

```
FS# configure terminal
FS(config)# interface GigabitEthernet 0/2
FS(config-if-GigabitEthernet 0/2)# ipv6 dhcp snooping filter-dhcp-pkt
FS(config-if-GigabitEthernet 0/2)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.9 Ipv6 Dhcp Snooping Information Option

Use this command to add option18/37 to the DHCPv6 request packets.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp snooping information option [**standard-format**]

no ipv6 dhcp snooping information option [**standard-format**]

Parameter Description

Parameter	Description
standard-format	The Option18/37 uses the standard format.

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

With this command configured, the option18/37 will be added to the DHCPv6 request packets and the DHCPv6 server will assign the addresses according to the option18/37 information. Use this command without parameter **standard-format** to enable the standard format.

DHCPv6 Relay function adds option18/37 by default. Therefore, it is unnecessary to enable functions of DHCP Snooping option18/37 and DHCPv6 Relay at the same time.

Configuration Examples

The following example adds the option18/37 into the DHCPv6 packets.

```
FS# configure terminal
FS(config)# ipv6 dhcp snooping information option
FS(config)# end
FS# show ipv6 dhcp snooping
Switch DHCPv6 snooping status :ENABLE
DHCPv6 snooping vlan: 1-4094
DHCPv6 snooping database write-delay time: 0 seconds
DHCPv6 snooping option 18/37 status: ENABLE
DHCPv6 snooping link detection :DISABLE
Interface                    Trusted     Filter DHCP
----------------------  -------     ---------
FastEthernet0/10              yes          DISABLE
```

Related Commands

Command	Description
show ipv6 dhcp snooping	Displays the configuration information of the DHCPv6 Snooping.

Platform Description

N/A

16.10 Ipv6 Dhcp Snooping Information Option Format Remote-id

Use this command to add option37 remote-id customized character string into the DHCPv6 request packets.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp snooping information option format remote-id [**string** *ascii-string* | **hostname**]

no ipv6 dhcp snooping information option format remote-id [**string** *ascii-string* | **hostname**]

Parameter Description

Parameter	Description
string *ascii-string*	The content of Option37 remote-id extension format is customized character string.
hostname	The content of Option37 remote-id extension format is hostname.

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide With this command configured, the option37 remote-id will be added to the DHCPv6 request packets with the content as the customized and the DHCPv6 server will assign the addresses according to the option37 information.

Configuration Examples The following example adds the option37 remote-id to the DHCPv6 request packets with the content being hostname.

```
FS# configure terminal
FS(config)# ipv6 dhcp snooping information option format remote-id hostname
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.11 Ipv6 Dhcp Snooping Link-detection

Use this command to clear the dynamic binding entry on an interface when the interface links down. Use the **no** form of this command to restore the default setting.

ipv6 dhcp snooping link-detection

no ipv6 dhcp snooping link-detection

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide By default, the dynamic binding entries are not cleared on a wired interface when the interface links down. With

this function enabled, the dynamic binding entries are auto-cleared on an interface when the interface is in the LINK DOWN status.

Configuration Examples

The following example clears the dynamic binding entry on a wired interface when the interface is in the LINK DOWN status.

```
FS# configure terminal
FS(config)# ipv6 dhcp snooping link-detection
```

Related Commands

Command	Description
show ipv6 dhcp snooping	Displays the configuration information of the DHCPv6 Snooping.

Platform Description

N/A

16.12 Ipv6 Dhcp Snooping Trust

Use this command to set the specified DHCPv6 Snooping ports as the trusted ports.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp snooping trust

no ipv6 dhcp snooping trust

Parameter Description

Parameter	Description
N/A	N/A

Defaults

All ports are untrusted ports by default.

Command Mode

Interface configuration mode

Usage Guide

1. Use this command to set a port as a trusted port. The DHCPv6 Server response messages received under the trust port are forwarded normally, but the response messages received under the untrusted port will be discarded.
2. This command is valid only on Layer 2 wired switch ports and aggregate ports.

Configuration Examples

The following example sets **FastEthernet** *0/1* as a trust port:

```
FS# configure terminal
FS(config)# interface GigabitEthernet 0/1
FS(config-if)# ipv6 dhcp snooping trust
FS(config-if)# end
```

Related Commands

Command	Description
show ipv6 dhcp snooping	Displays the DHCPv6 Snooping configuration.

Platform Description N/A

16.13 Ipv6 Dhcp Snooping Vlan

Use this command to enable DHCPv6 Snooping for the specific VLAN.

Use the **no** form of this command to disable this function.

ipv6 dhcp snooping vlan { *vlan-rng* **|** { *vlan-min* [*vlan-max*] } }

no ipv6 dhcp snooping vlan { *vlan-rn* **|** { *vlan-min* [*vlan-max*] } }

Parameter Description

Parameter	Description
vlan-rng	Sets the valid VLAN range.
vlan-min	Minimum VLAN ID
vlan-max	Maximum VLAN ID

Defaults By default, once the DHCPv6 Snooping is enabled globally, it takes effect for all VLANs.

Command Mode Global configuration mode

Usage Guide With the global DHCPv6 snooping enabled, this function is enabled in all VLANs by default.

Configuration Examples The following example enables the DHCPv6 Snooping function in VLAN 1000.

```
FS# configure terminal
FS(config)# ipv6 dhcp snooping vlan 1000
FS(config)# end
```

The following example enables the DHCPv6 Snooping function in VLAN 1 to VLAN 10.

```
FS# configure terminal
FS(config)# ipv6 dhcp snooping vlan 1-10
FS(config)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.14 Ipv6 Dhcp Snooping Vlan Information Option Change-vlan-to Vlan

Use this command to enable the function of adding the option18 interface-is into the DHCP request packets and

change the VLAN to the specified VLAN for the forwarding.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp snooping vlan *vlan-id* **information option change-vlan-to vlan** *vlan-id*

no ipv6 dhcp snooping vlan *vlan-id* **information option change-vlan-to vlan** *vlan-id*

Parameter Description

Parameter	Description
vlan-id	Specifies the ID of the VLAN to be replaced.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

With this command enabled, the option18 interface-id will be added into the DHCPv6 request packets and the VLAN will be changed to the specified one and the DHCP server will assign the addresses according to the optionq8 information.

Configuration Examples

The following example adds the option18 interface-id into the DHCPv6 request packets and changes the VLAN4094 in the option to VLAN 4093.

```
FS# configure terminal
FS(config)# interface fastEthernet 0/1
FS(config-if)# ipv6 dhcp snooping vlan 4094 information option change-vlan-to vlan 4093
FS(config-if)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

16.15 Ipv6 Dhcp Snooping Vlan Information Option Format-type Interface-id string

Use this command to enable the function of adding the option18 into the DHCP request packets and filling the option18 interface-id with the content being the user-defined (the storage format is ASCII) and performing the packet forwarding.

Use the **no** form of this command to restore the default setting.

ipv6 dhcp snooping vlan *vlan-id* **information option format-type interface-id string** *ascii-string*

no ipv6 dhcp snooping vlan *vlan-id* **information option format-type interface-id string** *ascii-string*

Parameter Description

Parameter	Description
vlan-id	The VLAN where the DHCPv6 request packets are
ascii-string	User-defined content for filling the interface-id

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide With this command configured, the option18 interface-id will be added into the DHCPv6 request packets with the content being user-defined and the DHCPv6 server will assign the addresses according to the option18 information.

Configuration Examples The following example adds the option18 interface-id to the DHCPv6 request packets with the content being *port-name*.

```
FS# configure terminal
FS(config)# interface fastEthernet 0/1
FS(config-if)# ipv6 dhcp snooping vlan 4094 information option format-type interface-id string port-name
FS(config-if)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.16 Renew Ipv6 Dhcp Snooping Database

Use this command to import the information in current flash to the DHCPv6 Snooping binding database manually as needed.

renew ipv6 dhcp snooping database

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to import the flash file information to the DHCPv6 Snooping database in real time.

Records out of lease time and repeated will be neglected.

Configuration Examples The following example imports the flash file information to the DHCPv6 Snooping database.

```
FS# renew ipv6 dhcp snooping database
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.17 Show Ipv6 Dhcp Snooping

Use this command to display the setting of the DHCPv6 Snooping.

show ipv6 dhcp snooping

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the setting of the DHCPv6 Snooping.

```
FS# show ipv6 dhcp snooping
Switch DHCPv6 snooping status :ENABLE
DHCPv6 snooping vlan: 1-4094
DHCPv6 snooping database write-delay time: 0 seconds
DHCPv6 snooping option 18/37 status: DISABLE
DHCPv6 snooping link detection :DISABLE
Interface                    Trusted     Filter DHCP
----------------------  -------     ---------
FastEthernet0/10              yes          DISABLE
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.18 Show Ipv6 Dhcp Snooping Binding

Use this command to display the information of the DHCPv6 Snooping binding database.

show ipv6 dhcp snooping binding [*mac*] [**vlan** *vlan-id*] [*ipv6-address*] [**interface** *interface-id*]

Parameter Description

Parameter	Description
mac	Displays the MAC address binding entry.
vlan_id	Displays the VLAN binding entry.
ipv6-address	Displays the IPv6 address binding entry.
interface-id	Displays the interface binding entry.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the information of the DHCP Snooping binding database.

```
FS# show ipv6 dhcp snooping binding
Total number of bindings: 1
NO.    MacAddress          IPv6 Address                                    Lease(sec)    VLAN    Interface
----- -----------------    ------------------------------------------ ------------ ----- --------------------
1      00d0.f801.0101      2001::10                                        42368         2
GigabitEthernet 0/1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.19 Show Ipv6 Dhcp Snooping Prefix

Use this command to display all user information in the DHCPv6 Snooping prefix list.

show ipv6 dhcp snooping prefix [*mac* | **vlan** *vlan-id* | *ipv6-prefix* | **interface** *interface-id*]

Parameter Description

Parameter	Description
mac	Displays the MAC address prefix entry.
vlan_id	Displays the VLAN prefix entry.
ipv6-prefix	Displays the IPv6 address prefix entry.
interface-id	Displays the interface prefix entry.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays all user information in the DHCPv6 Snooping prefix list.

```
FS# show ipv6 dhcp snooping prefix
Total number of prefix: 1

NO.   MacAddress        IPv6 Prefix      Lease(sec)   VLAN        Interface
----- ----------------- ----------------------------------------------
1     00d0.f801.0101    2001:2002::      42368        2           GigabitEthernet 0/1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.20 Show Ipv6 Dhcp Snooping Statistics

Use this command to display the statistical information of the DHCPv6 packets.

show ipv6 dhcp snooping statistics

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the statistical information of the DHCPv6 packets.

```
FS# show ipv6 dhcp snooping statistics
Packets Processed by DHCPv6 Snooping = 0
Packets Dropped Because
Received on untrusted ports      = 0
Relay forward                    = 0
No binding entry                 = 0
Binding fail                     = 0
Unknown packet                   = 0
```

```
Unknown output interface        = 0
No enough memory                = 0
Admin filter-dhcpv6-pkt         = 0
```

Field	Description
Received on untrusted ports	The discarded server response packets on the untrust port.
Relay forward	The packets that have been relayed once are discarded.
No binding entry	The binding entries of the release/decline packets are in-existent or error and the packets are discarded.
Binding fail	The entry binding fails and the packets are discarded due to a lack of the hardware resources.
Unknown packet	The unknown DHCP packets.
Unknown output interface	The packets on the unknown output interface. The MAC address for the interface is not found or the trust port is not configured.
No enough memory	There is no enough memory.
Admin filter-dhcpv6-pkt	The filtered DHCPv6 packets configured by the administrator. Use the **ipv6 dhcp snooping filter-dhcp-pkt** command to filter the packets.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

16.21 Show Ipv6 Dhcp Snooping Vlan

Use this command to display the VLAN with DHCPv6 Snooping function disabled.

show ipv6 dhcp snooping vlan

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to display the VLAN with DHCPv6 Snooping function disabled.

Configuration Examples

The following example displays the VLAN with DHCPv6 Snooping function disabled.

```
FS#show ipv6 dhcp snooping vlan
VLAN Name            Closed
---- ------------ -------
2      VLAN 2          YES
```

Field	Description
VLAN	VLAN ID
NAME	VLAN name
Close	Indicates whether DHCPv6 Snooping is disabled.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

17. ARP-Check Commands

17.1 Arp-check

Use this command to enable the ARP check function on the Layer 2 interface.

Use the **no** form of this command to restore the default setting.

arp-check

no arp-check

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command mode Interface configuration mode

Usage Guide The ARP check function generates the ARP filtering information according to legal user information, implementing the illegal ARP packet filtering on the network.

Configuration Examples This following example enables the APR check function on interface GigabitEthernet 0/1.

```
FS# configure terminal
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# arp-check
FS(config-if-GigabitEthernet 0/1)# end
```

Related Commands

Command	Description
show interfaces arp-check list	Displays the ARP check entries.

Platform Description N/A

17.2 Show Interface Arp-check List

Use this command to display the ARP check entries on the Layer 2 interface.

show { **interface** [*interface-type interface-number*]] } **arp-check list**

Parameter Description

Parameter	Description
interface-type	Wired interface type
interface-number	Wired interface number

Command mode Privileged EXEC mode

Usage Guide Use this command to display the ARP check entries.

Configuration Examples The following example displays the ARP check entries.

```
FS(config)#show interface arp-check list
INTERFACE                    SENDER MAC     SENDER IP      POLICY SOURCE
------------------------ ---------------- ---------------- --------------------
GigabitEthernet 0/1          00D0.F800.0003   192.168.1.3          address-bind
GigabitEthernet 0/1          00D0.F800.0001   192.168.1.1          port-security
GigabitEthernet 0/4                           192.168.1.3          port-security
GigabitEthernet 0/5          00D0.F800.0003   192.168.1.3          address-bind
GigabitEthernet 0/7          00D0.F800.0006   192.168.1.6          AAA ip-auth-mode
GigabitEthernet 0/8          00D0.F800.0007   192.168.1.7          GSN
```

Field	Description
INTERFACE	Interface name
SENDER MAC	Source MAC address
SENDER IP	Source IP address
POLICY SOURCE	Source of the entry

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

18. DAI Commands

18.1 Ip Arp Inspection Trust

Use this command to configure the L2 port to a trusted port.

Use the **no** form of this command to restore the L2 port to an untrusted port.

ip arp inspection trust

no ip arp inspection trust

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The L2 port is untrusted.

Command Mode

Interface configuration mode

Usage Guide

If it is necessary to make the ARP message received by some interface pass the DAI inspection unconditionally, you can set the interface to a trusted port, indicating that you do not need to check whether the ARP message received by this interface is legal.

Configuration Examples

The following example sets the gigabitEthernet 0/19 interface as the trusted port.

```
FS# configure terminal
FS(config)# interface gigabitEthernet 0/19
FS(config-if-GigabitEthernet 0/19)# ip arp inspection trust
FS(config-if-GigabitEthernet 0/19)# end
```

Related Commands

Command	Description
show ip arp inspection interface	Displays related DAI information on the interface, including the trust state and rate limit of the interface.

Platform Description

N/A

18.2 Ip Arp Inspection Vlan

Use this command to configure the DAI function on the VLAN.

Use the **no** form of this command to disable this function.

ip arp inspection vlan { *vlan-id* | *word* }

no ip arp inspection vlan { *vlan-id* | *word* }

Parameter Description

Parameter	Description
vlan-id	VLAN ID, ranging from 1 to 4094
word	String of the VLAN range, such as 1,3-5,7,9-11

Defaults

The DAI function on all VLANs is disabled by default.

Command Mode

Global configuration mode

Usage Guide

To make this command take effect, you need to enable the ARP Check function first,

Not all ports of the VLAN support the ARP packet detection function. For example, the DHCP Snooping Trust port does not support any security detection, including this function.

Configuration Examples

The following example detects the received ARP packets on the VLAN1 interfaces:

```
FS# configure terminal
FS(config)# ip arp inspection
FS(config)# ip arp inspection vlan 1
FS(config)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

18.3 Interface

Use this command to verify whether the interface is a DAI trust interface.

show ip arp inspection interface

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

Use this command to verify whether the interface is a DAI trust interface.

Configuration

The following example verifies the DAI trust state of all :

Examples

```
FS#show ip arp inspection interface
Interface                Trust State
---------------------    -----------
GigabitEthernet 0/1          Untrusted
Default                      Untrusted
```

Parameter Description:

Parameter	Description
Interface	Interface name.
Trust State	DAI trust state.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

18.4 Show Ip Arp Inspection Vlan

Use this command to verify whether the DAI function on the VLAN is enabled.

show ip arp inspection vlan [*vlan-id* | *word*]

Parameter Description

Parameter	Description
vlan-id	VLAN ID, ranging from 1 to 4094
word	String of the VLAN range, such as 1,3-5,7,9-11

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

Use this command to verify whether the DAI function on the VLAN is enabled.

Configuration Examples

The following example verifies whether the DAI function on the VLAN is enabled:

```
FS# show ip arp inspection vlan
Vlan        Configuration
----        -------------
1                                                    Active
```

Parameter Description:

Parameter	Description
Vlan	VLAN number.
Configuration	DAI status (active / inactive)

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

19. IP Source Guard Commands

19.1 Ip Source Binding

Use this command to add static user information to IP source address binding database.

Use the **no** form of this command to delete static user information from IP source address binding database.

ip source binding *mac-address* **{ vlan** *vlan-id* **}** *ip-address* { **interface** *interface-id* **| ip-mac | ip-only** }

no ip source binding *mac-address* **{ vlan** *vlan-id* **}** *ip-address* { **interface** *interface-id* **| ip-mac | ip-only** }

Parameter Description

Parameter	Description
mac-address	Adds user MAC address statically.
vlan-id	Adds user VLAN ID statically.
ip-address	Adds user IP address statically.
interface-id	Adds user interface ID statically.
ip-mac	The global binding type is IP+MAC
ip-only	The global binding type is IP only.

Defaults

No static address is added by default.

Command Mode

Global configuration mode

Usage Guide

This command allows specific clients to go through IP source guard detection instead of DHCP.

This command is supported on the wired L2 switching port, AP port, and sub interface.

This command enables global binding for IP source guard so that specific clients will get detected on all interfaces.

A static IPv6 source binding is valid either on wired interfaces or in global configuration mode.

A new binding will overwrite the old one sharing the same configuration.

Configuration Examples

The following example adds the interface ID of static users.

```
FS# configure terminal
FS(config)# ip source binding 0000.0000.0001 vlan 1 1.1.1.1 interface GigabitEthernet 0/1
FS(config)# end
```

The following example adds static user information based on IP-MAC binding.

```
FS# configure terminal
FS(config)# ip source binding 0000.0000.0001 vlan 1 1.1.1.1 ip-mac
FS(config)# end
```

The following example adds static user information based on IP binding.

```
FS# configure terminal
FS(config)# ip source binding 0000.0000.0001 vlan 1 1.1.1.1 ip-only
FS(config)# end
```

Related Commands

Command	Description
show ip source binding	Displays the binding information of IP source address and database.

Platform Description

N/A

19.2 Ip Verify Source

Use this command to enable IP Source Guard function on the interface.

Use the **no** form of this command to restore the default setting.

ip verify source [**port-security**]

no ip verify source

Parameter Description

Parameter	Description
port-security	Configures IP Source Guard to do IP+MAC-based detection.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

This command enables IP Source Guard function on the interface to do IP-based or IP+MAC-based detection.

This command is supported on the wired L2 switching port, AP port, and sub interface

IP Source Guard takes effect only on DHCP Snooping untrusted port. In other words, IP Source Guard does not take effect when configuring it on Trust port or the port which is not controlled by DHCP Snooping.

Configuration Examples

The following example enables IP-based IP Source Guard function.

```
FS# configure terminal
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# ip verify source
FS(config-if)# end
```

The following example enables IP+MAC-based IP Source Guard function.

```
FS# configure terminal
FS(config)# interface GigabitEthernet 0/2
FS(config-if-GigabitEthernet 0/2)# ip verify source port-security
FS(config-if)# end
```

Related Commands

Command	Description
show ip verify source	Displays user filtering entry of IP Source Guard.

Platform Description

N/A

19.3 Ip Verify Source Exclude-vlan

Use this command to exclude a VLAN from the IP source guard configuration on the port.

Use the **no** form of this command to restore the function.

ip verify source exclude-vlan *vlan-id*

no ip verify source exclude-vlan *vlan-id*

Parameter Description

Parameter	Description
vlan-id	The ID of VLAN excluded from the IP source guard configuration.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

- This command is used to exclude a VLAN from the IP source guard configuration. IP packets in this VLAN are forwarded without being checked and filtered.
- Once the IP source guard function is disabled, the excluded VLAN is cleared automatically.
- This command is supported on the wired L2 switching port, AP port, and sub interface.

Only when the IP source guard configuration is enabled on the port can a VLAN be excluded.

Configuration Examples

The following example configuration configures the IP source guard configuration for the port and excludes a VLAN.

```
FS# configure terminal
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# ip verify source
FS(config-if-GigabitEthernet 0/1)# ip verify exclude-vlan 1
FS(config-if)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

19.4 Show Ip Source Binding

Use this command to display the binding information of IP source addresses and database.

show ip source binding [*ip-address*] [*mac-address*] [**dhcp-snooping**] [**static**] [**vlan** *vlan-id*] [**interface** *interface-id*]

Parameter Description

Parameter	Description
ip-address	Displays user binding information of corresponding IP.
mac-address	Displays user binding information of corresponding MAC.
dhcp-snooping	Displays binding information of dynamic user.
static	Displays binding information of static user.
vlan-id	Displays user binding information of corresponding VLAN.
interface-id	Displays user binding information of corresponding interface.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the binding information of IP source guard addresses and database.

```
FS# show ip source binding static
FS#show ip source binding static
Total number of bindings: 5
NO.   MACADDRESS        IPADDRESS       LEASE(SEC)   TYPE      VLAN        INTERFACE
----- ---------------- --------------- ------------ ------------ ----- -----------------
1     0001.0002.0001    1.2.3.2         Infinite     Static      1          Global
2     0001.0002.0002    1.2.3.3         Infinite     Static      1          GigabitEthernet 0/5
3     0001.0002.0003    1.2.3.4         Infinite     Static      1          Global
4     0001.0002.0004    1.2.3.5         Infinite     Static      1          Global
```

Related Commands

Command	Description
ip source binding	Sets the binding static user.

Platform Description N/A

19.5 Show Ip Verify Source

Use this command to display user filtering entry of IP Source Guard.

show ip verify source [**interface** *interface-id*]

Parameter Description

Parameter	Description
interface-id	Displays user filtering entry of corresponding interface.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

If IP Source Guard is not enabled on the corresponding interface, the printing information will be shown on the terminal as: "IP source guard is not configured on the interface FastEthernet 0/10"

Now, IP Source Guard supports the following filtering modes:

inactive-restrict-off: the IP Source Guard is disabled on bound interfaces.

inactive--not-apply: the IP Source Guard cannot adds bound entries into filtering entries for system errors.

active: the IP Source Guard is active.

Configuration Examples

The following example displays user filtering entry of IP Source Guard.

```
FS # show ip verify source
Total number of bindings: 7
NO.    INTERFACE            FILTERTYPE    FILTERSTATUS            IPADDRESS         MACADDRESS          VLAN
TYPE
----- -------------------- ----------- ---------------------    --------------- --------------- -------- -------------
1      Global                    IP+MAC         Inactive-not-apply       192.168.0.127     0001.0002.0003    1
Static
2      GigabitEthernet 0/5   IP-ONLY       Active                        1.2.3.4             0001.0002.0004    1
DHCP-Snooping
3      Global                    IP-ONLY       Active                        1.2.3.7             0001.0002.0007    1
Static
4      Global                    IP+MAC         Active                        1.2.3.6             0001.0002.0006    1
Static
5      GigabitEthernet 0/1   UNSET          Inactive-restrict-off   1.2.3.9             0001.0002.0009    1
DHCP-Snooping
6      GigabitEthernet 0/5   IP-ONLY       Active                        Deny-All
```

Related Commands

Command	Description
ip verify source	Sets IP Source Guard on the interface.

Platform Description

N/A

20. IPv6 Source Guard Commands

20.1 Ipv6 Source Binding

Use this command to configure a static IPv6 source binding.

Use the **no** form of this command to delete a static IPv6 source binding.

ipv6 source binding *mac-address* **vlan** *vlan-id ipv6-address* { **interface** *interface-id* | | **ip-mac** | **ip-only** }

no ipv6 source binding *mac-address* **vlan** *vlan-id ipv6-address* { **interface** *interface-id* | | **ip-mac** | **ip-only** }

Parameter Description

Parameter	Description
mac-address	MAC address
vlan-id	VLAN ID
ipv6-address	IPv6 address
interface-id	Wired interface ID
ip-mac	IPv6-MAC binding
ip-only	IPv6-only binding

Defaults

No static IPv6 source binding is configured by default.

Command Mode

Global configuration mode

Usage Guide

- Use this command to exempt trusted hosts from IPv6 source guard.
- This command is supported only on Layer 2 ports, aggregate ports and encapsulated sub interfaces.

A static IPv6 source binding is valid either on wired interfaces or in global configuration mode.

A new binding will overwrite the old one sharing the same configuration.

Configuration Examples

The following example configures static IPv6 source bindings on GigabitEthernet 0/1.

```
FS# configure terminal
FS(config)# ipv6 source binding 0000.0000.0001 vlan 1 1::1 interface GigabitEthernet 0/1
FS(config)# end
```

The following example configures a static IPv6-MAC binding.

```
FS# configure terminal
FS(config)# ipv6 source binding 0000.0000.0001 vlan 1 1::1 ip-mac
FS(config)# end
```

The following example configures a static IPv6-only binding.

```
FS# configure terminal
FS(config)# ipv6 source binding 0000.0000.0001 vlan 1 1::1 ip-only
FS(config)# end
```

Platform

N/A

Description

20.2 Ipv6 Verify Source

Use this command to enable IPv6 source guard.

Use the **no** form of this command to restore the default setting.

ipv6 verify source [**port-security**]

no ipv6 verify source

Parameter Description

Parameter	Description
port-security	Enables source IPv6-MAC filtering.

Defaults

IPv6 source guard is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

Use this command to enable IPv6 source guard with source IPv6 filtering or source IPv6-MAC filtering.

This command is supported only on Layer 2 ports, aggregate ports and encapsulated sub interface.

Currently, the IPv6 source guard feature of FS devices filters traffic based on the DHCPv6 Snooping database or on manually configured IPv6 source bindings. A port with only IPv6 source guard enabled cannot realize normal network access for connected hosts.

Configuration Examples

The following example enables IPv6 source guard based on source IPv6 filtering.

```
FS# configure terminal
FS(config)# interface GigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# ipv6 verify source
FS(config-if)# end
```

The following example enables IPv6 source guard based on source IPv6-MAC filtering.

```
FS# configure terminal
FS(config)# interface GigabitEthernet 0/2
FS(config-if-GigabitEthernet 0/2)# ipv6 verify source port-security
FS(config-if)# end
```

Platform Description

N/A

20.3 Show Ipv6 Source Binding

Use this command to display the IPv6 source binding database.

show ipv6 source binding [*ipv6-address*] [*mac-address*] [**dhcp-snooping**] [**static**] [**vlan** *vlan-id*] [**interface** *interface-id*]

Parameter Description

Parameter	Description
ipv6-address	Displays the source IPv6 address bindings.
mac-address	Displays the source MAC address bindings.
dhcp-snooping	Displays the DHCP snooping bindings.
static	Displays the static IPv6 source bindings.
vlan-id	Displays the VLAN bindings.
interface-id	Displays the interface bindings.

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the IPv6 source binding database.

```
FS# show ipv6 source binding
Total number of bindings: 7
NO.        Filter Type    Filter Status                IPv6 Address                                        MACAddress
VLAN Type    Interface
------    -----------    ----------------------    ------------------------------------------ ---------------    ----    ---------------    -------------------
1          IPv6+MAC        Inactive-system-error      2000::127                                              0001.0002.0003
1        Static                Global
2          IPv6-ONLY       Active                          2008::4                                              0001.0002.0004
1       DHCPv6-Snooping       GigabitEthernet 0/5
3          IPv6-ONLY       Active                          2008::7                                              0001.0002.0007
1        Static                Global
4          IPv6+MAC        Active                           2008::1
0001.0002.0006      1         Static                Global
5          UNSET             Inactive-restrict-off      2008::9                                              0001.0002.0009      1
DHCPv6-Snooping       GigabitEthernet 0/1
6          IPv6-ONLY       Active                          Deny-All
                                                          GigabitEthernet 0/5
```

Platform Description

N/A

21. Anti-ARP Spoofing Commands

21.1 Anti-arp-spoofing Ip

Use this command to enable anti-ARP spoofing.

Use the **no** form of this command to disable this function.

anti-arp-spoofing ip *ip-address*

no anti-arp-spoofing ip *ip-address*

Parameter Description

Parameter	Description
ip-address	Gateway IP address

Defaults

The anti-ARP spoofing function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

This command is used to enable anti-ARP spoofing on only L2 interfaces.

Use the **show anti-arp-spoofing** command to display the configuration.

Configuration Examples

The following example enables anti-ARP spoofing.

```
FS(config)#interface fastEthernet 0/1
FS(config-if)#anti-arp-spoofing ip 192.168.1.1
```

Related Commands

Command	Description
show anti-arp-spoofing	Displays the anti-ARP spoofing configuration.

Platform Description

N/A

21.2 Show Anti-arp-spoofing

Use this command to display the anti-ARP spoofing configuration on all interfaces.

show anti-arp-spoofing

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide This command is used to display the anti-ARP spoofing configuration on all interfaces.

Configuration Examples The following example displays the anti-ARP-spoofing configuration on all interfaces.

```
FS#show anti-arp-spoofing
NO      PORT          IP                STATUS
----- ---------- ---------------- ----------
1       Gi0/1         192.168.1.1       active
```

Field Description

Field	Description
NO	Order number
PORT	Port number
IP	Gateway IP
STATUS	Anti-ARP spoofing status

Related Commands

Command	Description
anti-arp-spoofing ip	Configures anti-ARP spoofing.

Platform Description N/A

22. NFPP Commands

22.1 Arp-guard Attack-threshold

Use this command to set the global attack threshold. When the packet rate exceeds the attack threshold, the attack occurs.

Use the **no** or **default** form of this command to restore the default setting.

arp-guard attack-threshold { **per-src-ip** | **per-src-mac** | **per-port** } *pps*

no arp-guard attack-threshold { **per-src-ip** | **per-src-mac** | **per-port** }

default arp-guard attack-threshold { **per-src-ip** | **per-src-mac** | **per-port** }

Parameter Description

Parameter	Description
per-src-ip	Sets the attack threshold for each source IP address.
per-src-mac	Sets the attack threshold for each source MAC address.
per-port	Sets the attack threshold for each port.
pps	Sets the attack threshold, in the range from 1 to 19,999 in unit of pps.

Defaults

The default value varies with products. For details, see the *Configuration Guide*.

Command Mode

NFPP configuration mode.

Usage Guide

The attack threshold shall be equal to or greater than the rate-limit threshold.

Configuration Examples

The following example sets the global attack threshold.

```
FS(config)# nfpp
FS(config-nfpp)# arp-guard attack-threshold per-src-ip 2
FS(config-nfpp)# arp-guard attack-threshold per-src-mac 3
FS(config-nfpp)# arp-guard attack-threshold per-port 50
```

Related Commands

Command	Description
nfpp arp-guard policy	Displays the rate-limit threshold and attack threshold.
show nfpp arp-guard summary	Displays the configuration.
show nfpp arp-guard hosts	Displays the monitored host.
clear nfpp arp-guard hosts	Clears the isolated host.

Platform Description

N/A

22.2 Arp-guard Enable

Use this command to enable the anti-ARP guard function globally.

Use the **no** or **default** form of this command to restore the default setting.

arp-guard enable

no arp-guard enable

default arp-guard enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode NFPP configuration mode.

Usage Guide N/A

Configuration Examples The following example enables the anti-ARP guard function globally.

```
FS(config)# nfpp
FS(config-nfpp)# arp-guard enable
```

Related Commands

Command	Description
nfpp arp-guard enable	Enables the anti-ARP attack on the interface.
show nfpp arp-guard summary	Displays the configuration.

Platform Description N/A

22.3 Arp-guard Isolate-period

Use this command to set the arp-guard isolate time globally.

Use the **no** or **default** form of this command to restore the default setting.

arp-guard isolate-period { *seconds* | **permanent** }

no arp-guard isolate-period

default arp-guard isolate-period

Parameter Description

Parameter	Description
seconds	Sets the isolate time. The value is 0, or in the range from 30 to 86400 in the unit of seconds.
permanent	Permanent isolation.

Defaults The default isolate time is 0, which means no isolation.

Command Mode NFPP configuration mode.

Usage Guide N/A

Configuration Examples The following example sets the arp-guard isolate time globally to 180 seconds.

```
FS(config)# nfpp
FS(config-nfpp)# arp-guard isolate-period 180
```

Related Commands

Command	Description
nfpp arp-guard isolate-period	Sets the isolate time on the interface.
show nfpp arp-guard summary	Displays the configuration.

Platform Description N/A

22.4 Arp-guard Isolate-forwarding Enable

Use this command to enable packet forwarding through NFPP isolation.

Use the **no** form of this command to disable this function.

Use the **default** form of this command to restore the default setting.

arp-guard isolate-forwarding enable

no arp-guard isolate-forwarding enable

default arp-guard isolate-forwarding enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example enables packet forwarding through NFPP isolation.

```
FS(config)# nfpp
FS(config-nfpp)# arp-guard isolate-forwarding enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

22.5 Arp-guard MonitoRed-host-limit

Use this command to set the maximum monitored host number.

Use the **no** or **default** form of this command to restore the default setting.

arp-guard monitored-host-limit *number*

no arp-guard monitored-host-limit

default arp-guard monitored-host-limit

Parameter Description

Parameter	Description
number	The maximum monitored host number, in the range from 1 to 4,294,967,295.

Defaults

The default is 20000.

Command Mode

NFPP configuration mode

Usage Guide

If the monitored host number has reached the default 20,000, the administrator shall set the max-number smaller than 20,000 and it will prompt the message that %ERROR: The value that you configured is smaller than current monitored hosts 20,000, please clear a part of monitored hosts to remind the administrator of the invalid configuration and removing the monitored hosts.

When the maximum monitored host number has been exceeded, it prompts the message that % NFPP_ARP_GUARD-4-SESSION_LIMIT: Attempt to exceed limit of 20000 monitored hosts to remind the administrator.

Configuration Examples

The following example sets the maximum monitored host number to 200.

```
FS(config)# nfpp
FS(config-nfpp)# arp-guard monitored-host-limit 200
```

Related Commands

Command	Description
show nfpp arp-guard summary	Displays the configuration.

Platform Description

N/A

22.6 Arp-guard Monitor-period

Use this command to configure the arp guard monitor time.

Use the **no** or **default** form of this command to restore the default setting.

arp guard monitor-period *seconds*

no arp-guard monitor-period

default arp-guard monitor-period

Parameter Description

Parameter	Description
seconds	Sets the monitor time, in the range from 180 to 86,400 in the unit of seconds.

Defaults

The default is 600.

Command Mode

NFPP configuration mode

Usage Guide

When the attacker is detected, if the isolate period is 0, the attacker will be monitored by the software and the timeout time will be the monitor period. During the software monitoring, if the isolate period is not 0, the software-monitored attacker will be auto-isolated by the hardware and the timeout time will be the isolate period. The monitor period is valid with the isolate period 0.

If the isolate period has changed to be 0, the attackers on the interface will be removed rather than being monitored by the software.

Configuration Examples

The following example sets the arp guard monitor time to 180 seconds.

```
FS(config)# nfpp
FS(config-nfpp)# arp-guard monitor-period 180
```

Related Commands

Command	Description
show nfpp arp-guard summary	Displays the configuration.
show nfpp arp-guard hosts	Displays the monitored host list.
clear nfpp arp-guard hosts	Clears the isolated host.

Platform Description

N/A

22.7 Arp-guard Rate-limit

Use this command to set the arp guard rate limit.

Use the **no** or **default** form of this command to restore the default setting.

arp-guard rate-limit { **per-src-ip** | **per-src-mac** | **per-port** } *pps*

no arp-guard rate-limit { **per-src-ip** | **per-src-mac** | **per-port** }

default arp-guard rate-limit { **per-src-ip** | **per-src-mac** | **per-port** }

Parameter Description

Parameter	Description
per-src-ip	Sets the rate limit for each source IP address.
per-src-mac	Sets the rate limit for each source MAC address.
per-port	Sets the rate limit for each port.
pps	Sets the rate limit, in the range of 1 to 19,999.

Defaults

The default value varies with products. For details, see the *Configuration Guide*.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example sets the arp guard rate limit.

```
FS(config)# nfpp
FS(config-nfpp)# arp-guard rate-limit per-src-ip 2
FS(config-nfpp)# arp-guard rate-limit per-src-mac 3
FS(config-nfpp)# arp-guard rate-limit per-port 50
```

Related Commands

Command	Description
nfpp arp-guard policy	Sets the rate limit and the attack threshold.
show nfpp arp-guard summary	Displays the configuration.

Platform Description N/A

22.8 Arp-guard Ratelimit-forwarding Enable

Use this command to set the port based arp guard rate limit.

Use the **no** form of this command to disable this function.

Use the **default** form of this command to restore the default setting.

arp-guard ratelimit-forwarding enable

no arp-guard ratelimit-forwarding enable

default arp-guard ratelimit-forwarding enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example sets the port based arp guard rate limit.

```
FS(config)# nfpp
FS(config-nfpp)# arp-guard ratelimit-forwarding enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

22.9 Arp-guard Scan-threshold

Use this command to set the global scan threshold.

Use the **no** or **default** form of this command to restore the default setting.

arp-guard scan-threshold *pkt-cnt*

no arp-guard scan-threshold

default arp-guard scan-threshold

Parameter Description

Parameter	Description
pkt-cnt	Sets the scan threshold, in the range from 1 to 19,999 in the unit of seconds.

Defaults

The default value varies with products. For details, see the *Configuration Guide*.

Command Mode

NFPP configuration mode

Usage Guide

The scanning may occur on the condition that:

- More than 15 packets are received within 10 seconds;
- The source MAC address for the link layer is constant while the source IP address is uncertain;
- The source MAC and IP address for the link layer is constant while the destination IP address is uncertain.

Configuration Examples

The following example sets the global scan threshold to 20pps.

```
FS(config)# nfpp
FS(config-nfpp)# arp-guard scan-threshold 20
```

Related Commands

Command	Description
nfpp arp-guard scan-threshold	Sets the scan threshold on the port.
show nfpp arp-guard summary	Displays the configuration.
show nfpp arp-guard scan	Displays the ARP guard scan table.
clear nfpp arp-guard scan	Clears the ARP guard scan table.

Platform Description

N/A

22.10 Clear Nfpp Arp-guard Hosts

Use this command to clear the monitored host isolation.

clear nfpp arp-guard hosts [**vlan** *vid*] [**interface** *interface-id*] [*ip-address* | *mac-address*]

Parameter Description

Parameter	Description
vid	Sets the VLAN ID.
interface-id	Sets the interface name and number.
ip-address	Sets the IP address.
mac-address	Sets the MAC address.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example clears the monitored host isolation.

```
FS# clear nfpp arp-guard hosts vlan 1 interface g0/1
```

Related Commands

Command	Description
arp-guard attack-threshold	Sets the global attack threshold.
nfpp arp-guard policy	Sets the limit threshold and attack threshold.
show nfpp arp-guard hosts	Displays the monitored host.

Platform Description N/A

22.11 Clear Nfpp Arp-guard Scan

Use this command to clear ARP scanning table.

clear nfpp arp-guard scan

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example clears ARP scanning table.

```
FS# clear nfpp arp-guard scan
```

Related Commands

Command	Description
arp-guard attack-threshold	Sets the global attack threshold.
nfpp arp-guard policy	Sets the attack threshold.
show nfpp arp-guard scan	Displays the ARP scanning table.

Platform Description N/A

22.12 Clear Nfpp Define Name Hosts

Use this command to clear the monitored hosts. If the host is isolated, you need to release it.

clear nfpp define *name* **hosts** [**vlan** *vid*] [**interface** *interface-id*] [*ip-address*] [*mac-address*] [*ipv6-address*]

Parameter Description

Parameter	Description
name	Defines guard name
vid	VLAN ID
interface-id	Interface name
ip-address	IP address
mac	MAC address
ipv6-address	IPv6 address

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command without the parameter to clear all monitored hosts in the self-defined range.

Configuration Examples The following example clears the monitored hosts.

```
FS# clear nfpp define tcp hosts vlan 1 interface g 0/1
```

Related Commands

Command	Description
show nfpp define hosts	Displays the isolated hosts.

Platform Description N/A

22.13 Clear Nfpp Dhcp-guard Hosts

Use this command to clear the DHCP monitored hosts, that it, release them from isolation.

clear nfpp dhcp-guard hosts [**vlan** *vid*] [**interface** *interface-id*] [*mac-address*]

Parameter Description

Parameter	Description
vid	Sets the VLAN ID.
interface-id	Sets the interface name and number.
mac-address	Sets the MAC address.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command without the parameter to clear all monitored hosts.

Configuration Examples The following example clears the DHCP monitored hosts.

```
FS# clear nfpp dhcp-guard hosts vlan 1 interface g0/1
```

Related Commands

Command	Description
dhcp-guard attack-threshold	Sets the global attack threshold.
nfpp dhcp-guard policy	Sets the limit threshold and attack threshold.
show nfpp dhcp-guard hosts	Displays the monitored host.

Platform Description N/A

22.14 Clear Nfpp Dhcpv6-guard Hosts

Use this command to clear the DHCPv6 monitored host isolation.

clear nfpp dhcpv6-guard hosts [**vlan** *vid*] [**interface** *interface-id*] [*mac-address*]

Parameter Description

Parameter	Description
vid	Sets the VLAN ID.
interface-id	Sets the interface name and number.
mac-address	Sets the MAC address.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command without the parameter to clear all monitored hosts

Configuration Examples The following example clears the DHCPv6 monitored hosts.

```
FS# clear nfpp dhcpv6-guard hosts vlan 1 interface g0/1
```

Related Commands

Command	Description
dhcpv6-guard attack-threshold	Sets the global attack threshold.
nfpp dhcpv6-guard policy	Sets the limit threshold and attack threshold.
show nfpp dhcpv6-guard hosts	Displays the monitored host.

Platform Description N/A

22.15 Clear Nfpp Icmp-guard Hosts

Use this command to clear the ICMP monitored hosts.

clear nfpp icmp-guard hosts [**vlan** *vid*] [**interface** *interface-id*] [*ip-address*]

Parameter Description

Parameter	Description
vid	Sets the VLAN ID.
interface-id	Sets the interface name and number.
ip-address	Sets the IP address.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide Use this command without the parameter to clear all monitored hosts.

Configuration Examples The following example clears the ICMP monitored hosts.

```
FS# clear nfpp icmp-guard hosts vlan 1 interface g0/1
```

Related Commands

Command	Description
icmp-guard attack-threshold	Sets the global attack threshold.
nfpp icmp-guard policy	Sets the limit threshold and attack threshold.
show nfpp icmp-guard hosts	Displays the monitored host.

Platform Description N/A

22.16 Clear Nfpp Ip-guard Hosts

Use this command to clear the monitored host isolation.

clear nfpp ip-guard hosts [**vlan** *vid*] [**interface** *interface-id*] [*ip-address*]

Parameter Description

Parameter	Description
vid	Sets the VLAN ID.
interface-id	Sets the interface name and number.
ip-address	Sets the IP address.

Defaults N/A.

Command Mode Privileged EXEC mode

Usage Guide Use this command without the parameter to clear all monitored hosts.

Configuration Examples The following example clears the monitored host isolation.

```
FS# clear nfpp ip-guard hosts vlan 1 interface g0/1
```

Related Commands

Command	Description
ip-guard attack-threshold	Sets the global attack threshold.
nfpp ip-guard policy	Sets the limit threshold and attack threshold.
show nfpp ip-guard hosts	Displays the monitored host.

Platform Description N/A

22.17 Clear Nfpp Nd-guard Hosts

Use this command to remove the speed limit on the monitored host.

clear nfpp nd-guard hosts [**vlan** *vid*] [**interface** *interface-id*]

Parameter Description

Parameter	Description
vid	Sets the VLAN ID.
interface-id	Sets the interface name and number.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command without any parameter is used to remove speed limit on all monitored hosts.

Configuration Examples The following example removes speed limit on interface g0/1 in VLAN 1.

```
FS# clear nfpp nd-guard hosts vlan 1 interface g0/1
```

Prompt Messages N/A

Platform Description N/A

22.18 Clear Nfpp Log

Use this command to clear the NFPP log buffer area.

clear nfpp log

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example clears the NFPP log buffer area.

```
FS# clear nfpp log
```

Related Commands

Command	Description
show nfpp log	Displays the NFPP log configuration or the log buffer area.

Platform Description N/A

22.19 Cpu-protect sub-interface { manage | protocol | route } percent

Use this command to configure the percent value of each type of packets occupied in the buffer area. Use the **no** or **default** form of this command to restore the default setting.

cpu-protect sub-interface { **manage** | **protocol** | **route** } **percent** *percent_value*

no cpu-protect sub-interface { **manage** | **protocol** | **route** } **percent**

default cpu-protect sub-interface { **manage** | **protocol** | **route** } **percent**

Parameter Description

Parameter	Description
percent_value	The percent value, in the range from 1 to 100.

Defaults

The default percent values of each type of packets occupied in the buffer area are:

Manage packets: 30;

Route packets: 25;

Protocol packets: 45.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the percent value of management packets in the buffer area to 60.

```
FS(config)# cpu-protect sub-interface manage percent 60
```

Related Commands

Command	Description
cpu-protect sub-interface { **manage** | **protocol** | **route** } *pps*	Configures the traffic bandwidth of each type of packets.

Platform Description

N/A

22.20 Cpu-protect sub-interface { manage | protocol | route } pps

Use this command to configure the traffic bandwidth of each type of packets.

Use the **no** or **default** form of this command to restore the default setting.

cpu-protect sub-interface { **manage** | **protocol** | **route** } **pps** *pps_vaule*

no cpu-protect sub-interface { **manage** | **protocol** | **route** } **pps**

default cpu-protect sub-interface { **manage** | **protocol** | **route** } **pps**

Parameter Description

Parameter	Description
pps_value	The rate limit threshold, in the range from 1 to 100,000

Defaults

The default value varies with products. For details, see the *Configuration Guide*.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the traffic bandwidth of management packets to 2,000 pps.

```
FS(config)# cpu-protect sub-interface manage pps 2000
```

Related Commands

Command	Description
cpu-protect sub-interface { **manage** | **protocol** | **route** } **percent**	Configures the percent value of each type of packets occupied in the buffer area.

Platform Description

N/A

22.21 Define

Use this command to define the anti-attack type.

Use the **no** or **default** form of this command to restore the default setting.

define *name*

no define *name*

default define *name*

Parameter Description

Parameter	Description
name	Name of the user-defined anti-attack type

Defaults

N/A

Command Mode

NFPP configuration mode

Usage Guide

Use this command to define the anti-attack type.

Configuration Examples

The following example creates the user-defined anti-attack type.

```
FS(config)# nfpp
FS(config-nfpp)# define tcp
FS(config-nfpp-define)#
```

Related Commands

Command	Description
show nfpp define summary	Displays the defined anti-attack configuration.

Platform Description

N/A

22.22 Define Name Enable

Use this command to enable the user-defined anti-attack globally.

Use the **no** or **default** form of this command to restore the default setting.

define *name* **enable**

no define *name* **enable**

default define *name* **enable**

Parameter Description

Parameter	Description
name	Defines guard name.

Defaults This function is disabled by default.

Command Mode NFPP configuration mode

Usage Guide This command takes effect only after the match, rate-limit and attack-threshold have been configured.

Configuration Examples The following example enabled the user-defined anti-attack globally.

```
FS(config)# nfpp
FS(config-nfpp)#define tcp enable
```

Related Commands

Command	Description
show nfpp define summary	Displays the user-defined anti-attack configuration

Platform Description N/A

22.23 Dhcp-guard Attack-threshold

Use this command to set the global attack threshold. When the packet rate exceeds the attack threshold, the attack occurs.

Use the **no** or **default** form of this command to restore the default setting.

dhcp-guard attack-threshold { **per-src-mac** | **per-port** } *pps*

no dhcp-guard attack-threshold { **per-src-mac** | **per-port** }

default dhcp-guard attack-threshold { **per-src-mac** | **per-port** }

Parameter Description

Parameter	Description
per-src-mac	Sets the attack threshold for each source MAC address.
per-port	Sets the attack threshold for each port.
pps	Sets the attack threshold, in pps. The valid range is 1 to 19,999.

Defaults The default value varies with products. For details, see the *Configuration Guide*.

Command NFPP configuration mode

Mode

Usage Guide N/A

Configuration Examples The following example sets the global attack threshold.

```
FS(config)# nfpp
FS(config-nfpp)# dhcp-guard attack-threshold per-src-mac 15
FS(config-nfpp)# dhcp-guard attack-threshold per-port 200
```

Related Commands

Command	Description
nfpp dhcp-guard policy	Displays the rate-limit threshold and attack threshold.
show nfpp dhcp-guard summary	Displays the configuration.
show nfpp dhcp-guard hosts	Displays the monitored host list.
clear nfpp dhcp-guard hosts	Clears the monitored host.

Platform Description N/A

22.24 Dhcp-guard Enable

Use this command to enable the DHCP anti-attack function.

Use the **no** or **default** form of this command to restore the default setting.

dhcp-guard enable

no dhcp-guard enable

default dhcp-guard enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example enables the DHCP anti-attack function.

```
FS(config)# nfpp
FS(config-nfpp)# dhcp-guard enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

22.25 Dhcp-guard Isolate-period

Use this command to set the isolate time globally.

Use the **no** or **default** form of this command to restore the default setting.

dhcp-guard isolate-period { *seconds* | **permanent** }

no dhcp-guard isolate-period

default dhcp-guard isolate-period

Parameter Description

Parameter	Description
seconds	Sets the isolate time. The value is 0 or in the range from 30 to 86,400 in the unit of seconds.
permanent	Permanent isolation.

Defaults

The default isolate time is 0, which means no isolation.

Command Mode

NFPP configuration mode

Usage Guide

The isolate period can be configured globally or based on the interface. For one interface, if the isolate period is not set based on the interface, the global value shall be adopted; or the interface-based isolate period shall be adopted.

Configuration Examples

The following example sets the isolate time globally to 180 seconds.

```
FS(config)# nfpp
FS(config-nfpp)# dhcp-guard isolate-period 180
```

Related Commands

Command	Description
nfpp dhcp-guard isolate-period	Sets the isolate time on the interface.
show nfpp dhcp-guard summary	Displays the configuration.

Platform Description

N/A

22.26 Dhcp-guard Monitored-host-limit

Use this command to set the maximum monitored host number.

Use the **no** or **default** form of this command to restore the default setting.

dhcp-guard monitored-host-limit *number*
no dhcp-guard monitored-host-limit
default dhcp-guard monitored-host-limit

Parameter Description

Parameter	Description
number	The maximum monitored host number, in the range from 1 to 4,294,967,295.

Defaults The default is 20,000.

Command Mode NFPP configuration mode

Usage Guide If the monitored host number has reached the default 20,000, the administrator shall set the max-number smaller than 20,000 and it will prompt the message that %ERROR: The value that you configured is smaller than current monitored hosts 20,000, please clear a part of monitored hosts to remind the administrator of the invalid configuration and removing the monitored hosts.
When the maximum monitored host number has been exceeded, it prompts the message that % NFPP_ARP_GUARD-4-SESSION_LIMIT: Attempt to exceed limit of 20000 monitored hosts to remind the administrator.

Configuration Examples The following example sets the maximum monitored host number to 200.

```
FS(config)# nfpp
FS(config-nfpp)# dhcp-guard monitored-host-limit 200
```

Related Commands

Command	Description
show nfpp dhcp-guard summary	Displays the configuration.

Platform Description N/A

22.27 Dhcp-guard Monitor-period

Use this command to configure the monitor time.
Use the **no** or **default** form of this command to restore the default setting.
dhcp-guard monitor-period *seconds*
no dhcp-guard monitor-period
default dhcp-guard monitor-period

Parameter Description

Parameter	Description
seconds	Sets the monitor time, in the range from 180 to 86,400 in the unit of seconds.

Defaults The default is 600 seconds.

Command Mode NFPP configuration mode

Usage Guide When the attacker is detected, if the isolate period is 0, the attacker will be monitored by the software and the timeout time will be the monitor period. During the software monitoring, if the isolate period is not 0, the software-monitored attacker will be auto-isolated by the hardware and the timeout time will be the isolate period. The monitor period is valid with the isolate period 0.

If the isolate period has changed to be 0, the attackers on the interface will be removed rather than being monitored by the software.

Configuration Examples The following example sets the monitor time to 180 seconds.

```
FS(config)# nfpp
FS(config-nfpp)# dhcp-guard monitor-period 180
```

Related Commands

Command	Description
show nfpp dhcp-guard summary	Displays the configuration.
show nfpp dhcp-guard hosts	Displays the monitored host list.
clear nfpp dhcp-guard hosts	Clears the isolated host.

Platform Description N/A

22.28 Dhcp-guard Rate-limit

Use this command to set the rate-limit threshold globally.

Use the **no** or **default** form of this command to restore the default setting.

dhcp-guard rate-limit { **per-src-mac | per-port** } *pps*

no dhcp-guard rate-limit { **per-src-mac | per-port** }

default dhcp-guard rate-limit { **per-src-mac | per-port** }

Parameter Description

Parameter	Description
per-src-mac	Sets the rate limit for each source MAC address.
per-port	Sets the rate limit for each port.
pps	Sets the rate limit, in the range of 1 to 19,999.

Defaults The default value varies with products. For details, see the *Configuration Guide*.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples

The following example sets the rate-limit threshold globally.

```
FS(config)# nfpp
FS(config-nfpp)# dhcp-guard rate-limit per-src-mac 8
FS(config-nfpp)# dhcp-guard rate-limit per-port 100
```

Related Commands

Command	Description
nfpp dhcp-guard policy	Sets the rate limit and the attack threshold.
show nfpp dhcp-guard summary	Displays the configuration.

Platform Description

N/A

22.29 Dhcpv6-guard Attack-threshold

Use this command to set the global attack threshold. When the packet rate exceeds the attack threshold, the attack occurs.

Use the **no** or **default** form of this command to restore the default setting.

dhcpv6-guard attack-threshold { **per-src-mac** | **per-port** } *pps*

no dhcpv6-guard attack-threshold {**per-src-mac** | **per-port**}

default dhcpv6-guard attack-threshold { **per-src-mac** | **per-port**}

Parameter Description

Parameter	Description
per-src-mac	Sets the attack threshold for each source MAC address.
per-port	Sets the attack threshold for each port.
pps	Sets the attack threshold, in the range is from 1 to 19,999 pps.

Defaults

The default value varies with products. For details, see the *Configuration Guide*.

Command Mode

NFPP configuration mode

Usage Guide

N/A.

Configuration Examples

The following example sets the global attack threshold.

```
FS(config)# nfpp
FS(config-nfpp)# dhcpv6-guard attack-threshold per-src-mac 15
FS(config-nfpp)# dhcpv6-guard attack-threshold per-port 200
```

Related Commands

Command	Description
nfpp dhcpv6-guard policy	Displays the rate-limit threshold and attack

	threshold.
show nfpp dhcpv6-guard summary	Displays the configuration.
show nfpp dhcpv6-guard hosts	Displays the monitored host list.
clear nfpp dhcpv6-guard hosts	Clears the monitored host.

Platform Description N/A

22.30 Dhcpv6-guard Enable

Use this command to enable the DHCPv6 anti-attack function.

Use the **no** or **default** form of this command to restore the default setting.

dhcpv6-guard enable

no dhcpv6-guard enable

default dhcpv6-guard enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example enables the DHCPv6 anti-attack function globally.

```
FS(config)# nfpp
FS(config-nfpp)# dhcpv6-guard enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

22.31 Dhcpv6-guard Monitored-host-limit

Use this command to set the maximum monitored host number.

Use the **no** or **default** form of this command to restore the default setting.

dhcpv6-guard monitored-host-limit *number*

no dhcpv6-guard monitored-host-limit

default dhcpv6-guard monitored-host-limit

Parameter Description

Parameter	Description
number	The maximum monitored host number, in the range from 1 to 4,294,967,295.

Defaults

The default is 20,000.

Command Mode

NFPP configuration mode

Usage Guide

If the monitored host number has reached the default 20,000, the administrator shall set the max-number smaller than 20,000 and it will prompt the message that %ERROR: The value that you configured is smaller than current monitored hosts 20,000, please clear a part of monitored hosts to remind the administrator of the invalid configuration and removing the monitored hosts.

When the maximum monitored host number has been exceeded, it prompts the message that % NFPP_DHCPV6_GUARD-4-SESSION_LIMIT: Attempt to exceed limit of 20000 monitored hosts to remind the administrator.

Configuration Examples

The following example sets the maximum monitored host number to 200.

```
FS(config)# nfpp
FS(config-nfpp)# dhcpv6-guard monitored-host-limit 200
```

Related Commands

Command	Description
show nfpp dhcpv6-guard summary	Displays the configuration.

Platform Description

N/A

22.32 Dhcpv6-guard Monitor-period

Use this command to configure the monitor time.

Use the **no** or **default** form of this command to restore the default setting.

dhcpv6-guard monitor-period *seconds*

no dhcpv6-guard monitor-period

default dhcpv6-guard monitor-period

Parameter Description

Parameter	Description
seconds	Sets the monitor time, in the range from 180 to 86,400 in the unit of seconds.

Defaults

The default is 600 seconds.

Command Mode

NFPP configuration mode

Usage Guide When the attacker is detected, if the isolate period is 0, the attacker will be monitored by the software and the timeout time will be the monitor period. During the software monitoring, if the isolate period is not 0, the software-monitored attacker will be auto-isolated by the hardware and the timeout time will be the isolate period. The monitor period is valid with the isolate period 0.

If the isolate period has changed to be 0, the attackers on the interface will be removed rather than being monitored by the software.

Configuration Examples The following example sets the monitor time to 180 seconds.

```
FS(config)# nfpp
FS(config-nfpp)# dhcpv6-guard monitor-period 180
```

Related Commands

Command	Description
show nfpp dhcpv6-guard summary	Displays the configuration.
show nfpp dhcpv6-guard hosts	Displays the monitored host list.
clear nfpp dhcpv6-guard hosts	Clears the isolated host.

Platform Description N/A

22.33 Dhcpv6-guard Rate-limit

Use this command to set the rate-limit threshold globally.

Use the **no** or **default** form of this command to restore the default setting.

dhcpv6-guard rate-limit { **per-src-mac** | **per-port** } *pps*

no dhcpv6-guard rate-limit { **per-src-mac** | **per-port** }

default dhcpv6-guard rate-limit { **per-src-mac** | **per-port** }

Parameter Description

Parameter	Description
per-src-mac	Sets the rate limit for each source MAC address.
per-port	Sets the rate limit for each port.
pps	Sets the rate limit, in the range from 1 to 19,999.

Defaults The default value varies with products. For details, see the *Configuration Guide*.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example sets the rate-limit threshold globally.

```
FS(config)# nfpp
FS(config-nfpp)# dhcpv6-guard rate-limit per-src-mac 8
```

```
FS(config-nfpp)# dhcpv6-guard rate-limit per-port 100
```

Related Commands

Command	Description
nfpp dhcpv6-guard policy	Sets the rate limit and the attack threshold.
show nfpp dhcpv6-guard summary	Displays the configuration.

Platform Description

N/A

22.34 Global-policy

Use this command to set the rate-limit threshold and attack threshold based on the host or port.

Use the **no** or **default** form of this command to restore the default setting.

global-policy { **per-src-mac** | **per-src-ip** | **per-port** } *rate-limit-pps attack-threshold-pps*

no global-policy { **per-src-mac** | **per-src-ip** | **per-port** }

default global-policy { **per-src-mac** | **per-src-ip** | **per-port** }

Parameter Description

Parameter	Description
per-src-ip	Performs the rate statistics based on the source IP / VID and port.
per-src-mac	Performs the rate statistics based on the source MAC / VID and port.
per-port	Performs the rate statistics based on each physical port of receiving the packets.
rate-limit-pps	Sets the rate-limit threshold.
attack-threshold-pps	Sets the attack threshold.

Defaults

By default, no rate-limit threshold and attack threshold is configured. To enable self-defined anti-attack, these two parameters must be set.

Command Mode

NFPP define configuration mode

Usage Guide

To create a user-defined anti-attack type, the classification rule for the rate statistics must be specified, that is, recognize the host based on the source IP address/ source MAC address for the user-defined packets rate statistics based on the user / port and specify the rate-limit threshold and attack threshold for each classification. The rate-limit threshold shall be equal to or greater than the attack threshold. If the rate is greater than the rate-limit threshold, the packets that meet this classification rule will be discarded. If the rate exceeds the attack threshold, the user will be regarded as an attacker. The log will be printed and the trap will be sent.

Configuration Examples

The following example sets the rate-limit threshold and attack threshold based on the host or port.

```
FS(config)# nfpp
FS(config-nfpp)# nfpp define tcp
FS(config-nfpp-define)# global-policy per-src-ip 10    20
FS(config-nfpp-define)# global-policy per-port 100    200
```

Related Commands

Command	Description
nfpp define *name* **policy**	Sets the rate-limit threshold and attack threshold.
show nfpp define summary	Displays the user-defined anti-attack configuration

Platform Description N/A

22.35 Icmp-guard Attack-threshold

Use this command to set the global attack threshold. When the packet rate exceeds the attack threshold, the attack occurs.

Use the **no** or **default** form of this command to restore the default setting.

icmp-guard attack-threshold { **per-src-ip** | **per-port** } *pps*

no icmp-guard attack-threshold { **per-src-ip** | **per-port** }

default icmp-guard attack-threshold { **per-src-ip** | **per-port** }

Parameter Description

Parameter	Description
per-src-ip	Sets the attack threshold for each source IP address.
per-port	Sets the attack threshold for each port.
pps	Sets the attack threshold, in the range from 1 to 19,999 in the unit of pps.

Defaults The default value varies with products. For details, see the *Configuration Guide*.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example sets the global attack threshold.

```
FS(config)# nfpp
FS(config-nfpp)# icmp-guard attack-threshold per-src-ip 600
FS(config-nfpp)# icmp-guard attack-threshold per-port 1200
```

Related Commands

Command	Description
nfpp icmp-guard policy	Displays the rate-limit threshold and attack threshold.
show nfpp icmp-guard summary	Displays the configuration.
show nfpp icmp-guard hosts	Displays the monitored host list.
clear nfpp icmp-guard hosts	Clears the monitored host.

Platform Description N/A

22.36 Icmp-guard Enable

Use this command to enable the ICMP anti-attack function.

Use the **no** or **default** form of this command to restore the default setting.

icmp-guard enable

no icmp-guard enable

default icmp-guard enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example enables the ICMP anti-attack function globally.

```
FS(config)# nfpp
FS(config-nfpp)# icmp-guard enable
```

Related Commands

Command	Description
nfpp icmp-guard enable	Enables the ICMP anti-attack function on the interface.
show nfpp icmp-guard summary	Displays the configuration.

Platform Description N/A

22.37 Icmp-guard Isolate-period

Use this command to set the isolate time globally.

Use the **no** or **default** form of this command to restore the default setting.

icmp-guard isolate-period { *seconds* | **permanent** }

no icmp-guard isolate-period

default icmp-guard isolate-period

Parameter Description

Parameter	Description
seconds	Sets the isolate time. The value is in the range is 0 or from 30 to 86,400 in the

	unit of seconds.
permanent	Permanent isolation.

Defaults The default isolate time is 0, which means no isolation.

Command Mode NFPP configuration mode

Usage Guide The isolate period can be configured globally or based on the interface. For one interface, if the isolate period is not set based on the interface, the global value shall be adopted; or the interface-based isolate period shall be adopted.

Configuration Examples The following example sets the isolate time globally to 180 seconds.

```
FS(config)# nfpp
FS(config-nfpp)# icmp-guard isolate-period 180
```

Related Commands

Command	Description
nfpp icmp-guard isolate-period	Sets the isolate time on the interface.
show nfpp icmp-guard summary	Displays the configuration.

Platform Description N/A

22.38 Icmp-guard Monitored-host-limit

Use this command to set the maximum monitored host number.

Use the **no** or **default** form of this command to restore the default setting.

icmp-guard monitored-host-limit *number*

no icmp-guard monitored-host-limit

default icmp-guard monitored-host-limit

Parameter Description

Parameter	Description
number	The maximum monitored host number, in the range from 1 to 4,294,967,295.

Defaults The default is 20,000.

Command Mode NFPP configuration mode

Usage Guide If the monitored host number has reached the default 20,000, the administrator shall set the max-number smaller than 20,000 and it will prompt the message that %ERROR: The value that you configured is smaller than current monitored hosts 20,000, please clear a part of monitored hosts to remind the administrator of the invalid configuration and removing the monitored hosts.

When the maximum monitored host number has been exceeded, it prompts the message that % NFPP_ARP_GUARD-4-SESSION_LIMIT: Attempt to exceed limit of 20,000 monitored hosts to remind the administrator.

Configuration Examples

The following example sets the maximum monitored host number to 200.

```
FS(config)# nfpp
FS(config-nfpp)# icmp-guard monitored-host-limit 200
```

Related Commands

Command	Description
show nfpp icmp-guard summary	Displays the configuration.

Platform Description

N/A

22.39 Icmp-guard Monitor-period

Use this command to configure the monitor time.

Use the **no** or **default** form of this command to restore the default setting.

icmp-guard monitor-period *seconds*

no icmp-guard monitor-period

default icmp-guard monitor-period

Parameter Description

Parameter	Description
seconds	Sets the monitor time, in the range from180 to 86,400 seconds.

Defaults

The default is 600.

Command Mode

NFPP configuration mode

Usage Guide

When the attacker is detected, if the isolate period is 0, the attacker will be monitored by the software and the timeout time will be the monitor period. During the software monitoring, if the isolate period is not 0, the software-monitored attacker will be auto-isolated by the hardware and the timeout time will be the isolate period. The monitor period is valid with the isolate period 0.

If the isolate period has changed to be 0, the attackers on the interface will be removed rather than being monitored by the software.

Configuration Examples

The following example sets the monitor time to 180 seconds.

```
FS(config)# nfpp
FS(config-nfpp)# icmp-guard monitor-period 180
```

Related Commands

Command	Description
show nfpp icmp-guard summary	Displays the configuration.
show nfpp icmp-guard hosts	Displays the monitored host list.
clear nfpp icmp-guard hosts	Clears the isolated host.

Platform Description N/A

22.40 Icmp-guard Rate-limit

Use this command to set the rate-limit threshold globally.

Use the **no** or **default** form of this command to restore the default setting.

icmp-guard rate-limit { **per-src-ip** | **per-port** } *pps*

no icmp-guard rate-limit { **per-src-ip | per-port** }

default icmp-guard rate-limit { **per-src-ip | per-port** }

Parameter Description

Parameter	Description
per-src-ip	Sets the rate limit for each source IP address.
per-port	Sets the rate limit for each port.
pps	Sets the rate limit, in the range from1 to19,999.

Defaults The default value varies with products. For details, see the *Configuration Guide*.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example sets the rate-limit threshold globally.

```
FS(config)# nfpp
FS(config-nfpp)# icmp-guard rate-limit per-src-ip 500
FS(config-nfpp)# icmp-guard rate-limit per-port 800
```

Related Commands

Command	Description
nfpp icmp-guard policy	Sets the rate limit and the attack threshold.
show nfpp icmp-guard summary	Displays the configuration.

Platform Description N/A

22.41 Icmp-guard Trusted-host

Use this command to set the trusted hosts free form monitoring.

Use the **no** or **default** form of this command to restore the default setting.

icmp-guard trusted-host *ip mask*

no icmp-guard trusted-host { **all** | *ip mask* }

default icmp-guard trusted-host

Parameter Description

Parameter	Description
ip	Sets the IP address.
mask	Sets the IP mask.
all	Deletes the configuration of all trusted hosts.

Defaults

No trusted host is configured by default.

Command Mode

NFPP configuration mode

Usage Guide

The administrator can use this command to set the trusted host free from monitoring. The ICMP packets are allowed to send to the trusted host CPU without any rate-limit and warning configuration. Configure the mask to set all hosts in one network segment free from monitoring.

UP to 500 trusted hosts are supported.

Configuration Examples

The following example sets the trusted hosts free form monitoring.

```
FS(config)# nfpp
FS(config-nfpp)# icmp-guard trusted-host 1.1.1.0 255.255.255.0
```

Related Commands

Command	Description
show nfpp icmp-guard trusted-host	Displays the configuration.

Platform Description

N/A

22.42 Ip-guard Attack-threshold

Use this command to set the global attack threshold. When the packet rate exceeds the attack threshold, the attack occurs.

Use the **no** or **default** form of this command to restore the default setting.

ip-guard attack-threshold { **per-src-ip** | **per-port** } *pps*

no ip-guard attack-threshold { **per-src-ip** | **per-port** }

default ip-guard attack-threshold { **per-src-ip** | **per-port** }

Parameter Description

Parameter	Description
per-src-ip	Sets the attack threshold for each source IP address.
per-port	Sets the attack threshold for each port.
pps	Sets the attack threshold, in pps. The valid range is 1 to 19,999.

Defaults

The default value varies with products. For details, see the *Configuration Guide*.

Command Mode

NFPP configuration mode

Usage Guide

The attack threshold shall be equal to or larger than the rate-limit threshold.

Configuration Examples

The following example sets the global attack threshold.

```
FS(config)# nfpp
FS(config-nfpp)# ip-guard attack-threshold per-src-ip 2
FS(config-nfpp)# ip-guard attack-threshold per-port 50
```

Related Commands

Command	Description
nfpp ip-guard policy	Displays the rate-limit threshold and attack threshold.
show nfpp ip-guard summary	Displays the configuration.
show nfpp ip-guard hosts	Displays the monitored host list.
clear nfpp ip-guard hosts	Clears the monitored host.

Platform Description

N/A

22.43 Ip-guard Enable

Use this command to enable IP guard.

Use the **no** or **default** form of this command to restore the default setting.

ip-guard enable

no ip-guard enable

default ip-guard enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default.

Command Mode NFPP configuration mode.

Usage Guide This configuration aims at attacks whose destination IP address is not the local one. For those with the local address as the destination, CPP (CPU Protect Policy) will limit their rates.

Configuration Examples The following example enables the IP guard globally.

```
FS(config)# nfpp
FS(config-nfpp)# ip-guard enable
```

Related Commands

Command	Description
nffp ip-guard enable	Enables the IP guard on the interface.

Platform Description N/A

22.44 Ip-guard Isolate-period

Use this command to set the isolate time globally.

Use the **no** or **default** form of this command to restore the default setting.

ip-guard isolate-period { *seconds* | **permanent** }

no ip-guard isolate-period

default ip-guard isolate-period

Parameter Description

Parameter	Description
seconds	Sets the isolate time. The value is 0 or in the range from 30 to 86，400 in the unit of seconds.
permanent	Permanent isolation

Defaults The default isolate time is 0 second, which means no isolation.

Command Mode NFPP configuration mode

Usage Guide N/A.

Configuration Examples The following example sets the isolate time globally to 180 seconds.

```
FS(config)# nfpp
FS(config-nfpp)# ip-guard isolate-period 180
```

Related Commands

Command	Description
nfpp ip-guard isolate-period	Sets the isolate time on the interface.
show nfpp ip-guard summary	Displays the configuration.

Platform Description

N/A

22.45 Ip-guard Monitor-period

Use this command to configure the monitor time.

Use the **no** or **default** form of this command to restore the default setting.

ip-guard monitor-period *seconds*

no ip-guard monitor-period

default ip-guard monitor-period

Parameter Description

Parameter	Description
seconds	Sets the monitor time, in the range from 180 to 86,400 in the unit of seconds.

Defaults

The default is 600 seconds.

Command Mode

NFPP configuration mode

Usage Guide

When the attacker is detected, if the isolate period is 0, the attacker will be monitored by the software and the timeout time will be the monitor period. During the software monitoring, if the isolate period is not 0, the software-monitored attacker will be auto-isolated by the hardware and the timeout time will be the isolate period. The monitor period is valid with the isolate period 0.

If the isolate period has changed to be 0, the attackers on the interface will be removed rather than being monitored by the software

Configuration Examples

The following example sets the monitor time to 180 seconds.

```
FS(config)# nfpp
FS(config-nfpp)# ip-guard monitor-period 180
```

Related Commands

Command	Description
show nfpp ip-guard summary	Displays the configuration.
show nfpp ip-guard hosts	Displays the monitored host list.
clear nfpp ip-guard hosts	Clears the isolated host.

Platform Description

N/A

22.46 Ip-guard Monitored-host-limit

Use this command to set the maximum monitored host number.

Use the **no** or **default** form of this command to restore the default setting.

ip-guard monitored-host-limit *number*

no ip-guard monitored-host-limit

default ip-guard monitored-host-limit

Parameter Description

Parameter	Description
number	The maximum monitored host number, in the range from 1 to 4,294,967,295.

Defaults

The default is 20,000 seconds.

Command Mode

NFPP configuration mode

Usage Guide

If the monitored host number has reached the default 20,000, the administrator shall set the max-number smaller than 20,000 and it will prompt the message that %ERROR: The value that you configured is smaller than current monitored hosts 20,000, please clear a part of monitored hosts to remind the administrator of the invalid configuration and removing the monitored hosts.

When the maximum monitored host number has been exceeded, it prompts the message that % NFPP_ARP_GUARD-4-SESSION_LIMIT: Attempt to exceed limit of 20,000 monitored hosts to remind the administrator.

Configuration Examples

The following example sets the maximum monitored host number to 200.

```
FS(config)# nfpp
FS(config-nfpp)# ip-guard monitored-host-limit 200
```

Related Commands

Command	Description
show nfpp ip-guard summary	Displays the configuration.

Platform Description

N/A

22.47 Ip-guard Rate-limit

Use this command to set the rate-limit threshold globally.

Use the **no** or **default** form of this command to restore the default setting.

ip-guard rate-limit { **per-src-ip** | **per-port** } *pps*

no ip-guard rate-limit { **per-src-ip | per-port** }

default ip-guard rate-limit {**per-src-ip | per-port** }

Parameter Description

Parameter	Description
per-src-ip	Sets the rate limit for each source IP address.
per-port	Sets the rate limit for each port.
pps	Sets the rate limit, in the range of 1 to 19,999.

Defaults

The default value varies with products. For details, see the *Configuration Guide*.

Command Mode

NFPP configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the rate-limit threshold globally.

```
FS(config)# nfpp
FS(config-nfpp)# ip-guard rate-limit per-src-ip 2
FS(config-nfpp)# ip-guard rate-limit per-port 50
```

Related Commands

Command	Description
nfpp ip-guard policy	Sets the rate limit and the attack threshold.
show nfpp ip-guard summary	Displays the configuration.

Platform Description

N/A

22.48 Ip-guard Scan-threshold

Use this command to set the global scan threshold.

Use the **no** or **default** form of this command to restore the default setting.

ip-guard scan-threshold *pkt-cnt*

no ip-guard scan-threshold

default ip-guard scan-threshold

Parameter Description

Parameter	Description
pkt-cnt	Sets the scan threshold, in the range from 1 to 19,999.

Defaults

The default value varies with products. For details, see the *Configuration Guide*.

Command Mode

NFPP configuration mode.

Usage Guide N/A

Configuration Examples The following example sets the global scan threshold to 20 pps.

```
FS(config)# nfpp
FS(config-nfpp)# ip-guard scan-threshold 20
```

Related Commands

Command	Description
nfpp ip-guard scan-threshold	Sets the scan threshold on the port.
show nfpp ip-guard summary	Displays the configuration.

Platform Description N/A

22.49 Ip-guard Trusted-host

Use this command to set the trusted hosts free form monitoring.

Use the **no** or **default** form of this command to restore the default setting.

ip-guard trusted-host *ip mask*

no ip-guard trusted-host { **all** | *ip mask* }

default ip-guard trusted-host

Parameter Description

Parameter	Description
ip	Sets the IP address.
mask	Sets the IP mask.
all	Deletes the configuration of all trusted hosts.

Defaults N/A

Command Mode NFPP configuration mode

Usage Guide The administrator can use this command to set the trusted host free from monitoring. The ICMP packets are allowed to sent to the trusted host CPU without any rate-limit and warning configuration. Configure the mask to set all hosts in one network segment free from monitoring.

UP to 500 trusted hosts are supported.

Configuration Examples The following example sets the trusted hosts free form monitoring.

```
FS(config)# nfpp
FS(config-nfpp)# ip-guard trusted-host 1.1.1.0 255.255.255.0
```

Related Commands

Command	Description
show nfpp ip-guard trusted-host	Displays the configuration.

Platform Description N/A

22.50 Log-buffer Enable

Use this command to display logs on the screen.

Use the **no** or the **default** form of this command to restore the default setting.

log-buffer enable

no log-buffer enable

default log-buffer enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults Logs are stored in the cache by default.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example displays logs on the screen.

```
FS(config)# nfpp
FS(config-nfpp)# log-buffer enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

22.51 Log-buffer Entries

Use this command to set the NFPP log buffer area size.

Use the **no** or **default** form of this command to restore the default setting.

log-buffer entries *number*

no log-buffer entries

default log-buffer entries

Parameter Description

Parameter	Description
number	The buffer area size, in the range from 0 to 1,024.

Defaults The default is 256.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example sets the NFPP log buffer area size.

```
FS(config)# nfpp
FS(config-nfpp)# log-buffer entries 50
```

Related Commands

Command	Description
log-buffer logs *number_of_message* **interval** *length_in_seconds*	Displays the rate of the syslog generated from the NFPP buffer area.
show nfpp log	Displays the NFPP log configuration or the log buffer area.

Platform Description

N/A

22.52 Log-buffer Logs

Use this command to set the rate of syslog generated from the NFPP log buffer area.

Use the **no** or **default** form of this command to restore the default setting.

log-buffer logs *number_of_message* **interval** *length_in_seconds*

no log-buffer logs

default log-buffer logs

Parameter Description

Parameter	Description
number_of_message	The valid range is from 0 to1024. 0 indicates that all logs are recorded in the specific buffer area and no syslogs are generated.
length_in_seconds	The valid range is from 0 to 86400(one day). 0 indicates not to write the log to the buffer area but generate the syslog immediately. With both the *number_of_message* and *length_in_seconds* values are 0, it indicates not to write the log to the buffer area but generate the syslog immediately. The parameter *number_of_message /length_in_second* indicates the rate of syslog generated from the NFPP log buffer area.

Defaults

By default, *number_of_message* is 0 and *length_in_seconds* is 0.

Command Mode

NFPP configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the rate of syslog generated from the NFPP log buffer area.

```
FS(config)# nfpp
FS(config-nfpp)# log-buffer logs 2 interval 12
```

Related Commands

Command	Description
log-buffer entries *number*	Sets the NFPP log buffer area size.
show nfpp log summary	Displays the NFPP log configuration or the log buffer area.

Platform Description N/A

22.53 Logging

Use this command to set the VLAN or the interface log for NFPP.

Use the **no** or **default** form of this command to restore the default setting.

logging vlan *vlan-range*

logging interface *interface-id*

no logging vlan *vlan-range*

no logging interface *interface-id*

default logging

Parameter Description

Parameter	Description
vlan-range	Sets the specified VLAN range, in the format such as “1-3, 5”.
interface-id	Sets the interface ID.

Defaults All logs are recorded by default.

Command Mode NFPP configuration mode

Usage Guide Use this command to filter the logs and records the logs within the specified VLAN range or the specified port

Configuration Examples The following example records the logs in VLAN 1, VLAN 2,VLAN 3 and VLAN 5 only.

```
FS(config)# nfpp
FS(config-nfpp)# logging vlan 1-3,5
```

The following example records the logs on the interface GigabitEthernet 0/1 only.

```
FS(config)# nfpp
FS(config-nfpp)# logging interface G 0/1
```

Related Commands

Command	Description
show nfpp log summary	Displays the NFPP log configuration or the log buffer area.

Platform N/A

Description

22.54 Match

Use this command to specify the message matching filed for the user-defined anti-attack.

match [**etype** *type*] [**src-mac** *smac* [**src-mac-mask** *smac_mask*]] [**dst-mac** *dmac* [**dst-mac-mask** *dst_mask*]] [**protocol** *protocol*] [**src-ip** *sip* [**src-ip-mask** *sip-mask*]] [**src-ipv6** *sipv6* [**src-ipv6-masklen** *sipv6-masklen*]] [**dst-ip** *dip* [**dst-ip-mask** *dip-mask*]] [**dst-ipv6** *dipv6* [**dst-ipv6-masklen** *dipv6-masklen*]] [**src-port** *sport*] [**dst-port** *dport*]

Parameter Description

Parameter	Description
type	Ethernet link layer packet type
smac	Source MAC address
smac_mask	Source MAC address mask
dmac	Destination MAC address
dmac_mask	Destination MAC address mask
protocol	IPv4/v6 message protocol
sip	Source IPv4 address
sip_mask	Source IPv4 address mask
sipv6	Source IPv6 address
sipv6_masklen	Source IPv6 address mask
dip	Destination IPv4 address
dip_mask	Destination IPv4 address mask
dipv6	Destination IPv6 address
dipv6_masklen	Length of the destination IPv6 address mask.
sport	Source port
dport	Destination port

Defaults N/A

Command Mode NFPP configuration mode

Usage Guide Use this command to create a new user-defined anti-attack type and specify the message fields to be matched.

Configuration Examples The following example specifies the message matching filed for the user-defined anti-attack.

```
FS(config)# nfpp
FS(config-nfpp)# nfpp define tcp
FS(config-nfpp-define)#match etype 0x0800 protocol 0x06
```

Related Commands

Command	Description
show nfpp define summary	Displays the user-defined anti-attack configuration

Platform Description N/A

22.55 Monitored-host-limit

Use this command to set the maximum monitored host number.

Use the **no** or **default** form of this command to restore the default setting.

monitored-host-limit *number*

no monitored-host-limit

default monitored-host-limit

Parameter Description

Parameter	Description
number	The maximum monitored host number, in the range from 1 to 4,294,967,295.

Defaults The default is 20,000.

Command Mode NFPP define configuration mode

Usage Guide If the monitored host number has reached the default 20,000, the administrator shall set the max-number smaller than 20,000 and it will prompt the message that %ERROR: The value that you configured is smaller than current monitored hosts 20,000, please clear a part of monitored hosts to remind the administrator of the invalid configuration and removing the monitored hosts.

When the maximum monitored host number has been exceeded, it prompts the message that % % NFPP_DEFINE-4-SESSION_LIMIT: Attempt to exceed limit of name's 20,000 monitored hosts. to remind the administrator

Configuration Examples The following example sets the maximum monitored host number.

```
FS(config)# nfpp
FS(config-nfpp)# nfpp define tcp
FS(config-nfpp-define)#monitored-host-limit 500
```

Related Commands

Command	Description
show nfpp define summary	Displays the user-defined anti-attack configuration

Platform Description N/A

22.56 Monitor Period

Use this command to set the monitoring time.

Use the **no** or **default** form of this command to restore the default setting.

monitor-period *seconds*

no monitor-period

default monitor-period

Parameter Description

Parameter	Description
seconds	Sets the monitor time, in the range from180 to 86,400 in the unit of seconds.

Defaults

The default is 600 seconds.

Command Mode

NFPP define configuration mode

Usage Guide

When the attacker is detected, if the isolate period is 0, the attacker will be monitored by the software and the timeout time will be the monitor period. During the software monitoring, if the isolate period is not 0, the software-monitored attacker will be auto-isolated by the hardware and the timeout time will be the isolate period. The monitor period is valid with the isolate period 0.

If the isolate period has changed to be 0, the attackers on the interface will be removed rather than being monitored by the software.

Configuration Examples

The following example sets the monitoring time to 1,000 seconds.

```
FS(config)# nfpp
FS(config-nfpp)# define tcp
FS(config-nfpp-define)#monitor-period 1000
```

Related Commands

Command	Description
show nfpp define summary	Displays the user-defined anti-attack configuration.

Platform Description

N/A

22.57 Nd-guard attack-threshold

Use this command to set the global attack threshold. When the packet rate exceeds the attack threshold, the attack occurs.

Use the **no** or **default** form of this command to restore the default setting.

nd-guard attack-threshold per-port { **ns-na** | **rs** | **ra-redirect** } *pps*

no nd-guard attack-threshold per-port { **ns-na** | **rs** | **ra-redirect** }

default nd-guard attack-threshold per-port { **ns-na** | **rs** | **ra-redirect** }

Parameter Description

Parameter	Description
ns-na	Sets the neighbor request and neighbor advertisement.
rs	Sets the router request.
ra-redirect	Sets the router advertisement and the redirect packets.

pps	Sets the attack threshold, in the range from1 to 19999 in the unit of seconds.

Defaults The default value varies with products. For details, see the *Configuration Guide*.

Command Mode NFPP configuration mode.

Usage Guide The attack threshold shall be equal to or larger than the rate-limit threshold.

Configuration Examples The following example sets the global attack threshold.

```
FS(config)# nfpp
FS(config-nfpp)# nd-guard attack-threshold per-port ns-na 20
FS(config-nfpp)# nd-guard attack-threshold per-port rs 10
FS(config-nfpp)# nd-guard attack-threshold per-port ra-redirect 10
```

Related Commands

Command	Description
nfpp ip-guard policy	Displays the rate-limit threshold and attack threshold.
show nfpp ip-guard summary	Displays the configuration.

Platform Description N/A

22.58 Nd-guard Enable

Use this command to enable the ND anti-attack function.

Use the **no** or **default** form of this command to restore the default setting.

nd-guard enable

no nd-guard enable

default nd-guard enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is enabled by default.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example enables the ND anti-attack function.

```
FS(config)# nfpp
```

```
FS(config-nfpp)# nd-guard enable
```

Related Commands

Command	Description
nffp nd-guard enable	Enables the ND anti-attack function on the interface.
show nfpp nd-guard summary	Displays the configuration.

Platform Description N/A

22.59 Nd-guard Rate-limit

Use this command to set the rate-limit threshold globally.

Use the **no** or **default** form of this command to restore the default setting.

nd-guard rate-limit per-port { **ns-na** | **rs** | **ra-redirect** } *pps*

no nd-guard rate-limit per-port { **ns-na** | **rs** | **ra-redirect** }

default nd-guard rate-limit per-port { **ns-na** | **rs** | **ra-redirect** }

Parameter Description

Parameter	Description
ns-na	Sets the neighbor request and neighbor advertisement.
rs	Sets the router request.
ra-redirect	Sets the router advertisement and the redirect packets.
pps	Sets the attack threshold, in the range is from 1 to 19,999 in the unit of pps.

Defaults The default value varies with products. For details, see the *Configuration Guide*.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example sets the rate-limit threshold globally.

```
FS(config)# nfpp
FS(config-nfpp)# nd-guard rate-limit per-port ns-na 10
FS(config-nfpp)# nd-guard rate-limit per-port rs 5
FS(config-nfpp)# nd-guard rate-limit per-port ra-redirect 5
```

Related Commands

Command	Description
nfpp nd-guard policy	Sets the rate limit and the attack threshold.
show nfpp nd-guard summary	Displays the configuration.

Platform N/A

Description

22.60 Nd-guard Ratelimit-forwarding Enable

Use this command to enable the ND-guard ratelimit-forwarding on the interface.

nd-guard ratelimit-forwarding enable

Use this command to disable the ND-guard ratelimit-forwarding on the interface.

no nd-guard ratelimit-forwarding enable

Use this command to restore the default setting.

default nd-guard ratelimit-forwarding enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults The function is enabled by default.

Command Mode NFPP configuration mode

Usage Guide N/A

Configuration Examples The following example enables the ND-guard ratelimit-forwarding on the interface.

```
FS(config)# nfpp
FS(config-nfpp)# nd-guard ratelimit-forwarding enable
```

Platform Description N/A

22.61 Nfpp

Use this command to enter NFPP configuration mode.

nfpp

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Global configuration mode

Usage Guide Use this command to enter NFPP configuration mode and make further configuration.

Configuration The following example enters NFPP configuration mode.

Examples

```
FS(config)# nfpp
```

Platform Description N/A

22.62 Nfpp arp-guard Enable

Use this command to enable the anti-ARP attack function on the interface.

Use the **no** or **default** form of this command to restore the default setting.

nfpp arp-guard enable

no nfpp arp-guard enable

default nfpp arp-guard enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults The anti-ARP attack function is not enabled on the interface.

Command Mode Interface configuration mode

Usage Guide The interface anti-ARP attack configuration is prior to the global configuration.

Configuration Examples The following example enables the anti-ARP attack function on the interface.

```
FS(config)# interface G0/1
FS(config-if)# nfpp arp-guard enable
```

Related Commands

Command	Description
arp-guard enable	Enables the anti-ARP attack function.
show nfpp arp-guard summary	Displays the configuration.

Platform Description N/A

22.63 Nfpp Arp-guard Isolate-period

Use this command to set the isolate period in the interface configuration mode.

Use the **no** or **default** form of this command to restore the default setting.

nfpp arp-guard isolate-period { *seconds* | **permanent** }

no nfpp arp-guard isolate-period

default nfpp arp-guard isolate-period

Parameter Description

Parameter	Description
seconds	Sets the isolate period. The value is 0, or in the range from 30 to 86,400 in the unit of seconds.
permanent	Permanent isolation

Defaults By default, the isolate period is not configured.

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example sets the isolate period in the interface configuration mode.

```
FS(config)# interface G0/1
FS(config-if)# nfpp arp-guard isolate-period 180
```

Related Commands

Command	Description
arp-guard isolate-period	Sets the global isolate period.
show nfpp arp-guard summary	Displays the configuration.

Platform Description N/A

22.64 Nfpp Arp-guard Policy

Use this command to set the rate-limit threshold and the attack threshold.

Use the **no** or **default** form of this command to restore the default setting.

nfpp arp-guard policy { **per-src-ip** | **per-src-mac** | **per-port** } *rate-limit-pps attack-threshold-pps*

no nfpp arp-guard policy { **per-src-ip** | **per-src-mac** | **per-port** }

default nfpp arp-guard policy { **per-src-ip** | **per-src-mac** | **per-port** }

Parameter Description

Parameter	Description
per-src-ip	Sets the rate-limit threshold and the attack threshold for each source IP address.
per-src-mac	Sets the rate-limit threshold and the attack threshold for each source MAC address.
per-port	Sets the rate-limit threshold and the attack threshold for each port.
rate-limit-pps	Sets the rate-limit threshold, in the range from 1 to 19999.
attack-threshold-pps	Sets the attack threshold, in the range from1 to 19999.

Defaults By default, the rate-limit threshold and the attack threshold are not configured.

Command Mode Interface configuration mode

Usage Guide The attack threshold value shall be equal to or greater than the rate-limit threshold.

Configuration Examples The following example sets the rate-limit threshold and the attack threshold.

```
FS(config)# interface G 0/1
FS(config-if)# nfpp arp-guard policy per-src-ip 2 10
FS(config-if)# nfpp arp-guard policy per-src-mac 3 10
FS(config-if)# nfpp arp-guard policy per-port 50 100
```

Related Commands

Command	Description
arp-guard attack-threshold	Sets the global attack threshold.
arp-guard rate-limit	Sets the global rate-limit threshold.
show nfpp arp-guard summary	Displays the configuration.
show nfpp arp-guard hosts	Displays the monitored host.
clear nfpp arp-guard hosts	Clears the isolated host.

Platform Description N/A

22.65 Nfpp Arp-guard Scan-threshold

Use this command to set the scan threshold.

Use the **no** or **default** form of this command to restore the default setting.

nfpp arp-guard scan-threshold *pkt-cnt*

no nfpp arp-guard scan-threshold

default nfpp arp-guard scan-threshold

Parameter Description

Parameter	Description
pkt-cnt	Sets the scan threshold, in the range from1 to 19,999.

Defaults By default, the sport-based scan threshold is not configured.

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example sets the scan threshold to 20 pps.

```
FS(config)# interface G 0/1
FS(config-if)# nfpp arp-guard scan-threshold 20
```

Related Commands

Command	Description
arp-guard attack-threshold	Sets the global attack threshold.
show nfpp arp-guard summary	Displays the configuration.
show nfpp arp-guard scan	Displays the ARP scan table.
clear nfpp arp-guard scan	Clears the ARP scan table.

Platform Description

N/A

22.66 Nfpp Define Name Enable

Use this command to enable the user-defined anti-attack function on the interface.

Use the **no** or **default** form of this command to restore the default setting.

nfpp define *name* **enable**

no nfpp define *name* **enable**

default nfpp define *name* **enable**

Parameter Description

Parameter	Description
name	Name of the user-defined anti-attack type

Defaults

N/A

Command Mode

Interface configuration mode.

Usage Guide

This command takes effect only after the name of the user-defined anti-attack and the match, rate-count, rate-limit and the attack-threshold have been configured.

Configuration Examples

The following example enables the user-defined anti-attack function on the interface.

```
FS(config)# interface G0/1
FS(config-if)# nfpp define tcp enable
```

Related Commands

Command	Description
show nfpp define summary	Displays the user-defined anti-attack configuration.

Platform Description

N/A

22.67 Nfpp Define Policy

Use this command to set the local rate-limit threshold and the attack threshold.

Use the **no** or **default** form of this command to restore the default setting.

nfpp define *name* **policy** { **per-src-ip** | **per-src-mac** | **per-port** } *rate-limit-pps attack-threshold-pps*

no nfpp define *name* **policy** {**per-src-ip** | **per-src-mac** | **per-port**}

default nfpp define *name* **policy** { **per-src-ip** | **per-src-mac** | **per-port** }

Parameter Description

Parameter	Description
per-src-ip	Sets the attack threshold for each source IP address.
per-src-mac	Sets the attack threshold for each source MAC address.
per-port	Sets the attack threshold for each port.
rate-limit-pps	Sets the rate-limit threshold, in the range from 1 to 19,999.
attack-threshold-pps	Sets the attack threshold, in the range of from1 to 19,999.

Defaults By default, the rate-limit threshold and the attack threshold are not configured.

Command Mode Interface configuration mode

Usage Guide The attack threshold value shall be equal to or greater than the rate-limit threshold.

Configuration Examples The following example sets the local rate-limit threshold and the attack threshold.

```
FS(config)# interface G 0/1
FS(config-if)# nfpp define tcp policy per-src-ip 2 10
FS(config-if)# nfpp define tcp policy per-port 50 100
```

Related Commands

Command	Description
define-policy	Sets the global rate-limit threshold and attack threshold.
show nfpp define summary	Displays the user-defined anti-attack configuration.

Platform Description N/A

22.68 Nfpp Dhcp-guard Enable

Use this command to enable the DHCP anti-attack function on the interface.

Use the **no** or **default** form of this command to restore the default setting.

nfpp dhcp-guard enable

no nfpp dhcp-guard enable

default nfpp dhcp-guard enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults The DHCP anti-attack function is not enabled on the interface.

Command Mode Interface configuration mode

Usage Guide The interface DHCP anti- attack configuration is prior to the global configuratio

Configuration Examples The following example enables the DHCP anti-attack function on the interface.

```
FS(config)# interface G0/1
FS(config-if)# nfpp dhcp-guard enable
```

Related Commands

Command	Description
dhcp-guard enable	Enables the anti-ARP attack function.
show nfpp dhcp-guard summary	Displays the configuration.

Platform Description N/A

22.69 Nfpp Dhcp-guard Policy

Use this command to set the rate-limit threshold and the attack threshold on the port.

Use the **no** or **default** form of this command to restore the default setting.

nfpp dhcp-guard policy { **per-src-mac** | **per-port** } *rate-limit-pps attack-threshold-pps*

no nfpp dhcp-guard policy { **per-src-mac** | **per-port** }

default nfpp dhcp-guard policy { **per-src-mac** | **per-port** }

Parameter Description

Parameter	Description
per-src-mac	Sets the rate-limit threshold and the attack threshold for the designated source MAC address.
per-port	Sets the rate-limit threshold and the attack threshold for the designated port.
rate-limit-pps	Sets the rate-limit threshold, in the range from1 to 19,999.
attack-threshold-pps	Sets the attack threshold, in the range from1 to 19,999.

Defaults The rate-limit threshold and the attack threshold are not configured by default. So the device adopts the rate-limit threshold and the attack threshold that are set in the global configuration mode.

Command Mode Interface configuration mode

Usage Guide The attack threshold value shall be equal to or greater than the rate-limit threshold.

Configuration Examples The following example sets the rate-limit threshold and the attack threshold on interface G0/1.

```
FS(config)#interface G 0/1
FS(config-if)# nfpp dhcpv6-guard policy per-src-mac 3 10
```

```
FS(config-if)# nfpp dhcpv6-guard policy per-port 50 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

22.70 Nfpp Dhcpv6-guard Enable

Use this command to enable the DHCPv6 anti-attack function on the interface.

Use the **no** or **default** form of this command to restore the default setting.

nfpp dhcpv6-guard enable

no nfpp dhcpv6-guard enable

default nfpp dhcpv6-guard enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults The DHCPv6 anti-attack function is not enabled on the interface.

Command Mode Interface configuration mode

Usage Guide The interface DHCPv6 anti- attack configuration is prior to the global configuration.

Configuration Examples The following example enables the DHCPv6 anti-attack function on interface G0/1.

```
FS(config)# interface G0/1
FS(config-if)# nfpp dhcpv6-guard enable
```

Related Commands

Command	Description
dhcpv6-guard enable	Enables the anti-ARP attack function.
show nfpp dhcpv6-guard summary	Displays the configuration.

Platform Description N/A

22.71 Nfpp Dhcpv6-guard Policy

Use this command to set the rate-limit threshold and the attack threshold.

Use the **no** or **default** form of this command to restore the default setting.

nfpp dhcpv6-guard policy { **per-src-mac** | **per-port** } *rate-limit-pps attack-threshold-pps*

no nfpp dhcpv6-guard policy { **per-src-mac** | **per-port**}

default nfpp dhcpv6-guard policy { **per-src-mac** | **per-port**}

Parameter Description

Parameter	Description
per-src-mac	Sets the rate-limit threshold and the attack threshold for each source MAC address.
per-port	Sets the rate-limit threshold and the attack threshold for each port.
rate-limit-pps	Sets the rate-limit threshold, in the range of from1 to 19,999.
attack-threshold-pps	Sets the attack threshold, in the range from1 to19,999.

Defaults

By default, the rate-limit threshold and the attack threshold are not configured.

Command Mode

Interface configuration mode

Usage Guide

The attack threshold value shall be equal to or greater than the rate-limit threshold.

Configuration Examples

The following example sets the rate-limit threshold and the attack threshold.

```
FS(config)# interface G 0/1
FS(config-if)# nfpp dhcpv6-guard policy per-src-mac 3 10
FS(config-if)# nfpp dhcpv6-guard policy per-port 50 100
```

Related Commands

Command	Description
dhcpv6-guard attack-threshold	Sets the global attack threshold.
dhcpv6-guard rate-limit	Sets the global rate-limit threshold.
show nfpp dhcpv6-guard summary	Displays the configuration.
show nfpp dhcpv6-guard hosts	Displays the monitored host.
clear nfpp dhcpv6-guard hosts	Clears the isolated host.

Platform Description

N/A

22.72 Nfpp Icmp-guard Enable

Use this command to enable the ICMP anti-attack function on the interface.

Use the **no** or **default** form of this command to restore the default setting.

nfpp icmp-guard enable

no nfpp icmp-guard enable

default nfpp icmp-guard enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults The ICMP anti-attack function is not enabled on the interface.

Command Mode Interface configuration mode

Usage Guide The interface ICMP anti- attack configuration is prior to the global configuration.

Configuration Examples The following example enables the ICMP anti-attack function on the interface.

```
FS(config)# interface G0/1
FS(config-if)# nfpp icmp-guard enable
```

Related Commands

Command	Description
icmp-guard enable	Enables the anti-ARP attack function.
show nfpp icmp-guard summary	Displays the configuration.

Platform Description N/A

22.73 Nfpp Icmp-guard Isolate-period

Use this command to set the isolate period in the interface configuration mode.

Use the **no** or **default** form of this command to restore the default setting.

nfpp icmp-guard isolate-period { *seconds* | **permanent** }

no nfpp icmp-guard isolate-period

default nfpp icmp-guard isolate-period

Parameter Description

Parameter	Description
seconds	Sets the isolate period. The value is 0 or in the range from 30 to 86,400 in the unit of seconds.
permanent	Permanent isolation

Defaults By default, the isolate period is not configured.

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example sets the isolate period in the interface configuration mode.

```
FS(config)# interface G0/1
FS(config-if)# nfpp icmp-guard isolate-period 180
```

Related Commands

Command	Description
icmp-guard isolate-period	Sets the global isolate period.
show nfpp icmp-guard summary	Displays the configuration.

Platform Description

N/A

22.74 Nfpp Icmp-guard Policy

Use this command to set the rate-limit threshold and the attack threshold.

Use the **no** or **default** form of this command to restore the default setting.

nfpp icmp-guard policy { **per-src-ip** | **per-port** } *rate-limit-pps attack-threshold-pps*

no nfpp icmp-guard policy { **per-src-ip** | **per-port** }

default nfpp icmp-guard policy { **per-src-ip** | **per-port** }

Parameter Description

Parameter	Description
per-src-ip	Sets the rate-limit threshold and the attack threshold for each source IP address.
per-port	Sets the rate-limit threshold and the attack threshold for each port.
rate-limit-pps	Sets the rate-limit threshold, in the range from1 to 19,999.
attack-threshold-pps	Sets the attack threshold, in range from1 to 19,999.

Defaults

By default, the rate-limit threshold and the attack threshold are not configured.

Command Mode

Interface configuration mode

Usage Guide

The attack threshold value shall be equal to or greater than the rate-limit threshold.

Configuration Examples

The following example sets the rate-limit threshold and the attack threshold.

```
FS(config)# interface G 0/1
FS(config-if)# nfpp icmp-guard policy per-src-ip 5 10
FS(config-if)# nfpp icmp-guard policy per-port 100 200
```

Related Commands

Command	Description
icmp-guard attack-threshold	Sets the global attack threshold.
icmp-guard rate-limit	Sets the global rate-limit threshold.
show nfpp icmp-guard summary	Displays the configuration.
show nfpp icmp-guard hosts	Displays the monitored host.
clear nfpp icmp-guard hosts	Clears the isolated host.

Platform

N/A

Description

22.75 Nfpp Ip-guard Enable

Use this command to enable the IP anti-attack function on the interface.

Use the **no** or **default** form of this command to restore the default setting.

nfpp ip-guard enable

no nfpp ip-guard enable

default nfpp ip-guard enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults The IP anti-attack function is disabled on the interface.

Command Mode Interface configuration mode

Usage Guide The interface IP anti-attack configuration is prior to the global configuration.

Configuration Examples The following example enables the IP anti-attack function on the interface.

```
FS(config)# interface G0/1
FS(config-if)# nfpp ip-guard enable
```

Related Commands

Command	Description
ip-guard enable	Enables the anti-ARP attack function.
show nfpp ip-guard summary	Displays the configuration.

Platform Description N/A

22.76 Nfpp Ip-guard Isolate-period

Use this command to set the isolate period in the interface configuration mode.

Use the **no** or **default** form of this command to restore the default setting.

nfpp ip-guard isolate-period { *seconds* | **permanent** }

no nfpp ip-guard isolate-period

default nfpp ip-guard isolate-period

Parameter Description

Parameter	Description
seconds	Sets the isolate period, in the range from 30 to 86,400 in the unit of seconds.
permanent	Permanent isolation

Defaults By default, the isolate period is not configured.

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example sets the isolate period in the interface configuration mode.

```
FS(config)# interface G0/1
FS(config-if)# nfpp ip-guard isolate-period 180
```

Related Commands

Command	Description
ip-guard isolate-period	Sets the global isolate period.
show nfpp ip-guard summary	Displays the configuration.

Platform Description N/A

22.77 Nfpp Ip-guard Policy

Use this command to set the rate-limit threshold and the attack threshold.

Use the **no** or **default** form of this command to restore the default setting.

nfpp ip-guard policy { **per-src-ip** | **per-port** } *rate-limit-pps attack-threshold-pps*

no nfpp ip-guard policy { **per-src-ip** | **per-port** }

default nfpp ip-guard policy { **per-src-ip** | **per-port** }

Parameter Description

Parameter	Description
per-src-ip	Sets the rate-limit threshold and the attack threshold for each source IP address.
per-port	Sets the rate-limit threshold and the attack threshold for each port.
rate-limit-pps	Sets the rate-limit threshold, in the range from 1 to 19,999.
attack-threshold-pps	Sets the attack threshold, in the range from 1 to 19,999.

Defaults By default, the rate-limit threshold and the attack threshold are not configured.

Command Mode Interface configuration mode

Usage Guide The attack threshold value shall be equal to or greater than the rate-limit threshold.

Configuration Examples The following example sets the rate-limit threshold and the attack threshold.

```
FS(config)# interface G 0/1
FS(config-if)# nfpp ip-guard policy per-src-ip 2 10
```

```
FS(config-if)# nfpp ip-guard policy per-port 50 100
```

Related Commands

Command	Description
ip-guard attack-threshold	Sets the global attack threshold.
ip-guard rate-limit	Sets the global rate-limit threshold.
show nfpp ip-guard summary	Displays the configuration.
show nfpp ip-guard hosts	Displays the monitored host.
clear nfpp ip-guard hosts	Clears the isolated host.

Platform Description

N/A

22.78 Nfpp Ip-guard Scan-threshold

Use this command to set the scan threshold.

Use the **no** or **default** form of this command to restore the default setting.

nfpp ip-guard scan-threshold *pkt-cnt*

no nfpp ip-guard scan-threshold

default nfpp ip-guard scan-threshold

Parameter Description

Parameter	Description
pkt-cnt	Sets the scan threshold, in the range from 1 to 19,999.

Defaults

By default, the sport-based scan threshold is not configured.

Command Mode

Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the scan threshold to 20pps.

```
FS(config)# interface G 0/1
FS(config-if)# nfpp ip-guard scan-threshold 20
```

Related Commands

Command	Description
ip-guard attack-threshold	Sets the global attack threshold.
show nfpp ip-guard summary	Displays the configuration.

Platform Description

N/A

22.79 Nfpp Nd-guard Enable

Use this command to enable the ND anti-attack function on the interface.

Use the **no** or **default** form of this command to restore the default setting.

nfpp nd-guard enable

no nfpp nd-guard enable

default nfpp nd-guard enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The ND anti-attack function is disabled on the interface.

Command Mode

Interface configuration mode

Usage Guide

The interface ND anti-attack configuration is prior to the global configuration.

Configuration Examples

The following example enables the ND anti-attack function on the interface.

```
FS(config)# interface G0/1
FS(config-if)# nfpp nd-guard enable
```

Related Commands

Command	Description
nd-guard enable	Enables the ND anti-attack function.
show nfpp nd-guard summary	Displays the configuration.

Platform Description

N/A

22.80 Nfpp Nd-Guard Policy

Use this command to set the rate-limit threshold and the attack threshold.

Use the **no** or **default** form of this command to restore the default setting.

nfpp nd-guard policy per-port { **ns-na** | **rs** | **ra-redirect** } *rate-limit-pps attack-threshold-pps*

no nfpp nd-guard policy per-port { **ns-na** | **rs** | **ra-redirect** }

default nfpp nd-guard policy per-port { **ns-na** | **rs** | **ra-redirect** }

Parameter Description

Parameter	Description
ns-na	Sets the neighbor request and neighbor advertisement.
rs	Sets the router request.
ra-redirect	Sets the router advertisement and the redirect packets.
rate-limit-pps	Sets the rate-limit threshold, in the range from 1 to 19,999.

attack-threshold-pps	Sets the attack threshold, in the range from 1 to 19,999.

Defaults By default, the rate-limit threshold and the attack threshold are not configured.

Command Mode Interface configuration mode

Usage Guide The attack threshold value shall be equal to or greater than the rate-limit threshold.

Configuration Examples The following example sets the rate-limit threshold and the attack threshold.

```
FS(config)# interface G 0/1
FS(config-if)# nfpp nd-guard policy per-port ns-na 50 100
FS(config-if)# nfpp nd-guard policy per-port rs 10 20
FS(config-if)# nfpp nd-guard policy per-port ra-redirect 10 20
```

Related Commands

Command	Description
nd-guard attack-threshold	Sets the global attack threshold.
nd-guard rate-limit	Sets the global rate-limit threshold.
show nfpp nd-guard summary	Displays the configuration.

Platform Description N/A

22.81 Show Nfpp Arp-guard Hosts

Use this command to display the monitored host.

show nfpp arp-guard hosts [**statistics** | [[**vlan** *vid*] [**interface** *interface-id*] [*ip-address* | *mac-address*]]]

Parameter Description

Parameter	Description
statistics	Displays the statistical information of the monitored host.
vid	The VLAN ID
interface-id	The interface name
ip-address	The IP address
mac-address	The MAC address

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples

The following example displays the statistical information of the monitored host.

```
FS# show nfpp arp-guard hosts statistics
success      fail      total
-------      ----      -----
100          20        120
```

The following example shows the monitored host.

```
FS# show nfpp arp-guard hosts
If column 1 shows '*', it means "hardware do not isolate user" .
VLAN   interface IP address    MAC address     remain-time(s)
----   --------    ---------   -----------     -------------
1      Gi0/1       1.1.1.1     -                110
2      Gi0/2       1.1.2.1     -                61
*3     Gi0/3       -           0000.0000.1111   110
4      Gi0/4       -           0000.0000.2222   61
Total:4 hosts
```

Related Commands

Command	Description
clear nfpp arp-guard hosts	Clears the monitored hosts.

Platform Description

N/A

22.82 Show Nfpp Arp-guard Scan

Use this command to display the ARP scan list.

show nfpp arp-guard scan [**statistics** | [[**vlan** *vid*] [**interface** *interface-id*] [*ip-address*] [*mac-address*]]]

Parameter Description

Parameter	Description
statistics	Displays the statistical information of the ARP scan list.
vid	The VLAN ID
interface-id	The interface name
ip-address	The IP address
mac-address	The MAC address

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the ARP scan list.

```
FS# show nfpp arp-guard scan statistics
```

```
arp-guard table has 4 record(s).
```

The following example displays the ARP scan list.

```
FS# show nfpp arp-guard scan
VLAN      interface     IP address     MAC address       timestamp
----      --------      ----------     -----------       ---------
1         Gi0/1         -              0000.0000.0001    2008-01-23 16:23:10
2         Gi0/2         1.1.1.1        0000.0000.0002    2008-01-23 16:24:10
3         Gi0/3         -              0000.0000.0003    2008-01-23 16:25:10
4         Gi0/4         -              0000.0000.0004    2008-01-23 16:26:10
Total:4 record(s)
```

The following example displays the ARP scan list.

```
FS# show nfpp arp-guard scan vlan 1 interface G 0/1 0000.0000.0001
VLAN      interface     IP address     MAC address       timestamp
----      --------      ----------     -----------       -------
1         Gi0/1         -              0000.0000.0001    2008-01-23 16:23:10
Total:1 record(s)
```

Related Commands

Command	Description
arp-guard scan-threshold	Sets the global scan threshold.
nfpp arp-guard scan-threshold	Sets the scan threshold.
clear nfpp arp-guard scan	Clears the ARP scan list.

Platform Description N/A

22.83 Show Nfpp Arp-guard Summary

Use this command to display the configuration.

show nfpp arp-guard summary

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration The following example displays the configuration.

Examples

```
FS# show nfpp arp-guard summary
(Format of column Rate-limit and    Attack-threshold is per-src-ip/per-src-mac/per-port.)
Interface    Status    Isolate-period Rate-limit Attack-threshold Scan-threshold
Global          Enable    300                    4/5/60        8/10/100                15
Gi 0/1          Enable    180                    5/-/-         8/-/-                   -
Gi 0/2          Disable 200                    4/5/60        8/10/100                20

Maximum count of monitored hosts: 1000
Monitor period:300s
```

Field	Description
Interface(Global)	Global configuration
Status	Enables/Disables the anti-attack function.
Rate-limit	In the format of the rate-limit threshold for the source IP address/ the rate-limit threshold for the source MAC address/ the rate-limit threshold for the port
Attack-threshold	In the same format as the rate-limit.
Scan-threshold	Scan threshold

Related Commands

Command	Description
arp-guard attack-threshold	Sets the global attack threshold.
arp-guard enable	Enables the anti-ARP attack function.
arp-guard isolate-period	Sets the global isolate time.
arp-guard monitor-period	Sets the monitor period.
arp-guard monitored-host-limit	Sets the maximum number of the monitored hosts.
arp-guard rate-limit	Sets the global rate-limit threshold.
arp-guard scan-threshold	Sets the global scan threshold.
nfpp arp-guard enable	Enables the anti-ARP attack function on the interface.
nfpp arp-guard isolate-period	Sets the isolate time.
nfpp arp-guard policy	Sets the rate-limit threshold and attack threshold.
nfpp arp-guard scan-threshold	Sets the scan threshold.

Platform Description

N/A

22.84 Show Nfpp Define Hosts

Use this command to display the monitored hosts.

show nfpp define hosts *name* [**statistics** | [[**vlan** *vid*] [**interface** *interface-id*] [*ip-address*] [*mac-address*] [*ipv6-address*]]]

Parameter Description

Parameter	Description

name	Name of the user-defined anti-attack type
statistics	Displays the statistics of monitored hosts.
vid	VLAN ID
interface-id	Interface name
ip-address	IP address
mac-address	MAC address
ipv6-address	IPv6 address

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command allows filtering the hosts with parameters specified

Configuration Examples The following example displays the monitored hosts.

```
FS#show nfpp define hosts abc
If col_filter 1 shows '*', it means "hardware do not isolate host".
 VLAN      interface     MAC address        remain-time(s)
 ----      ---------     -----------        --------------
*1          Gi4/2          00d0.f822.33e5    592
Total: 1 host
```

Related Commands

Command	Description
clear nfpp define hosts	Clears the monitored hosts of user-defined anti-attack type.

Platform Description N/A

22.85 Show Nfpp Define Summary

Use this command to display the configuration.

show nfpp define summary [*name*]

Parameter Description

Parameter	Description
name	Name of the user-defined anti-attack type

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command can be used to display the configuration. Without the name specified, all user-defined anti-attack types will be displayed.

Configuration Examples The following example displays the configuration.

```
FS#show nfpp define summary abc
Define abc summary:
match etype 0x800 src-ip 1.1.1.1 src-ip-mask 255.255.255.255
Maximum count of monitored hosts: 20000
Monitor period:600s
(Format of column Rate-limit and Attack-threshold is per-src-ip/per-src-mac/per-port.)
Interface Status    Rate-limit          Attack-threshold
Global    Disable -/10/-                -/20/-
Gi4/1     Enable  -/-/-                 -/-/-
```

Field	Description
Interface	If the interface field is displayed as Global, it means that is configured in the global configuration mode.
Status	Enables/ Disables the anti-attack function.
Rate-limit	In the format of the rate-limit threshold for the source IP address/ the rate-limit threshold for the source MAC address/ the rate-limit threshold for the port
Attack-threshold	In the same format as the rate-limit.

Related Commands

Command	Description
match	Clears the monitored hosts of user-defined anti-attack type.
policy	Attack threshold and rate-limit threshold.
isolate-period	Isolates time
monitored-period	Monitored time
monitored-host-limit	Maximum monitored host number

Platform Description N/A

22.86 Show Nfpp Define Trusted-host

Use this command to display the trusted host free from monitoring.

show nfpp define trusted-host *name*

Parameter Description

Parameter	Description
name	Name of the user-defined anti-attack type

Defaults N/A.

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the trusted host configuration.

```
FS# show nfpp define trusted-host tcp
Define tcp:
IP address        mask
---------         ------
1.1.1.0           255.255.255.0
1.1.2.0           255.255.255.0
Total:2 record(s)
```

Related Commands

Command	Description
trusted-host	Configures the trusted hosts.

Platform Description N/A

22.87 Show Nfpp Dhcp-guard Hosts

Use this command to display the monitored host.

show nfpp dhcp-guard hosts [**statistics** | [[**vlan** *vid*] [**interface** *interface-id*] [*mac-address*]]]

Parameter Description

Parameter	Description
statistics	Displays the statistical information of the monitored host.
vid	VLAN ID
interface-id	Interface name
mac	MAC address

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the monitored host.

```
FS# show nfpp dhcp-guard hosts statistics
success     fail     total
-------     ----     -----
100         20       120
```

The following example displays the monitored host.

```
FS# show nfpp dhcp-guard hosts
If column 1 shows '*', it means "hardware failed to isolate host".
VLAN    interface     MAC address       remain-time(seconds)
----      ---------     -----------          -------------------
 1        gi0/2         0000.0000.0001     10
 *2       gi0/1         0000.0000.0002     20
Total:2 host(s)
```

Related Commands

Command	Description
clear nfpp dhcp-guard hosts	Clears the monitored host.

Platform Description

N/A

22.88 Show Nfpp Dhcp-guard Summary

Use this command to display the configuration.

show nfpp dhcp-guard summary

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the configuration.

```
FS# show nfpp dhcp-guard summary
(Format of column Rate-limit and Attack-threshold is per-src-ip/per-src-mac/per-port.)
Interface    Status    Isolate-period Rate-limit Attack-threshold
Global          Enable    300                    -/5/150        -/10/300
Gi 0/1          Enable    180                    -/6/-          -/8/-
Gi 0/2          Disable 200                    -/5/30         -/10/50

Maximum count of monitored hosts: 1000
Monitor period:300s
```

Field	Description

Interface(Global)	Global configuration
Status	Enables/Disables the anti-attack function.
Isolate-period	Isolate period
Rate-limit	In the format of the rate-limit threshold for the source IP address/ the rate-limit threshold for the source MAC address/ the rate-limit threshold for the port
Attack-threshold	In the same format as the rate-limit.

Related Commands

Command	Description
dhcp-guard attack-threshold	Sets the global attack threshold.
dhcp-guard enable	Enables the DHCP anti-attack function.
dhcp-guard isolate-period	Sets the global isolate time.
dhcp-guard monitor-period	Sets the monitor period.
dhcp-guard monitored-host-limit	Sets the maximum number of the monitored hosts.
dhcp-guard rate-limit	Sets the global rate-limit threshold.
nfpp dhcp-guard enable	Enables the DHCP anti-attack function on the interface.
nfpp dhcp-guard isolate-period	Sets the isolate time.
nfpp dhcp-guard policy	Sets the rate-limit threshold and attack threshold.

Platform Description N/A

22.89 Show Nfpp Dhcpv6-guard Hosts

Use this command to display the monitored host.

show nfpp dhcpv6-guard hosts [**statistics** | [[**vlan** *vid*] [**interface** *interface-id*] [*mac-address*]]]

Parameter Description

Parameter	Description
statistics	Displays the statistical information of the monitored host.
vid	The VLAN ID
interface-id	The interface name
mac-address	The MAC address

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples

The following example displays the monitored host.

```
FS# show nfpp dhcpv6-guard hosts
If column 1 shows '*', it means "hardware failed to isolate host".
VLAN    interface      MAC address        remain-time(seconds)
----        ---------       -----------                  -------------------
 *1         gi0/2            0000.0000.0001      10
 *2       gi0/1            0000.0000.0002      20
Total:2 host(s)
```

Related Commands

Command	Description
clear nfpp dhcpv6-guard hosts	Clears the monitored host.

Platform Description

N/A

22.90 Show Nfpp Dhcpv6-guard Summary

Use this command to display the configuration.

show nfpp dhcpv6-guard summary

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the configuration.

```
FS#show nfpp dhcpv6-guard summary

(Format of column Rate-limit and Attack-threshold is per-src-ip/per-src-mac/per-port.)
Interface Status    Rate-limit          Attack-threshold
Global       Enable    -/5/1200              -/10/1500

Maximum count of monitored hosts: 20000
Monitor period: 600s
```

Field	Description
Interface(Global)	Global configuration
Status	Enables/Disables the anti-attack function.
Rate-limit	In the format of the rate-limit threshold for the source IP address/ the

	rate-limit threshold for the source MAC address/ the rate-limit threshold for the port
Attack-threshold	In the same format as the rate-limit.

Related Commands

Command	Description
dhcpv6-guard attack-threshold	Sets the global attack threshold.
dhcpv6-guard enable	Enables the DHCPv6 anti-attack function.
dhcpv6-guard monitor-period	Sets the monitor period.
dhcpv6-guard monitored-host-limit	Sets the maximum number of the monitored hosts.
dhcpv6-guard rate-limit	Sets the global rate-limit threshold.
nfpp dhcpv6-guard enable	Enables the DHCPv6 anti-attack function on the interface.
nfpp dhcpv6-guard policy	Sets the rate-limit threshold and attack threshold.

Platform Description

N/A

22.91 Show Nfpp Icmp-guard Hosts

Use this command to display the monitored host.

show nfpp icmp-guard hosts [**statistics** | [[**vlan** *vid*] [**interface** *interface-id*] [*ip-address*]]]

Parameter Description

Parameter	Description
statistics	Displays the statistical information of the monitored host.
vid	The VLAN ID
interface-id	The interface name
ip-address	The IP address

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the monitored host.

```
FS# show nfpp icmp-guard hosts statistics
success      fail      total
-------      ----      -----
100          20        120
```

The following example displays the monitored host.

```
FS# show nfpp icmp-guard hosts
If column 1 shows '*', it means "hardware failed to isolate host".
VLAN    interface IP address        remain-time(s)
----    --------    ---------       -------------
1       Gi0/1       1.1.1.1         110
2       Gi0/2       1.1.2.1         61
Total:2 host(s)
```

Related Commands

Command	Description
clear nfpp icmp-guard hosts	Clears the monitored host.

Platform Description N/A

22.92 Show Nfpp Icmp-guard Summary

Use this command to display the configuration.

show nfpp icmp-guard summary

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the configuration.

```
FS# show nfpp icmp-guard summary
(Format of column Rate-limit and Attack-threshold is per-src-ip/per-src-mac/per-port.)
Interface    Status    Isolate-period Rate-limit Attack-threshold
Global       Enable    300            4/-/60     8/-/100
Gi 0/1       Enable    180            5/-/-      8/-/-
Gi 0/2       Disable   200            4/-/60     8/-/100

Maximum count of monitored hosts: 1000
Monitor period:300s
```

Field	Description
Interface(Global)	Global configuration
Status	Enables/Disables the anti-attack function.

Isolate-period	Isolate period
Rate-limit	In the format of the rate-limit threshold for the source IP address/ the rate-limit threshold for the source MAC address/ the rate-limit threshold for the port
Attack-threshold	In the same format as the rate-limit.

Related Commands

Command	Description
icmp-guard attack-threshold	Sets the global attack threshold.
icmp-guard enable	Enables the ICMP anti-attack function.
icmp-guard isolate-period	Sets the global isolate time.
icmp-guard monitor-period	Sets the monitor period.
icmp-guard monitored-host-limit	Sets the maximum number of the monitored hosts.
icmp-guard rate-limit	Sets the global rate-limit threshold.
nfpp icmp-guard enable	Enables the ICMP anti-attack function on the interface.
nfpp icmp-guard isolate-period	Sets the isolate time.
nfpp icmp-guard policy	Sets the rate-limit threshold and attack threshold.

Platform Description

N/A

22.93 Show Nfpp Icmp-guard Trusted-host

Use this command to display the trusted host free from being monitored.

show nfpp icmp-guard trusted-host

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the trusted host free from being monitored.

```
FS# show nfpp icmp-guard trusted-host
IP address          mask
---------           ------
1.1.1.0             255.255.255.0
1.1.2.0             255.255.255.0
Total:2 record(s)
```

Related Commands

Command	Description
icmp-guard trusted-host	Sets the trusted host.

Platform Description N/A

22.94 Show Nfpp Ip-guard Hosts

Use this command to display the monitored host.

show nfpp ip-guard hosts [**statistics** | [[**vlan** *vid*] [**interface** *interface-id*] [*ip-address*]]]

Parameter Description

Parameter	Description
statistics	Displays the statistical information of the monitored host.
vid	The VLAN ID.
interface-id	The interface name.
mac-address	The MAC address.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the monitored host.

```
FS# show nfpp ip-guard hosts statistics
success      fail      total
-------      ----      -----
100          20        120
```

The following example displays the monitored host.

```
FS#show nfpp ip-guard hosts
If column 1 shows '*', it means "hardware do not isolate host" .
VLAN   interface IP address   Reason        remain-time(s)
----   --------   ---------   -------       -------------
1      Gi0/1      1.1.1.1     ATTACK        110
2      Gi0/2      1.1.2.1     SCAN          61
Total:2 host(s)
```

Related Commands

Command	Description
clear nfpp ip-guard hosts	Clears the monitored host.

Platform Description N/A

22.95 Show Nfpp Ip-guard Summary

Use this command to display the configuration.

show nfpp ip-guard summary

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the configuration.

```
FS# show nfpp ip-guard summary
(Format of column Rate-limit and Attack-threshold is per-src-ip/per-src-mac/per-port.)
Interface Status Isolate-period Rate-limit Attack-threshold Scan-threshold
Global      Enable   300          4/-/60     8/-/100          15
Gi 0/1      Enable   180          5/-/-      8/-/-             -
Gi 0/2      Disable  200          4/-/60     8/-/100          20

Maximum count of monitored hosts: 1000
Monitor period..300s
```

Field	Description
Interface(Global)	Global configuration
Status	Enables/Disables the anti-attack function.
Isolate-period	Isolate period
Rate-limit	In the format of the rate-limit threshold for the source IP address/ the rate-limit threshold for the source MAC address/ the rate-limit threshold for the port
Attack-threshold	In the same format as the rate-limit.
Scan-threshold	Scan threshold

Related Commands

Command	Description
ip-guard attack-threshold	Sets the global attack threshold.
ip-guard enable	Enables the IP anti-attack function.
ip-guard isolate-period	Sets the global isolate time.

ip-guard monitor-period	Sets the monitor period.
ip-guard monitored-host-limit	Sets the maximum number of the monitored hosts.
ip-guard rate-limit	Sets the global rate-limit threshold.
nfpp ip-guard enable	Enables the IP anti-attack function on the interface.
nfpp ip-guard isolate-period	Sets the isolate time.
nfpp ip-guard policy	Sets the rate-limit threshold and attack threshold.

Platform Description N/A

22.96 Show Nfpp Ip-guard Trusted-host

Use this command to display the trusted host free from being monitored.

show nfpp ip-guard trusted-host

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the trusted host free from being monitored.

```
FS# show nfpp ip-guard trusted-host
IP address        mask
---------         ------
1.1.1.0           255.255.255.0
1.1.2.0           255.255.255.0
Total.2 record(s)
```

Related Commands

Command	Description
ip-guard trusted-host	Sets the trusted host.

Platform Description N/A

22.97 Show Nfpp Log

Use this command to display the NFPP log configuration.

show nfpp log summary

Use this command to display the NFPP log buffer area content.

show nfpp log buffer [**statistics**]

Parameter Description

Parameter	Description
statistics	Displays the statistical information of the NFPP log buffer area.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

When the log buffer area is full, the subsequent logs are to be dropped, and an entry with all attributes "-" is displayed in the log buffer area. The administrator shall increase the capacity of the log buffer area or improve the rate of generating the syslog.

The generated syslog in the log buffer area carries with the timestamp, for example:

%NFPP_ARP_GUARD-4-DOS_DETECTED: Host<IP=N/A,MAC=0000.0000.0004,port=Gi4/1,VLAN=1> was detected.(2009-07-01 13:00:00)

Configuration Examples

The following example displays the NFPP log configuration.

```
FS#show nfpp log summary
Total log buffer size : 10
Syslog rate : 1 entry per 2 seconds
Logging:
VLAN    1-3, 5
interface Gi 0/1
interface Gi 0/2
```

The following example displays the log number in the buffer area.

```
FS#show nfpp log buffer statistics
There are 6 logs in buffer.
```

The following example shows the NFPP log buffer area:

```
FS#show nfpp log buffer
Protocol VLAN    Interface IP address MAC address        Reason                Timestamp
------- ----    --------     ---------    -----------        ------                ---------
ARP   1          Gi0/1          1.1.1.1          -          DoS                    2009-05-30 16:23:10
ARP   1          Gi0/1          1.1.1.1          -          ISOLATED              2009-05-30 16:23:10
ARP   1          Gi0/1          1.1.1.2          -          DoS                    2009-05-30 16:23:15
ARP   1          Gi0/1          1.1.1.2          -          ISOLATE_FAILED 2009-05-30 16:23:15
ARP   1          Gi0/1          -                0000.0000.0001    SCAN                2009-05-30 16:30:10
ARP   -          Gi0/2          -                -                 PORT_ATTACKED      2009-05-30 16:30:10
```

Field	Description
Protocol	ARP, IP, ICMP, DHCP,DHCPv6, NS-NA, RS, RA-REDIRECT
Reason	DoS, ISOLATED, ISOLATE_FAILE, SCAN,

	PORT_ATTACKED

Related Commands

Command	Description
clear nfpp log	Clears the NFPP log buffer area.

Platform Description N/A

22.98 Show Nfpp Nd-guard Summary

Use this command to display the configuration.

show nfpp nd-guard summary

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the configuration.

```
FS# show nfpp nd-guard summary
(Format of column Rate-limit and Attack-threshold is NS-NA/RS/RA-REDIRECT.)
Interface Status Rate-limit Attack-threshold
Global      Enable   20/5/10      40/10/20
Gi 0/1      Enable   15/15/15     30/30/30
Gi 0/2      Disable -/5/30        -/10/50
```

Field	Description
Interface(Global)	Global configuration
Status	Enables/Disables the anti-attack function.
Rate-limit	In the format of the rate-limit threshold for the NS-NA/RS/RA-REDIRECT.
Attack-threshold	In the same format as the rate-limit.

Related Commands

Command	Description
nd-guard attack-threshold	Sets the global attack threshold.
nd-guard enable	Enables the ND anti-attack function.
nd-guard rate-limit	Sets the global rate-limit threshold.

nfpp nd-guard enable	Enables the ND anti-attack function on the interface.
nfpp nd-guard policy	Sets the rate-limit threshold and attack threshold.

Platform Description N/A

22.99 Show Nfpp Nd-guard Hosts

Use this command to display the monitored host.

show nfpp nd-guard hosts [**statistics** | [[**vlan** *vid*] [**interface** *interface-id*]]]

Parameter Description

Parameter	Description
statistics	Displays the statistics of the monitored host.
vid	Sets the VLAN ID.
interface-id	Sets the interface name and number.

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the statistics of the host monitored by ND-guard.

```
FS#show nfpp nd-guard hosts statistics
success      fail      total
-------      ----      -----
10           2         12
```

The following example displays the host monitored by ND-guard. The “remain-time(s)” refers to the remaining time of isolation.

```
FS#show nfpp nd-guard hosts
If col_filter 1 shows '*', it means "hardware do not isolate host".
 VLAN      interface     ND-guard              remain-time(s)
 ----      ---------     --------              --------------
 -         Gi4/2         ns-na-guard           174
 -         Gi4/2         rs-guard              98
 -         Gi4/2         ra-redirect-guard     127
Total: 3 hosts
```

Platform Description N/A

22.100 Trusted-host

Use this command to set the trusted hosts free form monitoring.

Use the **no** or **default** form of this command to restore the default setting,

trusted-host { *mac mac_mask* | *ip mask* | *IPv6/prefixlen* }

no trusted-host {**all** | *mac mac_mask* | *ip mask* | *IPv6/prefixlen* }

default trusted-host

Parameter Description

Parameter	Description
ip	Sets the IP address
mac	MAC address
mac_mask	MAC address mask
IPv6/prefixlen	IPv6 address and mask length
mask	IP mask
all	Deletes the configuration of all trusted hosts with the no form of this command.

Defaults N/A

Command Mode NFPP define configuration mode

Usage Guide The administrator can use this command to set the trusted host free from monitoring. The ICMP packets are allowed to be sent to the trusted host CPU without any rate-limit and warning configuration. Configure the mask to set all hosts in one network segment free from monitoring.

UP to 500 trusted hosts are supported.

Before configuring the trusted-host, the match type must be configured. If the message type configured by the match is Ipv4, the Ipv6 trusted addresses are not allowed. In the same way, if the message type is IPv6, the IPv4 trusted addresses are not allowed.

Configuration Examples The following example sets the trusted hosts free form monitoring.

```
FS(config)# nfpp
FS(config-nfpp)# define tcp
FS(config-nfpp-define)#trusted-host 1.1.1.1 255.255.255.255
```

Related Commands

Command	Description
show nfpp define trusted-host	Displays the trusted host configuration.

Platform Description N/A

22.101 No All-guard Enable

Use this command to disable all NFPP guards (except guards self-defined and enabled in interface configuration mode).

no all-guard enable

Use this command to enable all NFPP guards.

all-guard enable

Parameter Description

Parameter	Description
N/A	N/A

Command Mode

NFPP configuration mode

Usage Guide

- By default, all basic NFPP guards are enabled.
- This global command supports basic NFPP guards including ARP-GUARD, IP-GUARD, ICMP-GUARD, DHCP-GUARD, DHCPv6-GUARD and ND-GUARD.
- The **no** form command will disable all guards, which is displayed guard-by-guard by using the **show running-config** command. The exception is guards self-defined and configured in interface configuration mode.

Configuration Examples

```
FS(config)#show running-config    | begin nfpp
nfpp
 log-buffer enable
 arp-guard rate-limit per-port 201
 arp-guard attack-threshold per-port 210
!
FS(config)# nfpp
FS(config-nfpp)#no all-guard enable
FS(config-nfpp)#show running-config    | begin nfpp
nfpp
 log-buffer enable
 no arp-guard enable
 arp-guard rate-limit per-port 201
 arp-guard attack-threshold per-port 210
 no icmp-guard enable
 no ip-guard enable
 no dhcp-guard enable
 no dhcpv6-guard enable
 no nd-guard enable
!
FS(config-nfpp)#all-guard enable
FS(config-nfpp)#show running-config    | begin nfpp
nfpp
 log-buffer enable
 arp-guard rate-limit per-port 201
 arp-guard attack-threshold per-port 210
!
no service password-encryption
!
```

Platform Description

N/A

23. DoS Protection Commands

23.1 Ip Deny Invalid-l4port

Use this command to enable the anti-attack of the self-consumption.

Use the **no** form of this command to restore the default setting.

ip deny invalid-l4port

no ip deny invalid-l4port

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example enables the anti-attack of the self-consumption.

```
FS(config)# ip deny invalid-l4port
```

The following example disables the anti-attack of the self-consumption.

```
FS(config)# no ip deny invalid-l4port
```

Related Commands

Command	Description
show ip deny invalid-l4port	Displays the state of anti-attack of the self-consumption.

Platform Description

N/A

23.2 Ip Deny Invalid-tcp

Use this command to enable the anti-attack of the invalid TCP packets.

Use the **no** form of this command to restore the default setting.

ip deny invalid-tcp

no ip deny invalid-tcp

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The function is disabled by default.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example enables the anti-attack of the invalid TCP packets:

```
FS(config)# ip deny invalid-tcp
```

The following example disables the anti-attack of the invalid TCP packets:

```
FS(config)# no ip deny invalid-tcp
```

Related Commands

Command	Description
show ip deny invalid-tcp	Displays the state of anti-attack of the invalid TCP packets.

Platform Description N/A

23.3 Ip Deny Land

Use this command to enable the anti-land-attack.

Use the **no** form of this command to restore the default setting.

ip deny land

no ip deny land

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example enables the anti-land-attack:

```
FS(config)# ip deny land
```

The following example disables the anti-land-attack:

```
FS(config)# no ip deny land
```

Related Commands

Command	Description
show ip deny land	Displays the anti-land-attack state.

Platform Description N/A

23.4 Show Ip Deny

Use this command to display the state of the anti-DOS-attack.

show ip deny

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the state of the anti-DOS-attack.

```
FS#show ip deny
  Protect against Land attack          On
  Protect against invalid L4port attack   Off
  Protect against invalid TCP attack     Off
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

23.5 Show Ip Deny Invalid-l4port

Use this command to display the state of the anti-consumption-attack.

show ip deny invalid-l4port

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the state of the anti-consumption-attack.

```
FS# show ip deny invalid-l4port
 DoS Protection Mode                          State
------------------------------          -----
 protect against invalid l4port attack    Off
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

23.6 Show Ip Deny Invalid-tcp

Use this command to display the state of the anti-attack of the invalid TCP packets.

show ip deny invalid-tcp

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the state of the anti-attack of the invalid TCP packets.

```
FS# show ip deny invalid-tcp
DoS Protection Mode                          State
-------------------------------------          -----
protect against invalid tcp attack                On
```

Related Commands

Command	Description
ip deny invalid-tcp	Enables the anti-attack of the invalid TCP packets.

Platform Description N/A

23.7 Show Ip Deny Land

Use this command to display the anti-land-attack state.

show ip deny land

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the anti-land-attack state.

```
FS# show ip deny land
DoS Protection Mode                    State
------------------------------    -----
protect against land attack        On
```

Related Commands

Command	Description
no ip deny land	Enables the anti-land-attack function.

Platform Description N/A

Chapter 8 ACL & QoS Configuration Commands

1. ACL Commands
2. QoS Commands
3. MMU Commands

1. ACL Commands

1.1 Command ID Table

For IDs used in the following commands, refer to the command ID table below:

ID	Meaning
ID	Number of access list. Range: Standard IP ACL: 1 to 99, 1300 to 1999 Extended IP ACL: 100 to 199,2000 to 2699 Extended MAC ACL: 700 to 799 Extended expert ACL: 2700 to 2899
name	ACL name
sn	ACL SN (products can be set according to the priority)
start-sn	Start sequence number
inc-sn	Sequence number increment
deny	If matched, access is denied.
permit	If matched, access is permitted.
port	Protocol number. For IPv6, this field can be IPv6, ICMP, TCP, UDP and numbers 0 to 255. For IPv4, it can be one of EIGRP, GRE, IPINIP, IGMP, NOS, OSPF, ICMP, UDP, TCP,AHP, ESP, PCP, PIM and IP, or it can be numbers 0 to 255 that represent the IP protocol. It is described when some important protocols, such as ICMP, TCP and UDP, are listed individually.
interface *idx*	Interface index
src	Packet source IP address (host address or network address)
src-wildcard	Source IP address wildcard. It can be discontinuous, for example, 0.255.0.32.
src-ipv6-pfix	Source IPv6 network address or network type
dst-ipv6-pfix	Destination IPv6 network address or network type
pfix-len	Prefix mask length
src-ipv6-addr	Source IPv6 address
dst-ipv6-addr	Destination IPv6 address
dscp	Differential service code point, and code point value. Range: 0 to 63
flow-label	Flow label in the range 0 to 1048575
dst	Packet destination IP address (host address or network address)
dst-wildcard	Destination IP address wildcard. It can be discontinuous, such as 0.255.0.32
fragment	Packet fragment filtering.
precedence	Packet precedence value (0 to 7)
range	The layer 4 port number range of the packet.

time-range tm-rng-name	Time range of packet filtering, named *tm-rng-name*
tos	Type of service (0 to 15)
cos	Class of service (0-7)
cos inner *cos*	COS of the packet tag
icmp-type	ICMP message type (0 to 255)
icmp-code	ICMP message type code (0 to 255)
icmp-message	ICMP message type name (0 to 255)
operator port[port]	Operator (lt-smaller, eq-equal, gt-greater, neq-unequal, range-range) *port* indicates the port number. Dyadic operation needs two port numbers, while other operators only need one port number
src-mac-addr	Physical address of the source host
dst-mac-addr	Physical address of the destination host
VID vid	VLAN ID
VID inner vid	VID of the tag
ethernet-type	Ethernet protocol type. 0x value can be entered.
match-all *tcpf*	Match all bits of the TCP flag.
established	Match the RST or ACK bit of the TCP flag.
text	Remark text
in	Filter the incoming packets of the interface
out	Filter the outgoing packets of the interface
{rule mask offset}$^{+}$	rule: Hexadecimal value field; mask: Hexadecimal mask field offset: Refer to the offset table "+" sign indicates at least one group
log	Output the matching syslog when the packet matches the ACL rule.

Letter	Meaning	Offset	Letter	Meaning	Offset
A	Destination MAC	0	O	TTL field	34
B	Source MAC	6	P	Protocol number	35
C	Data frame length field	12	Q	IP check sum	36
D	VLAN tag field	14	R	Source IP address	38
E	DSAP (Destination Service Access Point) field	18	S	Destination IP address	42
F	SSAP (Source Service Access Point) field	19	T	TCP source port	46
G	Ctrl field	20	U	TCP destination port	48
H	Org Code field	21	V	Sequence number	50
I	Encapsulated data type	24	W	Confirmation field	54

J	IP version number	26	XY	IP header length and reserved bits	58
K	TOS field	27	Z	Resrved bits and flags bit	59
L	Length of IP packet	28	a	Windows size field	60
M	ID	30	b	Others	62
N	Flags field	32			

1.2 Access-list

Use this command to create an access list to filter data packets. Use the **no** form of this command to remove the specified access list.

5. Standard IP access list (1 to 99, 1300 to 1999)

access-list *id* { **deny** | **permit** } { *source source-wildcard* | **host** *source* | **any** | **interface** *idx* } [**time-range** *tm-range-name*] [**log**]

6. Extended IP access list (100 to 199, 2000 to 2699)

access-list *id* {**deny** | **permit**} **protocol** {*source source-wildcard* | **host** *source* | **any**| **interface** *idx* } {*destination destination-wildcard* | **host** *destination* | **any**} [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*] [**log**]

7. Extended MAC access list (700 to 799)

access-list *id* {**deny** | **permit**} {**any** | **host** *source-mac-address* | *source-mac-address mask* } {**any** | **host** *destination-mac-address* | *destination-mac-address mask* } [*ethernet-type*][**cos** [*out*][**inner** *in*]]

8. Extended expert access list (2700 to 2899)

access-list *id* {**deny** | **permit**} [**protocol** | [*ethernet-type*][**cos** [*out*][**inner** *in*]]] [**VID** [*out*][**inner** *in*]] {**source** *source-wildcard* | **host** *source* | **any**} {**host** *source-mac-address* | **any**} {**destination** *destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**}][**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**time-range** *time-range-name*]

- When you select the Ethernet-type field or cos field:

access-list *id* {**deny** | **permit**} {*ethernet-type*| **cos** [*out*][**inner** *in*]} [**VID** [*out*][**inner** *in*]] {**source** *source-wildcard* | **host** *source* | **any**} {**host** *source-mac-address* | **any** } {**destination** *destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**} [**time-range** *time-range-name*]

- When you select the protocol field:

access-list *id* {deny | permit} **protocol [VID** [*out*][**inner** *in*]] {**source** *source-wildcard* | host *source* | **any**} {**host** *source-mac-address* | **any** }{destination *destination-wildcard* | **host** *destination* | **any} {host** *destination-mac-address* | **any} [precedence** *precedence*] [**tos** *tos*] **[fragment]** [**range** *lower upper*] **[time-range** *time-range-name*]

- Extended expert ACLs of some important protocols:

Internet Control Message Protocol (ICMP)

access-list *id* {**deny** | **permit**} **icmp** [**VID** [*out*][**inner** *in*]] {**source** *source-wildcard* | **host** *source* | **any**} {**host** *source-mac-address* | **any** } {**destination** *destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**} [*icmp-type*] [[*icmp-type* [*icmp-code*]] | [*icmp-message*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**time-range** *time-range-name*]

Transmission Control Protocol (TCP)

access-list *id* {**deny** | **permit**} **tcp** [**VID** [*out*][**inner** *in*]]{**source** *source-wildcard* | **host** *Source* | **any**} {**host** *source-mac-address* | **any** } [**operator** port [*port*]] {**destination** *destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**} [**operator port** [*port*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*] [**match-all** *tcp-flag* | **established**]

User Datagram Protocol (UDP)

access-list *id* {**deny** | **permit**} **udp** [**VID** [*out*][**inner** *in*]] {**source** *source –wildcard* | **host** *source* | **any**} {**host** *source-mac-address* | **any** } [**operator port** [*port*]] {**destination** *destination-wildcard* | **host** *destination* | **any**}{**host** *destination-mac-address* | **any**} [**operator port** [*port*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

Parameter Description

Parameter	Description
id	Access list number. The ranges available are 1 to 99, 100 to 199, 1300 to 1999, 2000 to 2699, 2700 to 2899, and 700 to 799.
deny	If not matched, access is denied.
permit	If matched, access is permitted.
source	Specify the source IP address (host address or network address).
source-wildcard	It can be discontinuous, for example, 0.255.0.32.
protocol	IP protocol number. It can be one of EIGRP, GRE, IPINIP, IGMP, NOS, OSPF, ICMP, UDP, TCP, and IP. It can also be a number representing the IP protocol between 0 and 255. The important protocols such as ICMP, TCP, and UDP are described separately.
destination	Specify the destination IP address (host address or network address).
destination-wildcard	Wildcard of the destination IP address. It can be discontinuous, for example, 0.255.0.32.
fragment	Packet fragment filtering
precedence	Specify the packet priority.
precedence	Packet precedence value (0 to 7)
range	Layer4 port number range of the packet.
lower	Lower limit of the layer4 port number.
upper	Upper limit of the layer4 port number.
time-range	Time range of packet filtering
time-range-name	Time range name of packet filtering
tos	Specify type of service.
tos	ToS value (0 to 15)
icmp-type	ICMP message type (0 to 255)
icmp-code	ICMP message type code (0 to 255)
icmp-message	ICMP message type name
operator	Operator (lt-smaller, eq-equal, gt-greater, neq-unequal, range-range)
port [port]	Port number; range needs two port numbers, while other operators only need one port number.
host source-mac-address	Source physical address
host destination-mac-address	Destination physical address
VID vid	Match the specified VID.
ethernet-type	Ethernet type
match-all	Match all the bits of the TCP flag.
tcp-flag	Match the TCP flag.

established	Match the RST or ACK bits, not other bits of the TCP flag.

Defaults N/A

Command Mode Global configuration mode.

Usage Guide To filter the data by using the access control list, you must first define a series of rule statements by using the access list. You can use ACLs of the appropriate types according to the security needs:

The standard IP ACL (1 to 99, 1300 to 1999) only controls the source IP addresses.

The extended IP ACL (100 to 199, 2000 to 2699) can enforce strict control over the source and destination IP addresses.

The extended MAC ACL (700 to 799) can match against the source/destination MAC addresses and Ethernet type.

The extended expert access list (2700 to 2899) is a combination of the above and can match and filter the VLAN ID.

For the layer-3 routing protocols including the unicast routing protocol and multicast routing protocol, the following parameters are not supported by the ACL: **precedence** *precedence*/**tos** *tos*/**fragments**/**range** *lower upper*/**time-range** *time-range-name*

The TCP Flag includes part or all of the following:

- urg
- ack
- psh
- rst
- syn
- fin

The packet precedence is as below:

- critical
- flash
- flash-override
- immediate
- internet
- network
- priority
- routine

The service types are as below:

- max-reliability
- max-throughput
- min-delay
- min-monetary-cost
- normal

The ICMP message types are as below:

- administratively-prohibited
- dod-host-prohibited
- dod-net-prohibited
- echo
- echo-reply
- fragment-time-exceeded
- general-parameter-problem
- host-isolated
- host-precedence-unreachable
- host-redirect
- host-tos-redirect
- host-tos-unreachable
- host-unknown
- host-unreachable
- information-reply
- information-request
- mask-reply
- mask-request
- mobile-redirect
- net-redirect
- net-tos-redirect
- net-tos-unreachable
- net-unreachable
- network-unknown
- no-room-for-option
- option-missing
- packet-too-big
- parameter-problem
- port-unreachable
- precedence-unreachable
- protocol-unreachable
- redirect
- device-advertisement
- device-solicitation
- source-quench
- source-route-failed
- time-exceeded
- timestamp-reply
- timestamp-request
- ttl-exceeded
- unreachable

The TCP ports are as follows. A port can be specified by port name and port number:

- bgp

- chargen
- cmd
- daytime
- discard
- domain
- echo
- exec
- finger
- ftp
- ftp-data
- gopher
- hostname
- ident
- irc
- klogin
- kshell
- ldp
- login
- nntp
- pim-auto-rp
- pop2
- pop3
- smtp
- sunrpc
- syslog
- tacacs
- talk
- telnet
- time
- uucp
- whois
- www

The UDP ports are as follows. A UDP port can be specified by port name and port number.

- biff
- bootpc
- bootps
- discard
- dnsix
- domain
- echo
- isakmp
- mobile-ip
- nameserver

- netbios-dgm
- netbios-ns
- netbios-ss
- ntp
- pim-auto-rp
- rip
- snmp
- snmptrap
- sunrpc
- syslog
- tacacs
- talk
- tftp
- time
- who
- xdmcp

The Ethernet types are as below:

- aarp
- appletalk
- decnet-iv
- diagnostic
- etype-6000
- etype-8042
- lat
- lavc-sca
- mop-console
- mop-dump
- mumps
- netbios
- vines-echo
- xns-idp

Configuration Examples

1. Example of the standard IP ACL

The following basic IP ACL allows the packets whose source IP addresses are 192.168.1.64 - 192.168.1.127 to pass:

```
FS (config)#access-list 1 permit 192.168.1.64 0.0.0.63
```

2. Example of the extended IP ACL

The following extended IP ACL allows the DNS messages and ICMP messages to pass:

```
FS(config)#access-list 102 permit tcp any any eq domain log
FS(config)#access-list 102 permit udp any any eq domain log
FS(config)#access-list 102 permit icmp any any echo log
FS(config)#access-list 102 permit icmp any any echo-reply
```

3. Example of the extended MAC ACL

This example shows how to deny the host with the MAC address 00d0f8000c0c to provide service with the

protocol type 100 on gigabit Ethernet port 1/1. The configuration procedure is as below:

```
FS(config)#access-list 702 deny host 00d0f8000c0c any aarp
FS(config)# interface gigabitethernet 1/1
FS(config-if)# mac access-group 702 in
```

4. Example of the extended expert ACL

The following example shows how to create and display an extended expert ACL. This expert ACL denies all the TCP packets with the source IP address 192.168.12.3 and the source MAC address 00d0.f800.0044.

```
FS(config)#access-list 2702 deny tcp host 192.168.12.3 mac 00d0.f800.0044 any any
FS(config)# access-list 2702 permit any any any any
FS(config)# show access-lists
expert access-list extended 2702
10 deny tcp    host    192.168.12.3 mac 00d0.f800.0044 any any
10 permit any any any any
```

Related Commands

Command	Description
show access-lists	Show all the ACLs.
mac access-group	Apply the extended MAC ACL on the interface.

Platform Description N/A

1.3 Access-list List-remark

Use this command to write a helpful comment (remark) for an access list. Use the **no** form of this command to remove the remark.

access-list *id* **list-remark** *text*

no access-list *id* **list-remark**

Parameter Description

Parameter	Description
id	Access list number. Standard IP ACL: 1 to 99, 1300 to 1999. Extended IP ACL: 100 to 199. 2000 to 2699. Extended MAC ACL: 700 to 799. Extended Expert ACL: 2700 to 2899.
text	Comment that describes the access list.

Defaults The access lists have no remarks by default.

Command Mode Global configuration mode

Usage Guide You can use this command to write a helpful comment for a specified access list. If the specified access list does not exist, the command will create the access list, then add remarks for the access list.

Configuration Examples

The following example writes a comment of "this acl is to filter the host 192.168.4.12" for ACL100.

```
FS(config)# ip access-list extended 100
FS(config)# access-list 100 list-remark this acl is to filter the host 192.168.4.12
```

Related Commands

Command	Description
show access- lists	Displays all access lists, including the remarks for the access lists.
show access-lists *id*	Displays the access list of a specified number, including the remarks for the access list.
show access-lists *name*	Displays the access list of a specified name, including the remarks for the access list.

Platform Description

1.4 Access-list Remark

Use this command to write a helpful comment (remark) for an entry in a numbered access list. Use the **no** form of this command to remove the remark.

access-list *id* **remark** *text*

no access-list *id* **remark** *text*

Parameter Description

Parameter	Description
id	Access list number. Standard IP ACL: 1 to 99, 1300 to 1999. Extended IP ACL: 100 to 199. 2000 to 2699. Extended MAC ACL: 700 to 799. Extended Expert ACL: 2700 to 2899.
text	Comment that describes the access list entry.

Defaults

The access list entries have no remarks by default.

Command Mode

Global configuration mode

Usage Guide

You can use this command to write a helpful comment for an entry in a specified access list. If the specified access list does not exist, the command will create the access list, then add remarks for the access entry.

Configuration Examples

The following example writes a comment for an entry in ACL102.

```
FS(config)# access-list 102 remark deny-host-10.1.1.1
```

Related

Command	Description

Commands

show access-lists	Displays all access lists, including the remarks for the access list entries.
show access-lists *id*	Displays the access list of a specified number, including the remarks for the access list entry.
show access-lists *name*	Displays the access list of a specified name, including the remarks for the access list entry.

Platform Description

1.5 Clear Access-list Counters

Use this command to clear counters of packets matching the deny entries in ACLs.

clear access-list counters [*id* | *name*]

Parameter Description

Parameter	Description
id	Access list number
name	Access list name

Defaults

Command Mode Privileged EXEC mode

Usage Guide This command is used to clear the counters of packets matching the deny entries in ACLs.

Configuration Examples The following example clears the packet matching counter of ACL No. 1:

Before configuration:

```
FS #show access-lists
ip access-list standard 1
    10 deny host 50.1.1.2 (10 matches)
    20 permit host 60.1.1.2 (15 matches)
    (10 packets filtered)
```

After configuration:

```
FS# end
FS# clear access-list counters
FS# show access-lists
ip access-list standard 1
    10 deny host 50.1.1.2 (10 matches)
    20 permit host 60.1.1.2 (15 matches)
```

Related

Command	Description

Commands

expert access-list	Defines an expert ACL.
deny	Defines a deny ACL entry.
permit	Defines a permits ACL entry.

Platform Description N/A

1.6 Clear Counters Access-list

Use this command to clear counters of packets matching ACLs.

clear counters access-list [*id* | *name*]

Parameter Description

Parameter	Description
id	Access list number
name	Access list name

Command Mode Privileged EXEC mode

Usage Guide This command is used to clear the counters of packets matching the specified or all ACLs.

Configuration Examples The following example clears the packet matching counter of ACL No. 2700:

```
FS #show access-lists 2700
expert access-list extended 2700
    10 permit ip VID 4 host 192.168.3.55 any host 192.168.99.6 any    (88 matches)
    20 deny tcp any any eq login any any (33455 matches)
    30 permit tcp any any host 192.168.6.9 any (10 matches)

FS# clear counters access-list 2700
FS #show access-lists 2700
expert access-list extended 2700
    10 permit ip VID 4 host 192.168.3.55 any host 192.168.99.6 any
    20 deny tcp any any eq login any any
    30 permit tcp any any host 192.168.6.9 any
```

Related Commands

Command	Description
expert access-list	Defines an expert ACL.
deny	Defines a deny ACL entry.
permit	Defines a permits ACL entry.

Platform Description N/A

1.7 Deny

One or multiple **deny** conditions are used to determine whether to forward or discard the packet. In ACL configuration mode, you can modify the existent ACL or configure according to the protocol details.

1. Standard IP ACL

[*sn*] **deny** {*source source-wildcard* | **host** *source* | **any| interface** *idx* }[**time-range** *tm-range-name*] [**log**]

2. Extended IP ACL

[*sn*] **deny protocol source** *source-wildcard* **destination** *destination-wildcard* [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*] [**log**]

Extended IP ACLs of some important protocols:

- Internet Control Message Prot (ICMP)

[*sn*] **deny icmp** {**source** *source-wildcard* | **host** *source* | **any**} {**destination** *destination-wildcard* | **host** *destination* | **any**} [*icmp-type*] [[*icmp-type* [*icmp-code*]] | [*icmp-message*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**time-range** *time-range-name*]

- Transmission Control Protocol (TCP)

[*sn*] deny udp {*source source –wildcard* | **host** *source* | **any**} [*operator* **port** [*port*]] {*destination destination-wildcard* | **host** *destination* | **any**} [*operator* **port** [*port*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

- User Datagram Protocol (UDP)

[*sn*] deny udp {*source source –wildcard* | **host** *source* | **any**} [*operator* **port** [*port*]] {*destination destination-wildcard* | **host** *destination* | **any**} [*operator* **port** [*port*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

3. Extended MAC ACL

[*sn*] **deny** { **any** | **host** *source-mac-address* } { **any** | **host** *destination-mac-address* } [*ethernet-type*] [**cos** [*out*] [**inner** *in*]]

4. Extended expert ACL

[*sn*] **deny**[**protocol** | [*ethernet-type*][**cos** [*out*] [**inner** *in*]]] [[**VID** [*out*][**inner** *in*]]] {*source source-wildcard* | **host** *source* | **any**}{**host** *source-mac-address* | **any** } {*destination destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**} [**precedence** *precedence*] [**tos** *tos*][**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

- When you select the ethernet-type field or cos field:

[*sn*] **deny** {[*ethernet-type*}[**cos** [*out*] [**inner** *in*]]} [[**VID** [*out*][**inner** *in*]]] {*source source-wildcard* | **host** *source* | **any**} {**host** *source-mac-address* | **any** } {*destination destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**} [**time-range** *time-range-name*]

- When you select the protocol field:

[*sn*] **deny protocol** [[**VID** [*out*][**inner** *in*]]] {*source source-wildcard* | **host** *source* | **any**} {**host** *source-mac-address* | **any** } {*destinationdestination-wildcard* | **host** *destination* | **any**} { **host** *destination-mac-address* | **any**} [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

- Extended expert ACLs of some important protocols

Internet Control Message Protocol (ICMP)

[*sn*] **deny icmp** [[**VID** [*out*][**inner** *in*]]] {*source source-wildcard* | **host** *source* | **any**} {**host** *source-mac-address* | **any**} {*destination destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**} [*icmp-type*] [[*icmp-type* [*icmp-code*]] | [*icmp-message*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**time-range** *time-range-name*]

Transmission Control Protocol (TCP)

[*sn*] **deny tcp** [[**VID** [*out*][**inner** *in*]]]{*source source-wildcard* | **host** *Source* | **any**} {**host** *source-mac-address* | **any** } [*operator* **port** [*port*]] {*destination destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**} [*operator* **port** [*port*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*] [**match-all** *tcp-flag* | **established**]

User Datagram Protocol (UDP)

[*sn*] **deny udp** [[**VID** [*out*][**inner** *in*]]]{*source source –wildcard* | **host** *source* | **any**} {**host** *source-mac-address* | **any** } [*operator* **port** [*port*]] {*destination destination-wildcard* | **host** *destination* | **any**}{**host** *destination-mac-address* | **any**} [*operator* **port** [*port*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

Address Resolution Protocol (ARP)

[*sn*] **deny arp** {**vid** *vlan-id*}[**host** *source-mac-address* | **any**] [**host** *destination –mac-address* | **any**] {*sender-ip sender-ip–wildcard* | **host** *sender-ip* | **any**} {*sender-mac sender-mac-wildcard* | **host** *sender-mac* | **any**} {*target-ip target-ip–wildcard* | **host** *target-ip* | **any**}

5. Extended IPv6 ACL

[*sn*] **deny protocol**{*source-ipv6-prefix/prefix-length* | **any** | **host** *source-ipv6-address* } {*destination-ipv6-prefix / prefix-length* | **any**| *hostdestination-ipv6-address*} [**dscp** *dscp*] [**flow-label** *flow-label*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

Extended ipv6 ACLs of some important protocols:

Internet Control Message Protocol (ICMP)

[*sn*]**deny icmp** {*source-ipv6-prefix / prefix-length* | *any source-ipv6-address* | **host**} {*destination-ipv6-prefix / prefix-length*| **host** *destination-ipv6-address* | **any**} [*icmp-type*] [[*icmp-type* [*icmp-code*]] | [*icmp-message*]] [**dscp** *dscp*] [**flow-label** *flow-label*] [**fragment**] [**time-range** *time-range-name*]

Transmission Control Protocol (TCP)

[*sn*] **deny tcp** {*source-ipv6-prefix / prefix-length* | **host***source-ipv6-address* | **any**}[*operator* **port**[*port*]] {*destination-ipv6-prefix /prefix-length* | **host** *destination-ipv6-address* | **any**} [*operator* **port** [*port*]] [**dscp** *dscp*] [**flow-label** *flow-label*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*] [**match-all** *tcp-flag* | **established**]

User Datagram Protocol (UDP)

[sn] **deny udp** {*source-ipv6-prefix/prefix-length* | **host** *source-ipv6-address* | **any**} [*operator* **port** [*port*]] {*destination-ipv6-prefix /prefix-length* | **host** *destination-ipv6-address* | **any**}[*operator* **port** [*port*]] [**dscp** *dscp*] [**flow-label** *flow-label*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

Parameter Description

Parameter	Description
sn	ACL entry sequence number
source-ipv6-prefix	Source IPv6 network address or network type
destination-ipv6-prefix	Destination IPv6 network address or network type
prefix-length	Prefix mask length
source-ipv6-address	Source IPv6 address

destination-ipv6-address	Destination IPv6 address
dscp	Differential Service Code Point
dscp	Code value, within the range of 0 to 63
flow-label	Flow label
flow-label	Flow label value, within the range of 0 to 1048575.
protocol	For the IPv6, the field can be ipv6 | icmp | tcp | udp and number in the range 0 to 255
time-range	Time range of the packet filtering
time-range-name	Time range name of the packet filtering

Defaults No entry

Command mode ACL configuration mode.

Usage Guide Use this command to configure the filtering entry of ACLs in ACL configuration mode.

Configuration Examples The following example shows how to create and display an extended expert ACL. This expert ACL denies all the TCP packets with the source IP address 192.168.4.12 and the source MAC address 001300498272.

```
FS(config)#expert access-list extended 2702
FS(config-exp-nacl)#deny tcp    host
192.168.4.12 host 0013.0049.8272 any any
FS(config-exp-nacl)#permit any any any any
FS(config-exp-nacl)#show access-lists
expert access-list extended 2702
10 deny tcp    host    192.168.4.12 host 0013.0049.8272 any any
20 permit any any any any
FS(config-exp-nacl)#
```

This example shows how to use the extended IP ACL. The purpose is to deny the host with the IP address 192.168.4.12 to provide services through the TCP port 100 and apply the ACL to Interface gigabitethernet 1/1. The configuration procedure is as below:

```
FS(config)# ip access-list extended ip-ext-acl
FS(config-ext-nacl)# deny tcp host 192.168.4.12 eq 100 any
FS(config-ext-nacl)# show access-lists
ip access-list extended ip-ext-acl
10 deny tcp host 192.168.4.12 eq 100 any
FS(config-ext-nacl)#exit
FS(config)#interface gigabitethernet 1/1
FS(config-if)#ip access-group ip-ext-acl in
FS(config-if)#
```

This example shows how to use the extended MAC ACL. The purpose is to deny the host with the MAC address 0013.0049.8272 to send Ethernet frames of the type 100 and apply the rule to Interface gigabitethernet 1/1. The configuration procedure is as below:

```
FS(config)#mac access-list extended mac1
```

```
FS(config-mac-nacl)#deny host 0013.0049.8272 any aarp
FS(config-mac-nacl)# show access-lists
mac access-list extended mac1
10 deny host 0013.0049.8272 any aarp
FS(config-mac-nacl)#exit
FS(config)# interface gigabitethernet 1/1
FS(config-if)# mac access-group mac1 in
```

This example shows how to use the standard IP ACL. The purpose is to deny the host with the IP address 192.168.4.12 and apply the rule to Interface gigabitethernet 1/1. The configuration procedure is as below:

```
FS(config)#ip access-list standard 34
FS(config-ext-nacl)# deny host 192.168.4.12
FS(config-ext-nacl)#show access-lists
ip access-list standard 34
10 deny host 192.168.4.12
FS(config-ext-nacl)#exit
FS(config)# interface gigabitethernet 1/1
FS(config-if)# ip access-group 34 in
```

This example shows how to use the extended IPV6 ACL. The purpose is to deny the host with the IP address 192.168.4.12 and apply the rule to Interface gigabitethernet 1/1. The configuration procedure is as below:

```
FS(config)#ipv6 access-list extended v6-acl
FS(config-ipv6-nacl)#11 deny ipv6 host 192.168.4.12 any
FS(config-ipv6-nacl)#show access-lists
ipv6 access-list extended v6-acl
11 deny ipv6 host 192.168.4.12 any
FS(config-ipv6-nacl)# exit
FS(config)# interface gigabitethernet 1/1
FS(config-if)# ipv6 traffic-filter v6-acl in
```

Related Commands

Command	Description
show access-lists	Displays all ACLs.
ipv6 traffic-filter	Applies the extended IPv6 ACL on the interface.
ip access-group	Applies the IP ACL on the interface.
mac access-group	Applies the extended MAC ACL on the interface.
ip access-list	Defines an IP ACL.
mac access-list	Defines an extended MAC ACL.
expert access-list	Defines an extended expert ACL.
ipv6 access-list	Defines an extended IPv6 ACL.
permit	Permits the access.

Platform Description

N/A

1.8 Expert Access-group

Use this command to apply the specified expert access list on the specified interface. Use the **no** form of the command to remove the application.

expert access-group { *id* | *name* } { **in** | **out** }

no expert access-group { *id* | *name* } { **in** | **out** }

Parameter Description

Parameter	Description
id	Expert access list number: 2700 to 2899
name	Name of the expert access list
in	Specifies filtering on inbound packets.
out	Specifies filtering on outbound packets.

Defaults

No expert access list is applied on the interface.

Command mode

Interface configuration mode.

Usage Guide

This command is used to apply the specified access list on the interface to control the input and output data streams. Use the **show access-group** command to view the setting.

Configuration Examples

The following example shows how to apply the **access-list *accept***_00d0f8xxxxxx only to Gigabit interface 0/1:

```
FS(config)# interface GigaEthernet 0/1
FS(config-if)# expert access-group
accept_00d0f8xxxxxx_only in
```

Related Commands

Command	Description
show access-group	Displays the ACL configuration.

Platform Description

N/A

1.9 Expert Access-list Advanced

Use this command to create an advanced expert access list and place the device in expert advanced access list configuration mode. Use the **no** form of this command to remove the advanced expert access list.

expert access-list advanced *name*

no expert access-list advanced *name*

Parameter Description

Parameter	Description
name	Name of the advanced expert access list

Defaults N/A

Command mode Global configuration mode

Usage Guide Use this command to create an advanced expert access list (namely, ACL80) to match your custom fields.

Configuration Examples The following example creates an advanced expert access list named adv-acl.

```
FS(config)# expert access-list advanced adv-acl
FS(config-exp-dacl)# show access-lists
expert access-list advanced adv-acl
```

Related Commands

Command	Description
show access-lists	Displays all access lists.
show access-lists *name*	Displays the access list of a specified name.

Platform Description N/A

1.10 Expert Access-list Counter

Use this command to enable the counter of packets matching the specified expert access list. Use the **no** form of this command to disable this function.

expert access-list counter { *id* | *name* }

no expert access-list counter { *id* | *name* }

Parameter Description

Parameter	Description
id	Expert access list number: 2700 to 2899.
name	Name of the access list.

Defaults The counter of the packets matching the expert access list is disabled.

Command mode Global configuration mode

Usage Guide Use this command to enable the counter of packets matching the specified expert access list, so that you can analyze the counters to learn whether the network is attacked by the illegal packets.

Configuration Examples The following example enables the counter of packets matching the extended expert access list named exp-acl:

```
FS(config)# expert access-list counter exp-acl
FS(config)# show access-lists
expert access-list extended exp-acl
 10 permit ip VID 4 host 192.168.3.55 any host 192.168.99.6 any (16 matches)
 20 deny tcp any any eq login any any (78 matches)
```

The following example disables the counter of packets matching the extended expert access list named exp-acl.

```
FS(config)#no expert access-list counter exp-acl
FS(config)# show access-lists
expert access-list extended 2700
 10 permit ip VID 4 host 192.168.3.55 any host 192.168.99.6 any
 20 deny tcp any any eq login any any
```

Related Commands

Command	Description
show access-lists	Displays the extended expert ACL.

Platform Description

N/A

1.11 Expert Access-list Extended

Use this command to create an extended expert access list. Use the **no** form of the command to remove the ACL.

expert access-list extended {*id* | *name*}

no expert access-list extended {*id* | *name*}

Parameter Description

Parameter	Description
id	Extended expert access list number: 2700 to 2899
name	Name of the extended expert access list

Defaults

N/A

Command mode

Global configuration mode.

Usage Guide

Use the **show access-lists** command to display the ACL configurations**.**

Configuration Examples

Create an extended expert ACL named exp-acl:

```
FS(config)# expert access-list extended exp-acl
FS(config-exp-nacl)# show access-lists expert access-list extended exp-acl
FS(config-exp-nacl)#
```

Create an extended expert ACL numbered 2704:

```
FS(config)# expert access-list extended 2704
FS(config-exp-nacl)# show access-lists    access-list extended 2704
FS(config-exp-nacl)#
```

Related Commands

Command	Description
show access-lists	Displays the extended expert ACLs

Platform Description N/A

1.12 Expert Access-list New-fragment-mode

Use this command to switch the matching mode of fragmentation packets. Use the **no** form of this command to restore the default matching mode of fragmentation packets.

expert access-list new-fragment-mode { *id* | *name* }

no expert access-list new-fragment-mode { *id* | *name* }

Parameter Description

Parameter	Description
id	Expert access list number: 2700 to 2899.
name	Name of the expert access list.

Defaults Use the default matching mode of fragmentation packets. By default, if the access rule is tagged with fragment, it will match all packets except for the first fragmentation packet. If the access rule is not tagged with fragment, all packets including the first and all subsequent fragmentation packets will be matched.

Command mode Global configuration mode

Usage Guide Use this command to switch and control the matching mode of access rules to fragmentation packets.

Configuration Examples The following example switches the matching mode of fragmentation packets for the ACL 2700 from the default mode to a new matching mode:

```
FS(config)#expert access-list new-fragment-mode 2700
```

Related Commands

Command	Description
-	-

Platform Description N/A

1.13 Expert Access-list Resequence

Use this command to resequence an expert access list. Use the no form of this command to restore the default order of access entries.

expert access-list resequence { *id* | *name* } *start-sn inc-sn*

no expert access-list resequence { *id* | *name* }

Parameter

Parameter	Description

Description

Id	Expert access list number: 2700 to 2899.
name	Name of the expert access list
start-sn	Start sequence number. Range: 1 to 2147483647
inc-sn	Increment of the sequence number. Range: 1 to 2147483647

Defaults

start-sn: 10

inc-sn: 10

Command mode

Global configuration mode

Usage Guide

Use this command to change the order of the access entries.

Configuration Examples

The following example resequences entries of expert access list "exp-acl":

Before the configuration:

```
FS# show access-lists
expert access-list extended exp-acl
 10 permit ip any any any any
 20 deny ip any any any any
```

After the configuration:

```
FS# config
FS(config)# expert access-list resequence exp-acl 21 43
FS(config)# exit
FS# show access-lists
expert access-list extended exp-acl
 21 permit ip any any any any
 64 deny ip any any any any
```

Related Commands

Command	Description
show access-lists	Displays all access lists..

Platform Description

N/A

1.14 Global Ip Access-group

Use this command to apply the global IP-based access list on the interface. Use the **no** form of this command to remove the global IP-based access list from the interface.

global ip access-group

no global ip access-group

Parameter

Parameter	Description

Description

N/A	N/A

Defaults By default, the global IP-based access list is applied on the interface.

Command mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example applies the global IP-based access list on interface fastEthernet0/0.

```
FS(config)# interface fastEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#global ip access-group
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.15 Ip Access-group

Use this command to apply a specific access list globally or to an interface. Use the **no** form of this command to remove the access list from the interface.

ip access-group {*id* | *name*} {**in** | **out**}

no ip access-group { *id* | *name*} {**in** | **out**}

Parameter Description

Parameter	Description
id	IP access list or extended IP access list number: 1 to 199, 1300 to 2699
name	Name of the IP ACL
in	Filters the incoming packets of the interface.
out	Filters the outgoing packets of the interface.

Defaults No access list is applied globally or on the interface by default.

Command mode Global, interface

Usage Guide Use this command to control access to a specified interface, VXLAN or globally.

Configuration Examples The following example applies the ACL 120 on interface fastEthernet0/0 to filter the incoming packets:

```
FS(config)# interface fastEthernet 0/0
```

```
FS(config-if)# ip access-group 120 in
```

Related Commands

Command	Description
access-list	Defines an ACL.
show access-lists	Displays all ACLs.

Platform Description N/A

1.16 Ip Access-list

Use this command to create a standard IP access list or extended IP access list. Use the **no** form of the command to remove the access list.

ip access-list {**extended** | **standard**} {*id* | *name*}

no ip access-list {**extended** | **standard**} {*id* | *name*}

Parameter Description

Parameter	Description
id	Access list number: Standard: 1 to 99, 1300 to 1999; Extended: 100 to 199, 2000 to 2699.
name	Name of the access list

Defaults N/A

Command mode Global configuration mode

Usage Guide Configure a standard access list if you need to filter on source address only. If you want to filter on anything other than source address, you need to create an extended access list.

Refer to **deny** or **permit** in the two modes. Use the **show access-lists** command to display the ACL configurations**.**

Configuration Examples The following example creates a standard access list named std-acl.

```
FS(config)# ip access-list standard std-acl
FS(config-std-nacl)# show access-lists
ip access-list standard std-acl
FS(config-std-nacl)#
```

The following example creates an extended ACL numbered 123:

```
FS(config)# ip access-list extended 123
FS(config-ext-nacl)# show access-lists
ip access-list extended 123
```

Related Commands

Command	Description
show access-lists	Displays all ACLs.

Platform Description N/A

1.17 Ip Access-list Counter

Use this command to enable the counter of packets matching the standard or extended IP access list. Use the **no** form of this command to disable the counter.

ip access-list counter { *id* | *name* }

no ip access-list counter { *id* | *name* }

Parameter Description

Parameter	Description
id	IP access list number: Standard IP access list: 1 to 99, 1300 to 1999; Extended IP access list: 100 to 199, 2000 to 2699.
name	Name of the IP access list.

Defaults The counter of packets matching the standard or extended IP access list is disabled by default.

Command mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example enables the counter of packets matching the standard access list:

```
FS(config)# ip access-list counter std-acl
FS(config-std-nacl)# show access-lists
ip access-list standard std-acl
 10 permit 195.168.6.0 0.0.0.255 (999 matches)
 20 deny host 5.5.5.5 time-range tm (2000 matches)
```

The following example disables the counter of packets matching the standard access list:

```
FS(config)#no ip access-list counter std-acl
FS(config-std-nacl)# show access-lists
ip access-list standard std-acl
 10 permit 195.168.6.0 0.0.0.255
 20 deny host 5.5.5.5 time-range tm
```

Related Commands

Command	Description

show access-lists	Displays all access lists.

Platform Description

N/A

1.18 Ip Access-list Log-update Interval

Use this command to configure the interval at which the IPv4 access list log is updated. Use the **no** form of this command to restore the default interval.

ip access-list log-update interval *time*

no ip access-list log-update interval

Parameter Description

Parameter	Description
time	For the access rule with the **log** option, a packet hit is output at the interval of ACL logging output. The interval ranges from 0 to 1440 minutes, and the default value is 5 minutes, indicating that the ACL matching log of a specified flow is output every 5 minutes. 0 indicates that no ACL logging is output.

Defaults

The default interval at which the IPv4 access list log is updated is 5 minutes.

Command mode

Global configuration mode

Usage Guide

Use this command to configure the interval at which the IPv4 access list log is updated.

Configuration Examples

The following example configures the interval for the IPv4 access list log update to 10 minutes:

```
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)# ip access-list log-update interval 10
```

Related Commands

Command	Description
ip access-list	Defines an IPv4 access list.
deny	Defines the **deny** access entries.
permit	Defines the **permit** access entries.
show running	Displays running configurations of the device.

Platform Description

N/A

1.19 Ip Access-list New-fragment-mode

Use this command to switch the matching mode of fragmentation packets of standard or extended IP access list. Use the **no** form of this command to restore the default matching mode of fragmentation packets.

ip access-list new-fragment-mode { *id* | *name* }

no ip access-list new-fragment-mode { *id* | *name* }

Parameter Description

Parameter	Description
id	IP access list number: Standard IP access list: 1 to 99, 1300 to 1999; Extended IP access list: 100 to 199, 2000 to 2699.
name	Name of the standard or extended IP access list

Defaults

Use the default matching mode of fragmentation packets. By default, if the access rule is tagged with fragment, it will match all packets except for the first fragmentation packet. If the access rule is not tagged with fragment, all packets including the first and all subsequent fragmentation packets will be matched.

Command mode

Global configuration mode

Usage Guide

This command is used to switch and control the fragmentation packet matching mode of access rules.

Configuration Examples

The following example switches the fragmentation packet matching mode of the ACL 100 from the default mode to a new mode:

```
FS(config)#ip access-list new-fragment-mode 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.20 Ip Access-list Resequence

Use this command to resequence a standard or extended IP access list. Use the **no** form of this command to restore the default order of access entries.

ip access-list resequence { *id* | *name* } *start-sn inc-sn*

no ip access-list resequence { *id* | *name* }

Parameter Description

Parameter	Description
id	IP access list number: Standard IP access list: 1 to 99, 1300 to 1999; Extended IP access list: 100 to 199, 2000 to 2699.
name	Name of the standard or extended IP access list
start-sn	Start sequence number. Range: 1 to 2147483647
inc-sn	Increment of the sequence number. Range: 1 to 2147483647

Defaults

start-sn: 10

inc-sn: 10

Command mode Global configuration mode

Usage Guide Use this command to change the order of the access entries.

Configuration Examples The following example resequences entries of ACL1:

Before the configuration:

```
FS# show access-lists
ip access-list standard 1
10 permit host 192.168.4.12
20 deny any any
```

After the configuration:

```
FS# config
FS(config)# ip access-list resequence 1 21 43
FS(config)# exit
FS# show access-lists
ip access-list standard 1
21 permit host 192.168.4.12
64 deny any any
```

Related Commands

Command	Description
show access-lists	Displays all access lists..

Platform Description N/A

1.21 Ipv6 Access-list

Use this command to create an IPv6 access list and to place the device in IPv6 access list configuration mode. Use the **no** form of this command to remove the access list.

ipv6 access-list *name*

no ipv6 access-list *name*

Parameter Description

Parameter	Description
name	Name of the IPv6 access list.

Defaults N/A

Command mode Global configuration mode

Usage Guide To filter the IPv6 packets through the access list, you need to define an IPv6 access list by using the **ipv6 access-list** command.

Configuration Examples The following example creates an IPv6 access list named v6-acl:

```
FS(config)# ipv6 access-list v6-acl
FS(config-ipv6-nacl)# show access-lists
ipv6 access-list extended v6-acl
FS(config-ipv6-nacl)#
```

Related Commands

Command	Description
show access-lists	Displays all access lists.

Platform Description N/A

1.22 Ipv6 Access-list Counter

Use this command to enable the counter of packets matching the IPv6 access list. Use the **no** form of this command to disable the counter.

ipv6 access-list counter *name*

no ipv6 access-list counter *name*

Parameter Description

Parameter	Description
name	Name of the IPv6 access list.

Defaults -

Command mode Global configuration mode

Usage Guide Use this command to enable the counter of packets matching the IPv6 access list to monitor the IPv6 packets matching and filtering.

Configuration Examples The following example enables the counter of packets matching the IPv6 access list named v6-acl:

```
FS(config)# ipv6 access-list v6-acl
FS(config-ipv6-nacl)# show access-lists
ipv6 access-list acl-v6
 10 permit icmp any any (7 matches)
 20 deny tcp any any (7 matches)
```

The following example disables the counter of packets matching the IPv6 access list named v6-acl:

```
FS(config)#no ipv6 access-list v6-acl counter
```

```
FS(config-ipv6-nacl)# show access-lists
ipv6 access-list acl-v6
 10 permit icmp any any
20 deny tcp any any
```

Related Commands

Command	Description
show access-lists	Displays all access lists.

Platform Description N/A

1.23 Ipv6 Access-list Log-update Interval

Use this command to configure the interval at which the IPv6 access list log is updated. Use the **no** form of this command to restore the default interval.

ipv6 access-list log-update interval *time*

no ipv6 access-list log-update interval

Parameter Description

Parameter	Description
time	For the access rule with the **logging** option, a packet hit is output at the interval of ACL logging output. The interval ranges from 0 to 1440 minutes, and the default value is 5 minutes, indicating that the ACL matching log of a specific flow is output every 5 minutes. 0 indicates that no ACL logging is output.

Defaults By default, the value is 5 minutes.

Command mode Global configuration mode

Usage Guide Use this command to configure the interval at which the IPv6 access list log is updated.

Configuration Examples The following example configures the interval for the IPv6 access list log update to 10 minutes:

```
FS# configure terminal
Enter configuration commands, one per line.   End with CNTL/Z.
FS(config)# ipv6 access-list log-update interval 9
```

Related Commands

Command	Description
ipv6 access-list	Defines an IPv6 access list.
deny	Defines the **deny** access entries.

permit	Defines the **permit** access entries.
show running	Displays the running configurations of the device.

Platform Description

N/A

1.24 Ipv6 Access-list Resequence

Use this command to resequence an IPv6 access list. Use the **no** form of this command to restore the default order of access entries.

ipv6 access-list resequence *name start-sn inc-sn*

no ipv6 access-list resequence *name*

Parameter Description

Parameter	Description
name	Name of the IPv6 access list
start-sn	Start sequence number. Range: 1 to 2147483647
inc-sn	Increment of the sequence number. Range: 1 to 2147483647

Defaults

start-sn: 10

inc-sn: 10

Command mode

Global configuration mode

Usage Guide

Use this command to change the order of the access entries.

Configuration Examples

The following example resequences entries of IPv6 access list "v6-acl":

Before the configuration:

```
FS# show access-lists
ipv6 access-list v6-acl
 10 permit ipv6 any any
 20 deny ipv6 any any
```

After the configuration:

```
FS# config
FS(config)# ipv6 access-list resequence v6-acl 21 43
FS(config)# exit
FS# show access-lists
ipv6 access-list v6-acl
 21 permit ipv6 any any
 64 deny ipv6 any any
```

Related Commands

Command	Description

show access-lists	Displays all access lists..

Platform Description N/A

1.25 Ipv6 Traffic-filter

Use this command to apply an IPV6 access list on the specified interface/VXLAN. Use the **no** form of the command to remove the IPv6 access list from the interface.

ipv6 traffic-filter *name* { **in** | **out** }

no ipv6 traffic-filter *name* { **in** | **out** }

Parameter Description

Parameter	Description
name	Name of IPv6 access list
in	Specifies filtering on inbound packets
out	Specifies filtering on outbound packets

Defaults N/A

Command mode Interface configuration mode.

Usage Guide Use this command to apply the IPv6 access list to a specified interface to filter the inbound or outbound packets.

Configuration Examples The following example applies the IPv6 access list named **v6-acl** to interface GigabitEthernet 0/1:

```
FS(config)# interface GigaEthernet 0/1
FS(config-if)# ipv6 traffic-filter v6-acl in
```

Related Commands

Command	Description
show access-group	Displays ACL configurations on the interface.

Platform Description N/A

1.26 List-remark

Use this command to write a helpful comment (remark) for an access list. Use the **no** form of this command to remove the remark.

list-remark *text*

no list-remark

Parameter Description

Parameter	Description

text	Comment that describes the access list.

Defaults The access lists have no remarks by default.

Command mode ACL configuration mode

Usage Guide You can use this command to write a helpful comment for a specified access list.

Configuration Examples The following example writes a comment of "this acl is to filter the host 192.168.4.12" for ACL102.

```
FS(config)# ip access-list extended 102
FS(config-ext-nacl)# list-remark this acl is to filter the host 192.168.4.12
FS(config-ext-nacl)# show access-lists
ip access-list extended 102
deny ip host 192.168.4.12 any
1000 hits
this acl is to filter the host 192.168.4.12
FS(config-ext-nacl)#
```

Related Commands

Command	Description
show access-lists	Displays all access lists.
ip access-list	Defines an IPv4 access list.
access-list list remark	Adds a helpful comment for an access list in global configuration mode.

Platform Description N/A

1.27 Mac Access-group

Use this command to apply the specified MAC access list on the specified interface. Use the **no** form of the command to remove the access list from the interface.

mac access-group { *id* | *name* } { **in** | **out** }

no mac access-group { *id* | *name* } { **in** | **out** }

Parameter Description

Parameter	Description
id	MAC access list number. The range is from 700 to 799.
name	Name of the MAC access list
in	Specifies filtering on the inbound packets.
out	Specifies filtering on the outbound packets.

Defaults No MAC access list is applied by default.

Command mode Interface configuration mode.

Usage Guide Use this command to apply the access list to the interface to filter the inbound or outbound packets based on the MAC address.

Configuration Examples The following example applies the MAC access-list **accept_00d0f8xxxxxx_only** to interface GigabitEthernet 1/1:

```
FS(config)# interface GigaEthernet 1/1
FS(config-if-GigabitEthernet 1/1)# mac access-group accept_00d0f8xxxxxx_only in
```

Related Commands

Command	Description
show access-group	Displays the ACL configuration on the interface.

Platform Description N/A

1.28 Mac Access-list Counter

Use this command to enable the counter of packet matching the extended MAC access list. Use the **no** form of this command to disable the counter.

mac access-list counter { *id* | *name* }

no mac access-list counter { *id* | *name* }

Parameter Description

Parameter	Description
id	Extended MAC access list number. The range is from 700 to 799.
name	Name of the extended MAC access list

Defaults The counter is disabled by default.

Command mode Global configuration mode

Usage Guide Use this command to enable the counter of packets matching the MAC access list to monitor the packets matching and filtering.

Configuration Examples The following example enables the counter of packet matching the extended MAC access list named mac-acl:

```
FS(config)# mac access-list counter mac-acl
FS(config)# show access-lists
mac access-list extended mac-acl
 10 permit host 0023.56ac.8965 any (170 matches)
 20 deny any any etype-any cos 6 (239 matches)
```

The following example disables the counter of packet matching the extended MAC access list named mac-acl:

```
FS(config)#no mac access-list counter mac-acl
FS(config)# show access-lists
mac access-list extended mac-acl
 10 permit host 0023.56ac.8965 any
 20 deny any any etype-any cos 6
```

Related Commands

Command	Description
show access-lists	Displays all access lists.

Platform Description N/A

1.29 Mac Access-list Extended

Use this command to create an extended MAC access list. Use the **no** form of the command to remove the MAC access list.

mac access-list extended { *id* | *name* }

no mac access-list extended { *id* | *name* }

Parameter Description

Parameter	Description
id	Extended MAC access list number. The range is from 700 to 799.
name	Name of the extended MAC access list

Defaults N/A

Command mode Global configuration mode.

Usage Guide To filter the packets based on the MAC address, you need to define a MAC access list by using the **mac access-list extended** command.

Configuration Examples The following command creates an extended MAC access list named mac-acl:

```
FS(config)# mac access-list extended mac-acl
FS(config-mac-nacl)# show access-lists mac access-list extended mac-acl
```

The following command creates an extended MAC access list numbered 704:

```
FS(config)# mac access-list extended 704
FS(config-mac-nacl)# show access-lists mac access-list extended 704
```

Related Commands

Command	Description
show access-lists	Displays all access lists.

Platform Description N/A

1.30 Mac Access-list Resequence

Use this command to resequence an extended MAC access list. Use the **no** form of this command to restore the default order of access entries.

mac access-list resequence { *id* | *name* } *start-sn inc-sn*

no mac access-list resequence { *id* | *name* }

Parameter Description

Parameter	Description
id	Extended MAC access list number: 700 to 799.
name	Name of the extended MAC access list
start-sn	Start sequence number. Range: 1 to 2147483647
inc-sn	Increment of the sequence number. Range: 1 to 2147483647

Defaults

start-sn: 10

inc-sn: 10

Command mode Global configuration mode

Usage Guide Use this command to change the order of the access entries.

Configuration Examples

The following example resequences entries of extended MAC access list "mac-acl":

Before the configuration:

```
FS# show access-lists
mac access-list extended mac-acl
 10 permit any any etype-any
 20 deny any any etype-any
```

After the configuration:

```
FS# config
FS(config)# mac access-list resequence exp-acl 21 43
FS(config)# exit
FS# show access-lists
mac access-list extended mac-acl
 21 permit any any etype-any
 64 deny any any etype-any
```

Related Commands

Command	Description
show access-lists	Displays all access lists..

Platform Description N/A

1.31 Permit

One or multiple **permit** conditions are used to determine whether to forward or discard the packet. In ACL configuration mode, you can modify the existent ACL or configure according to the protocol details.

1. Standard IP ACL

[*sn*] **permit** {*source source-wildcard* | **host** *source* | **any | interface** *idx* } [**time-range** *tm-range-name*] [**log**]

2. Extended IP ACL

[*sn*] **permit protocol** *source source-wildcard destination destination-wildcard* [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*] [**log**]

Extended IP ACLs of some important protocols:

Internet Control Message Protocol (ICMP)

[*sn*] **permit icmp** {*source source-wildcard* | **host** *source* | **any** } { *destination destination-wildcard* | **host** *destination* | **any** } [*icmp-type*] [[*icmp-type* [*icmp-code*]] | [*icmp-message*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**time-range** *time-range-name*]

Transmission Control Protocol (TCP)

[*sn*] **permit tcp** { *source source-wildcard* | **host** *source* | **any** } [*operator* **port** [*port*]] { *destination destination-wildcard* | **host** *destination* | **any** } [*operator* **port** [*port*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*] [**match-all** *tcp-flag* | **established**]

User Datagram Protocol (UDP)

[*sn*] **permit udp** {*source source -wildcard*|**host** *source* |**any**} [*operator* **port** [*port*]] {*destination destination-wildcard* |**host** *destination* | **any**} [**operator port** [*port*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

3. Extended MAC ACL

[*sn*] **permit** { **any** | **host** *source-mac-address* | *source-mac-address mask*} { **any** | **host** *destination-mac-address* | *destination -mac-address mask* } [*ethernet-type*] [**cos** [*out*] [**inner** *in*]]

4. Extended expert ACL

[*sn*] **permit** [**protocol** | [*ethernet-type*][**cos** [*out*] [**inner** *in*]]] [**VID** [*out]*[**inner** *in]*] {*source source-wildcard* | **host** *source* | **any**} {**host** *source*-mac-*address* | **any** } {*destination destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**} [**precedence** *precedence*] [**tos** *tos*][**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

When you select the Ethernet-type field or cos field:

[*sn*] **permit** {*ethernet-type*| **cos** [*out*] [**inner** *in*]} [**VID** [*out*][**inner** *in*]] {*source source-wildcard* | **host** *source* | **any**} {**host** *source-mac-address* | **any** } {*destination destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**} [**time-range** *time-range-name*]

When you select the protocol field:

[*sn*] **permit protocol** [**VID** [*out]*[**inner** *in*]] {*source source-wildcard* | **host** *Source* | **any**} {**host** *source-mac-address* | **any** } {*destination destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**} [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

Extended expert ACLs of some important protocols:

Internet Control Message Protocol (ICMP)

[*sn*] **permit icmp** [**VID** [*out*][**inner** *in*]] {*source source-wildcard* | **host** *source* | **any**} {**host** *source-mac-address* | **any** } {*destination destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**}[*icmp-type*]

[[*icmp-type* [*icmp-code*]] | [*icmp-message*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**time-range** *time-range-name*]

Transmission Control Protocol (TCP)

[*sn*] **permit tcp** [**VID** [*out*][**inner** *in*]]{*source source-wildcard* | **host** *Source* | **any**} {**host** *source-mac-address* | **any** } [*operator* **port** [*port*]] {*destination destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**} [*operator* **port** [*port*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*] [**match-all** *tcp-flag* | **established**]

User Datagram Protocol (UDP)

[*sn*] **permit udp** [**VID** [*out*][**inner** *in*]]{*source source –wildcard* | **host** *source* | **any**} {**host** *source-mac-address* | **any** } [*operator* **port** [*port*]] {*destination destination-wildcard* | **host** *destination* | **any**} {**host** *destination-mac-address* | **any**} [*operator* **port** [*port*]] [**precedence** *precedence*] [**tos** *tos*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

Address Resolution Protocol (ARP)

[*sn*] **permit arp** {**vid** *vlan-id***}** [**host** *source-mac-address* | **any**] [**host** *destination –mac-address* | **any**] {*sender-ip sender-ip–wildcard* | **host** *sender-ip* | **any**} {*sender-mac sender-mac-wildcard* | **host** *sender-mac* | **any**} {*target-ip target-ip–wildcard* | **host** *target-ip* | **any**}

5. Extended IPv6 ACL

[*sn*] **permit protocol** {*source-ipv6-prefix / prefix-length* | **any** | **host** *source-ipv6-address*} {*destination-ipv6-prefix / prefix-length* | **any**| *hostdestination-ipv6-address*} [**dscp** *dscp*] [**flow-label** *flow-label*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

Extended IPv6 ACLs of some important protocols:

Internet Control Message Protocol (ICMP)

[*sn*] **permit icmp** {*source-ipv6-prefix / prefix-length* | **any** *source-ipv6-address* | **host**} {*destination-ipv6-prefix / prefix-length*| **host** *destination-ipv6-address* | **any**} [*icmp-type*] [[*icmp-type* [*icmp-code*]] | [*icmp-message*]] [**dscp** *dscp*] [**flow-label** *flow-label*][**fragment**] [**time-range** *time-range-name*]

Transmission Control Protocol (TCP)

[*sn*] **permit tcp** {*source-ipv6-prefix / prefix-length* | **host** *source-ipv6-address* | **any**} [*operator* **port** [*port*]] {*destination-ipv6-prefix / prefix-length* | **host** *destination-ipv6-address* | **any**} [*operator* **port** [*port*]] [**dscp** *dscp*] [**flow-label** *flow-label*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*] [**match-all** *tcp-flag* | **established**]

User Datagram Protocol (UDP)

[*sn*] **permit udp** {*source-ipv6-prefix / prefix-length* | **host** *source-ipv6-address* | **any**} [*operator* **port** [*port*]] {*destination-ipv6-prefix / prefix-length* | **host** *destination-ipv6-address* | **any**} [*operator* **port** [*port*]] [**dscp** *dscp*] [**flow-label** *flow-label*] [**fragment**] [**range** *lower upper*] [**time-range** *time-range-name*]

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command mode ACL configuration mode.

Usage Guide Use this command to configure the **permit** conditions for the ACL in ACL configuration mode.

Configuration Examples The following example shows how to create and display an Expert Extended ACL. This expert ACL permits all the TCP packets with the source IP address 192.168.4.12 and the source MAC address 001300498272.

```
FS(config)#expert access-list extended exp-acl
FS(config-exp-nacl)#permit tcp    host    192.168.4.12 host 0013.0049.8272 any any
FS(config-exp-nacl)#deny any any any any
FS(config-exp-nacl)#show access-lists
expert access-list extended exp-acl
10 permit tcp    host    192.168.4.12 host 0013.0049.8272 any any
20 deny any any any any
FS(config-exp-nacl)#
```

This example shows how to use the extended IP ACL. The purpose is to permit the host with the IP address 192.168.4.12 to provide services through the TCP port 100 and apply the ACL to interface gigabitethernet 1/1. The configuration procedure is as below:

```
FS(config)# ip access-list extended 102
FS(config-ext-nacl)# permit tcp host 192.168.4.12 eq 100 any
FS(config-ext-nacl)# show access-lists
ip access-list extended 102
10 permit tcp host 192.168.4.12 eq 100 any
FS(config-ext-nacl)#exit
FS(config)#interface gigabitethernet 1/1
FS(config-if)#ip access-group 102 in
FS(config-if)#
```

This example shows how to use the extended MAC ACL. The purpose is to permit the host with the MAC address 0013.0049.8272 to send Ethernet frames through the type 100 and apply the ACL to interface gigabitethernet 1/1. The configuration procedure is as below:

```
FS(config)#mac access-list extended 702
FS(config-mac-nacl)#permit host 0013.0049.8272 any aarp
FS(config-mac-nacl)#show access-lists
mac access-list extended 702
10 permit host 0013.0049.8272 any aarp 702
FS(config-mac-nacl)#exit
FS(config)#interface gigabitethernet 1/1
FS(config-if)#mac access-group 702 in
```

This example shows how to use the standard IP ACL. The purpose is to permit the host with the IP address 192.168.4.12 and apply the ACL to interface gigabitethernet 1/1. The configuration procedure is as below:

```
FS(config)#ip access-list standard std-acl
FS(config-std-nacl)#permit host 192.168.4.12
FS(config-std-nacl)#show access-lists
ip access-list standard std-acl
   10 permit host 192.168.4.12
FS(config-std-nacl)#exit
FS(config)# interface gigabitethernet 1/1
```

```
FS(config-if)# ip access-group std-acl in
```

This example shows how to use the extended IPV6 ACL. The purpose is to permit the host with the IP address 192.168.4.12 and apply the ACL to interface gigabitethernet 1/1. The configuration procedure is as below:

```
FS(config)#ipv6 access-list extended v6-acl
FS(config-ipv6-nacl)#11 permit ipv6 host ::192.168.4.12 any
FS(config-ipv6-nacl)# show access-lists
ipv6 access-list extended v6-acl
11 permit ipv6 host ::192.168.4.12 any
FS(config-ipv6-nacl)# exit
FS(config)#interface gigabitethernet 1/1
FS(config-if)#ipv6 traffic-filter v6-acl in
```

Related Commands

Command	Description
show access-lists	Displays all access lists.
ipv6 traffic-filter	Applies the extended IPv6 access list to the interface.
ip access-group	Applies the IP access list to the interface.
mac access-group	Applies the extended MAC access list to the interface.
ip access-list	Defines an IP access list.
mac access-list	Defines an extended MAC access list.
expert access-list	Define an extended expert access list.
ipv6 access-list	Defines an extended IPv6 access list.
deny	Defines the **deny** access entry.

Platform Description

N/A

1.32 Redirect Destination Interface

Use this command to redirect the traffic matching the access list to the specified interface. Use the **no** form of this command to remove the redirection.

redirect destination interface *interface-name* **acl** { *id* | *name* } **in**

no redirect destination interface *interface-name* **acl** { *id* | *name* } **in**

Parameter Description

Parameter	Description
interface-name	Redirect interface
id	Access list number
name	Access list name

Defaults

No redirection is configured.

Command mode

Interface configuration mode

Usage Guide

Use this command to configure access redirection, namely, to redirect the traffic matching the access list to the specified interface. You can monitor the operation of a specified access list by using this command.

Configuration Examples

The following example configures access redirection.

```
FS(config)# interface gigabitEthernet 0/3
FS(config-if-GigabitEthernet 0/3)# redirect destination interface gigabitEthernet 0/2 acl1 in
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.33 Remark

Use this command to write a helpful comment (remark) for an entry in the access list. Use the **no** form of this command to remove the remark.

[*sn*] **remark** *text*

no [*sn*] **remark**

Parameter Description

Parameter	Description
text	Comment that describes the access entry.
sn	The sequence number of the ACE.

Defaults

The access entries have no remarks.

Command mode

ACL configuration mode.

Usage Guide

Use this command to write a helpful comment for an access entry.

Up to 100 characters are allowed in the remark.

Two identical access entry remarks in one access list entry are not allowed.

Removing an access entry may delete the remark for it as well.

If sn is specified, the remark is applied to the specified ACE; otherwise, the remark is applied to the last ACE.

Configuration Examples

The following example writes remarks for the entry in extended IP access list 102.

```
FS(config)# ip access-list extended 102
FS(config-ext-nacl)# remark first_remark
FS(config-ext-nacl)# 10 permit tcp 1.1.1.1 0.0.0.0 2.2.2.2 0.0.0.0
FS(config-ext-nacl)# 10 remark second_remark
FS(config-ext-nacl)# permit tcp 3.3.3.3 0.0.0.0 4.4.4.4 0.0.0.0
FS(config-ext-nacl)# end
```

```
FS#
```

Related Commands

Command	Description
show access-lists	Displays all access lists.
ip access-list	Defines an IP access list.

Platform Description N/A

1.34 Security Access-group

Use this command to configure an interface secure channel. Use the **no** form of this command to restore to default settings.

security access-group { *id* | *name* }

no security access-group

Parameter Description

Parameter	Description
id	Access list number.
name	Name of the access list.

Defaults N/A

Command mode Interface configuration mode

Usage Guide If a device is configured authentications such as 802.1x or Web authentication, the user cannot access the external network before passing the authentication. You can use this command to configure a secure channel for the users on the specified interface to access the external network without authentication.

Configuration Examples The following example configures a secure channel on interface GigaEthernet 1/1:

```
FS(config)# interface GigaEthernet 1/1
FS(config-if-GigabitEthernet 1/1)# security access-group 1
```

Related Commands

Command	Description
show secu-acl	Displays the secure channel configuration.

Platform Description N/A

1.35 Security Global Access-group

Use this command to configure the global secure channel.

security global access-group { *id* | *name* }

no security global access-group

Parameter Description

Parameter	Description
id	Access list number.
name	Name of the access list.

Defaults

-

Command mode

Global configuration mode

Usage Guide

If a device is configured authentications such as 802.1x or Web authentication, the user cannot access the external network before passing the authentication. You can use this command to configure a global secure channel for some users to access the external network without authentication.

Configuration Examples

The following example configures a global secure channel.

```
FS(config)#security global access-group 1
```

Related Commands

Command	Description
show secu-acl	Displays the secure channel configuration..

Platform Description

N/A

1.36 Security Uplink Enable

Use this command to configure an exceptional interface of the global secure channel.

security uplink enable

no security uplink enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The global secure channel takes effect on all interfaces by default.

Command mode

Interface configuration mode.

Usage Guide

The global secure channel takes effect on all interfaces by default. To disable the secure channel function on some interfaces, you can used this command to configure the interface as exceptional.

Configuration

The following example configures interface GigaEthernet 1/1 as an exceptional interface of the secure channel.

Examples

```
FS(config)# interface GigaEthernet 1/1
FS(config-if-GigabitEthernet 1/1)# security uplink enable
```

Related Commands

Command	Description
show secu-acl	Displays the secure channel configuration.

Platform Description

N/A

1.37 Show Access-group

Use this command to display the access list applied to the interface.

show access-group [**interface** *interface-name*]

Parameter Description

Parameter	Description
interface	Interface name

Defaults

-

Command mode

Privileged EXEC mode

Usage Guide

Use this command to display the access list configuration on the specified interface. If no interface is specified, access list configuration on all interfaces is displayed.

Configuration Examples

The following example displays the access list configuration on the interface GigabitEthernet 0/3.

```
FS# show access-group interface GigabitEthernet 0/3
ip access-list extended 101
Applied On interface GigabitEthernet 0/3 in.
```

Related Commands

Command	Description
ip access-group	Applies the IP access list to the interface.
mac access-group	Applies the MAC access list to the interface.
expert access-group	Applies the expert access list to the interface.
ipv6 traffic-filter	Applies the IPv6 access list to the interface.

Platform Description

N/A

1.38 Show Access-lists

Use this command to display all access lists or the specified access list.

show access-lists [*id* | *name*] [**summary**]

Parameter Description

Parameter	Description
id	Access list number
name	Name of the IP access list
summary	Access list summary

Defaults N/A

Command mode Global configuration mode

Usage Guide Use this command to display the specified access list. If no access list number or name is specified, all the access lists are displayed.

Configuration Examples

```
FS# show access-lists n_acl
ip access-list standard n_acl
FS# show access-lists 102
ip access-list extended 102

FS# show access-lists
ip access-list standard n_acl
ip access-list extended 101
permit icmp host 192.168.1.1 any log (1080 matches)
   permit tcp host 1.1.1.1 any established
   deny ip any any (80021 matches)
mac access-list extended mac-acl
expert access-list extended exp-acl
ipv6 access-list extended v6-acl
petmit ipv6 ::192.168.4.12 any (100 matches)
deny any any (9 matches)
```

Related Commands

Command	Description
ip access-list	Defines an IP access list.
mac access-list	Defines an extended MAC access list.
expert access-list	Defines an extended expert access list.
ipv6 access-list	Defines an extended IPv6 access list.

Platform Description N/A

1.39 Show Expert Access-group

Use this command to display the expert access list applied to the interface.

show expert access-group [**interface** *interface-name*]

Parameter Description

Parameter	Description
interface-name	Interface name

Defaults

-

Command mode

Privileged EXEC mode

Usage Guide

Use this command to display the expert access list configured on the interface. If no interface is specified, the expert access lists on all interfaces are displayed.

Configuration Examples

```
FS# show expert access-group interface gigabitethernet 0/2
expert access-group ee in
Applied On interface GigabitEthernet 0/2.
```

Related Commands

Command	Description
expert access-list	Defines an extended expert access list.

Platform Description

N/A

1.40 Show Ip Access-group

Use this command to display the standard and extended IP access lists on the interface.

show ip access-group [**interface** *interface-name*]

Parameter Description

Parameter	Description
Interface Interface-name	Interface name

Defaults

N/A

Command mode

Privileged EXEC mode

Usage Guide

Use this command to display the standard and extended IP access lists configured on the interface. If no interface is specified, the standard and extended IP access lists on all interfaces are displayed.

Configuration Examples

```
FS# show ip access-group interface gigabitethernet 0/1
ip access-group aaa in
Applied On interface GigabitEthernet 0/1.
```

Related Commands

Command	Description
ip access-list	Defines an IP access list.

Platform Description N/A

1.41 Show Ipv6 Traffic-filter

Use this command to display the IPv6 access list on the interface.

show ipv6 traffic-filter [**interface** *interface-name*]

Parameter Description

Parameter	Description
interface-name	Interface name

Defaults -

Command mode Privileged EXEC mode

Usage Guide Use this command to display the IPv6 access list configured on the interface. If no interface is specified, the IPv6 access lists on all interfaces are displayed.

Configuration Examples

```
FS# show ipv6 traffic-filter interface gigabitethernet 0/4
ipv6 access-group v6 in
Applied On interface GigabitEthernet 0/4.
```

Related Commands

Command	Description
ipv6 access-list	Defines an IPv6 access list.

Platform Description N/A

1.42 Show Mac Access-group

Use this command to display the MAC access list on the interface.

show mac access-group [**interface** *interface-name*]

Parameter Description

Parameter	Description
interface-name	Interface name

Defaults N/A

Command mode Privileged EXEC mode

Usage Guide Use this command to display the MAC access list configured on the interface. If no interface is specified, the MAC access lists on all interfaces are displayed.

Configuration Examples

```
FS# show mac access-group interface gigabitethernet 0/3
mac access-group mm in
Applied On interface GigabitEthernet 0/3.
```

Related Commands

Command	Description
mac access-list	Defines a MAC access list.

Platform Description N/A

1.43 Show Redirect Interface

Use this command to display the access redirection configuration.

show redirect [**interface** *interface-name*]

Parameter Description

Parameter	Description
interface *interface-name*	Interface name

Defaults N/A

Command mode Privileged EXEC mode

Usage Guide Use this command to display the access redirection configuration on the interface. If no interface is specified, the access redirection configuration on all interfaces is displayed.

Configuration Examples The following example displays the access redirection configuration on interface GigabitEthernet 0/3.

```
FS #show redirect interface gigabitEthernet 0/3
acl redirect configuration on interface gigabitEthernet 0/3
redirect destination interface gigabitEthernet 0/3 acl 1 in
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.44 Svi Router-acls Enable

Use this command to enable the SVI filter only for the Layer3 packets. Use the **no** form of this command to disable this function.

svi router-acls enable

no svi router-acls enable

Parameter Description

Parameter	Description
N/A	N/A.

Defaults The SVI filter takes effect for both Layer2 and Layer3 packets by default.

Command mode Global configuration mode

Usage Guide Use this command to make the SVI filter take effect only for the Layer3 packets,

Configuration Examples The following example enables the SVI filter only for the Layer3 packets.

```
FS(config)#svi router-acls enable
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2. QoS Commands

2.1 Class

Use this command to add reference to an existing class map. Use the **no** form of this command to remove the class from the policy map.

class *class-map-name*

no class *class-map-name*

Parameter Description

Parameter	Description
class-map-name	Reference to a class map.

Defaults

The function is disabled by default.

Command Mode

Policy configuration mode

Usage Guide

N/A

Configuration Examples

The following example adds reference to the class map named cmap1.

```
FS(config)# class-map cmap1
FS(config-cmap)# match ip dscp 5
FS(config-cmap)# exit

FS(config)# policy-map pmap1
FS(config-pmap)# class cmap1
FS(config-pmap-c)# end
```

Related Commands

Command	Description
show policy-map [*policy-map-name* **[class** *class-map-name*]]	Displays the policy map.

Platform Description

N/A

2.2 Class Map

Use this command to create a class map and enter class-map configuration mode. Use the **no** or **default** form of this command to remove a class map.

class-map *class-map-name*

no class-map *class-map-name*

default class-map *class-map-name*

Parameter Description

Parameter	Description
class-map-name	Class map name. The class map name can be a maximum of 31 characters.

Defaults None

Command Mode Global configuration mode

Usage Guide N/A

Configuration Examples The following example creates a class map named cm_acl to match an access list named me.

```
FS(config)# mac access-list extended me
FS(config-ext-macl)# permit host 1111.2222.3333 any
FS(config-ext-macl)# exit

FS(config)# class-map cm_acl
FS(config-cmap)# match access-group me
FS(config-cmap)# exit
```

The following example creates a class map named cm_dscp to match DHCP 8, 16 and 24.

```
FS(config)# class-map cm_dscp
FS(config-cmap)# match ip dscp 8 16 24
FS(config-cmap)# exit
```

Related Commands

Command	Description
show class-map [*class-map-name*]	Displays the class map.

Platform Description N/A

2.3 Drr-queue Bandwidth

Use this command to set the DRR queue weight ratio. Use the **no** or **default** form of this command to restore the default setting.

drr-queue bandwidth *weight1...weight8*

no drr-queue bandwidth

default drr-queue bandwidth

Parameter Description

Parameter	Description
weight1...weight8	8 queue weights. The default queue weight ratio is 1:1:1:1:1:1:1:1. For the products supporting the SP scheduling policy, the weight range is from 0 to 15. For the products not supporting the SP scheduling policy, the weight range is from 1 to 15.

Defaults

The default queue weight ratio is 1:1:1:1:1:1:1:1.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example configures the DRR queue weight ratio to 1:1:1:2:2:4:6:8.

```
FS(config)# drr-queue bandwidth 1:1:1:2:2:4:6:8
```

Related Commands

Command	Description
show mls qos queuing	Displays information about the queue.

Platform Description

N/A

2.4 Match

Use this command to define a match criteria in class map configuration mode. Use the **no** form of this command to remove the match criteria.

match { **access-group** *access_list* | **ip** { **dscp** *dscp-vlaue-list* | **precedence** *pre-vlaue-list* } }

no match { **access-group** *access_list* | **ip** { **dscp** *dscp-vlaue-list* | **precedence** *pre-vlaue-list* } }

Parameter Description

Parameter	Description
access-group *access_list*	Identifies a numbered or named access list as the match criteria.
ip dscp *dscp-vlaue-list*	Identifies DSCP values as the match criteria. Multiple DSCP can be configured. The range is from 0 to 63.
ip precedence *pre-vlaue-list*	Identifies IP precedence values as the match criteria. Multiple IP precedence can be configured. The range is from 0 to 7.

Defaults

None

Command Mode

Class map configuration mode

Usage Guide

N/A

Configuration Examples

The following example creates a class map named cmap1 to match DSCP 20, 22, 24 and 30.

```
FS(config)# class-map cmap1
FS(config-cmap)# match ip dscp 20 22 24 30
```

Related Commands

Command	Description
show class-map [*class-map-name*]	Displays the class map.

Platform Description

N/A

2.5 Mls Qos Cos

Use this command to configure the CoS value of an interface. Use the **no** form of this command to restore the default setting.

mls qos cos *default-cos*

no mls qos cos

Parameter Description

Parameter	Description
default-cos	CoS value of the interface. The range is from 0 to 7.

Defaults

The default CoS value is 0.

Command Mode

Interface configuration mode.

Usage Guide

N/A

Configuration Examples

The following example configures the default CoS value to 7.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if)# mls qos cos 7
```

Related Commands

Command	Description
show mls qos interface *interface-id*	Displays information of the specified interface.

Platform Description

N/A

2.6 Mls Qos Map Cos-dscp

Use this command to map the CoS value to the DSCP value. Use the **no** or **default** form of this command to restore the default CoS-DSCP mapping.

mls qos map cos-dscp *dscp1...dscp8*

no mls qos map cos-dscp

default mls qos map cos-dscp

Parameter Description

Parameter	Description
dscp1...dscp8	Specifies the DSCP value. The range is from 0 to 63.

Defaults

By default, the CoS 0, 1, 2, 3, 4, 5, 6, 7 is mapped to the DSCP 0, 8, 16, 24, 32, 40, 48, 56 respectively.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

```
FS(config)# mls qo map cos-dscp 8 10 16 18 24 26 32 34
```

Related Commands

Command	Description
show mls qos maps cos-dscp	Displays the CoS-DSCP mapping.

Platform Description

N/A

2.7 Mls Qos Map Dscp-cos

Use this command to map the DSCP value to the CoS value. Use the **no** or **default** form of this command to restore the default DSCP-CoS mapping.

mls qos map dscp-cos *dscp-list* **to** *cos*

no mls qos map dscp-cos

default mls qos map dscp-cos

Parameter Description

Parameter	Description
dscp-list	DSCP list. The range is from 0 to 63.
cos	CoS value. The range is from 0 to 7.

Defaults

The default DSCP-CoS mapping is listed below:

DSCP 0-7	DSCP 8-15	DSCP 16-23	DSCP 24-31	DSCP 32-39	DSCP 40-47	DSCP 48-55	DSCP 56-63
CoS 0	CoS 1	CoS 2	CoS 3	CoS 4	CoS 5	CoS 6	CoS 7

Command Mode

Global configuration mode.

Usage Guide

N/A

Configuration Examples

```
FS(config)# mls qos map dscp-cos 8 10 16 18 to 0
```

Related Commands

Command	Description
show mls qos maps dscp-cos	Displays the DSCP-CoS mapping.

Platform Description N/A

2.8 Mls Qos Map Ip-precedence-dscp

Use this command to map the IP precedence to the DSCP value. Use the **no** or **default** form of this command to restore the default IP-precedence to DSCP mapping.

mls qos map ip-precedence-dscp *dscp1 ... dscp8*

no mls qos map ip-precedence-dscp

default mls qos map ip-precedence-dscp

Parameter Description

Parameter	Description
dscp1...dscp8	DSCP list. The range is from 0 to 63.

Defaults By default, the IP precedence 0, 1, 2, 3, 4, 5, 6, 7 is mapped to the DSCP 0, 8, 16, 24, 32, 40, 48, 56 respectively.

Command Mode Global configuration mode.

Usage Guide N/A

Configuration Examples

```
FS(config)# mls qo map ip-prec -dscp 8 10 16 18 24 26 32 34
```

Related Commands

Command	Description
show mls qos maps ip-pre-dscp	Displays the IP-precedence to DSCP mapping.

Platform Description N/A

2.9 Mls Qos Scheduler

Use this command to configure the output queue scheduling. Use the **no** or **default** form of this command to restore the default scheduler.

mls qos scheduler [**sp** | **rr** | **wrr** | **drr** | **wfq**]

no mls qos scheduler

Parameter Description

Parameter	Description
sp	Specifies the absolute priority scheduling.
rr	Specifies the round-robin scheduling.

wrr	Specifies the frame count weighted round-robin scheduling.
drr	Specifies the frame length weighted round-robin scheduling.
wfq	Specifies the weighted fair queuing.

Defaults The default queue scheduling is **wrr**.

Command Mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example specifies the sp scheduling.

```
FS(config)# mls qos scheduler sp
```

Related Commands

Command	Description
show mls qos scheduler	Displays the output queue scheduling.

Platform Description N/A

2.10 Mls Qos Trust

Use this command to configure the trust mode on an interface. Use the **no** or **default** form of this command to restore the default setting.

mls qos trust { **cos** | **dscp** | **ip-precedence** }

no mls qos trust

default mls qos trust

Parameter Description

Parameter	Description
cos	Specifies the CoS trust mode.
dscp	Specifies the DSCP trust mode.
ip-precedence	Specifies the IP-PRE trust mode.

Defaults No trust mode is configured by default.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example configures the CoS trust mode.

```
FS(config)# interface gigabitethernet 1/1
FS(config-if)# mls qos trust cos
```

Related Commands

Command	Description
show mls qos interface *interface-id*	Displays the specified interface configuration.

Platform Description

N/A

2.11 Police

Use this command to configure traffic policing for a class map in a policy map. Use the **no** form of this command to remove traffic policing for the class map.

police *rate-bps burst-byte* [**exceed-action** { **drop** | **dscp** *new-dscp* | **cos** *new-cos* [**none-tos**] }]

no police

Parameter Description

Parameter	Description
rate-bps	Bandwidth limit value per second (The unit is KBits). This value depends on the specific product.
burst-byte	Burst traffic limit value (The unit is KBytes). This value depends on the specific product.
drop	Drops the packet. This is available only when the packet exceeds the bandwidth limit.
dscp *new-dscp*	Modifies the DSCP value of the packet. This is available only when the packet exceeds bandwidth limit. The DSCP value range is from 0 to 63.
cos *new-cos*	Modifies the CoS value of the packet. This is available only when the packet exceeds bandwidth limit. The CoS value range is from 0 to 7.
none-tos	Modifies the CoS value only.

Defaults

No traffic policing is configured for the class map by default.

Command Mode

Policy map class configuration mode

Usage Guide

N/A

Configuration Examples

The following example configures traffic policing which modifies the DSCP value of the packet to 16 for class map "cm-acl" in policy map "pmap1".

```
FS(config)# policy-map pmap1
FS(config-pmap)# class cm-acl

FS(config-pmap-c)# police 102400 4096 exceed-action dscp 16
```

Related Commands

Command	Description
show policy-map [*policy-map-name* [**class** *class-map-name*]]	Displays the policy map configuration.

Platform Description N/A

2.12 Policy Map

Use the following command to create a policy map and enter policy map configuration mode. Use the **no** or **default** form of this command to remove the specified policy map.

policy-map *policy-map-name*

no policy-map *policy-map-name*

default policy-map *policy-map-name*

Parameter Description

Parameter	Description
policy-map-name	Policy map name. The policy map name can be a maximum of 31 characters.

Defaults No policy map is configured by default.

Command Mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example creates policy map "po", and then adds a reference to class map "cmap1". Sets the rate limit value to 10 Mbps, the burst traffic limit value to 256 Kbps, and discard packets which exceed the limit.

```
FS(config)# policy-map po
FS(config-pmap)# class cmapl
FS(config-pmap-c)# police 10240 256 exceed-action drop
```

Related Commands

Command	Description
show policy-map [*policy-map-name* [**class** *class-map-name*]]	Displays the policy map configuration.

Platform Description N/A

2.13 Priority-queue

Use this command to configure the output queue scheduling policy to SP. Use the **no** or **default** form of this command to restore the default queue scheduling policy.

priority-queue

no priority-queue

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The default output queue scheduling policy is WRR.

Command Mode

Global configuration mode.

Usage Guide

This command shares the same configuration with the **mls qos scheduler sp**. The **show run** command displays this configuration in the **mls qos scheduler sp** item instead of **priority-queue**.

Configuration Examples

The following example configures the output queue scheduling policy to SP.

```
FS(config)# priority-queue
```

Related Commands

Command	Description
show mls qos scheduler	Displays the output queue scheduling policy.

Platform Description

N/A

2.14 Priority-queue cos-map

Use this command to configure the mapping between the CoS value and the queue ID. Use the **no** or **default** form of this command to restore the default CoS mapping to the queue.

priority-queue cos-map *qid cos0* [*cos1* [*cos2* [*cos3* [*cos4* [*cos5* [*cos6* [*cos7*]]]]]]]

no priority-queue cos-map

default priority-queue cos-map

Parameter Description

Parameter	Description
qid	Queue ID. The range is from 1 to 8.
cos0 ... cos7	CoS value. The range is from 0 to 7.

Defaults

The default mapping between the CoS value and the queue ID is listed below:

Queue 1	Queue 2	Queue 3	Queue 4	Queue 5	Queue 6	Queue 7	Queue 8
CoS 0	CoS 1	CoS 2	CoS 3	CoS 4	CoS 5	CoS 6	CoS 7

Command Mode

Global configuration mode.

Usage Guide

N/A

Configuration Examples

The following example maps the CoS 3, 5 to the output queue 1.

```
FS(config)#priority-queue cos-map 1 3 5
```

Related Commands

Command	Description
show mls qos queuing	Displays the output queues.

Platform Description N/A

2.15 Qos Queue

Use this command to configure a minimum or maximum of the interface bandwidth to a queue. Use the **no** or **default** form of this command to remove the minimum or maximum of the interface bandwidth.

qos queue *queue-id* **bandwidth** { **minimum** | **maximum** } *bandwidth*

no qos queue *queue-id* **bandwidth** { **minimum** | **maximum** }

default qos queue *queue-id* **bandwidth** { **minimum** | **maximum** }

Parameter Description

Parameter	Description
queue-id	Queue ID. The range is from 1 to 8.
bandwidth { **minimum** | **maximum** } *bandwidth*	Bandwidth value. The value range depends on the specific product.

Defaults No minimum or maximum of interface bandwidth to a queue is configured by default.

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples

N/A

Related Commands

Command	Description
show qos bandwidth [**interfaces** *interface-id*]	Displays the interface bandwidth of the queue.

Platform Description N/A

2.16 Rate-limit

Use this command to configure rate limiting on the interface. Use the **no** or **default** form of this command to remove rate limiting from the interface.

rate-limit { input | output } *bps burst-size*

no rate-limit { **input | output** }

default rate-limit { **input | output** }

Parameter Description

Parameter	Description
input	Configures input rate limiting.
output	Configures output rate limiting.
bps	Bandwidth limit value per second (The unit is KBits). This value depends on the specific product.
burst-size	Burst traffic limit value (The unit is KBytes). This value depends on the specific product.

Defaults Rate limiting is not configured by default.

Command Mode Interface configuration mode.

Usage Guide N/A

Configuration Examples The following example configures the rate limit value to 10 Mbps, and the burst traffic limit value to 256 Kbps.

```
FS(config)# interface gigabitethernet 1/3
FS(config-if-GigabitEthernet 1/3)# rate-limit input 10240 256
```

Related Commands

Command	Description
show mls qos rate-limit [**interface** *interface-id*]	Displays the rate limiting configuration of the interface.

Platform Description N/A

2.17 Service-policy

Use this command to apply the policy map to the interface, the virtual group or globally. Use the **no** or **default** form of this command to remove the policy map.

service-policy { **input** | **output** } *policy-map-name*

no service-policy { **input** | **output** } *policy-map-name*

default service-policy { **input** | **output** } *policy-map-name*

Parameter Description

Parameter	Description
policy-map-name	Policy map name
input	Applies the policy map to the input direction.
output	Applies the policy map to the output direction.

Defaults No policy map is configured on the interface or virtual group by default.

Command Mode Interface configuration mode, and virtual group configuration mode.

Usage Guide N/A

Configuration Examples The following example applies policy map "po" to the input direction of interface GigabitEthernet 1/3.

```
FS(config)# interface gigabitethernet 1/3
FS(config-if-GigabitEthernet 1/3)# service-policy input po
```

The following example applies policy map "po" to the output direction of virtual group 3.

```
FS(config)# virtual-group 3
FS(config-VirtualGroup)# service-policy output po
```

Related Commands

Command	Description
show mls qos interface policers	Displays the policy map configuration on the interface.
show mls qos virtual-group policers	Displays the policy map configuration on the virtual group.

Platform Description N/A

2.18 Set

Use this command to configure the CoS, DSCP or VID value for the traffic. Use the **no** form of this command to remove the CoS, DSCP or VID value from the traffic.

set { **ip dscp** *new-dscp* | **cos** *new-cos* | **vid** *new-vid* }

no set { **ip dscp** | **cos** | **vid** }

Parameter Description

Parameter	Description
ip dscp *new-dscp*	Configures the DSCP value for the traffic. The range is from 0 to 63.
cos *new-cos*	Configures the CoS value for the traffic. The range is from 0 to 7.
vid *new-vid*	Configures the VID value for the traffic. The range is from 1 to 4094.

Defaults No CoS, DSCP or VID value is configured for the traffic in policy map class mode.

Command Mode Policy map class configuration mode

Usage Guide N/A

Configuration Examples The following example creates policy map "pmap1", and adds a reference to class map "cmap1".

```
FS(config)# policy-map pmap1
FS(config-pmap)# class cmap1
```

The following example modifies the CoS value of the traffic to 3.

```
FS(config-pmap-c)# set cos 3
```

Related Commands

Command	Description
show policy-map[*policy-map-name* [**class** *class-map-name*]]	Displays the policy map configuration on the interface.

Platform Description N/A

2.19 Show Class-map

Use this command to display the class map.

show class-map [*class-map-name*]

Parameter Description

Parameter	Description
class-map-name	Class map name.

Defaults None

Command Mode Privileged EXEC mode, global configuration mode, interface configuration mode.

Usage Guide N/A

Configuration Examples The following example displays all class maps.

```
FS# show class-map


 Class Map cmap1
    Match ip dscp 20 40
 Class Map cmap2
    Match access-group 110
```

The fields in the output of this command are described in the following table.

Field	Description
Class Map	Indicates the class map name.
Match	Indicates the matched rule.

Related Commands

Command	Description
N/A	N/A

Platform N/A

Description

2.20 Show Mls Qos Interface

Use this command to display the QoS configuration of the interface.

show mls qos interface [*interface-id*] [**policers**]

Parameter Description

Parameter	Description
interface-id	Interface name
policers	Displays the traffic policing configured on the interface.

Defaults None

Command Mode Privileged EXEC mode, global configuration mode, interface configuration mode.

Usage Guide N/A

Configuration Examples The following example displays the QoS configuration of interface GigabitEthernt 1/3.

```
FS# show mls qos interface gigabitethernet 1/3
Interface: GigabitEthernet 0/3
Ratelimit input: 10240 256
Ratelimit output: 51200 4096
Attached input    policy-map: pmap1
Attached output policy-map:
Default trust: dscp
Default cos: 3
```

The fields in the output of this command are described in the following table.

Field	Description
Interface	Indicates the interface name.
Ratelimit input	Indicates the input rate limit value .
Ratelimit output	Indicates the output rate limit value .
Attached input policy-map	Indicates the input policy map .
Attached output policy-map	Indicates the output policy map.
Default trust	Indicates the trust mode of the interface.
Default cos	Indicates the default CoS value.

The following example displays the QoS configuration of all interfaces.

```
FS# show mls qos interface policers
Interface: GigabitEthernet 0/1
Attached input    policy-map: pmap1
```

```
Attached output policy-map: pmap1
Interface: GigabitEthernet 0/2
Attached input    policy-map: p1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.21 Show Mls Qos Maps

Use this command to display DSCP-CoS mapping, CoS-DSCP mapping and IP-PRE-DSCP mapping.

show mls qos maps [**cos-dscp** | **dscp-cos** | **ip-prec-dscp**]

Parameter Description

Parameter	Description
cos-dscp	Displays the CoS-DSCP mapping.
dscp-cos	Displays the DSCP-CoS mapping.
ip-prec-dscp	Displays the IP-PRE-DSCP mapping..

Defaults None

Command Mode Privileged EXEC mode, global configuration mode, interface configuration mode.

Usage Guide N/A

Configuration Examples The following example displays the CoS-DSCP mapping.

```
FS# show mls qos maps cos-dscp
cos dscp
--- ----
0    0
1    8
2    16
3    24
4    32
5    40
6    48
7    56
```

The fields in the output of this command are described in the following table.

Field	Description
cos	Indicates the CoS value.
dscp	Indicates the DSCP value mapped .

The following example displays the DSCP- CoS mapping.

```
FS# show mls qos maps dscp-cos

dscp cos      dscp cos      dscp cos      dscp cos

---- ---      ---- ---      ---- ---      ---- ---

 0    0         1    0         2    0         3    0

 4    0         5    0         6    0         7    0

 8    1         9    1        10    1        11    1

12    1        13    1        14    1        15    1

16    2        17    2        18    2        19    2

20    2        21    2        22    2        23    2

24    3        25    3        26    3        27    3

28    3        29    3        30    3        31    3

32    4        33    4        34    4        35    4

36    4        37    4        38    4        39    4

40    5        41    5        42    5        43    5

44    5        45    5        46    5        47    5

48    6        49    6        50    6        51    6

52    6        53    6        54    6        55    6

56    7        57    7        58    7        59    7

60    7        61    7        62    7        63    7
```

The fields in the output of this command are described in the following table.

Field	Description
dscp	Indicates the DSCP value.
cos	Indicates the CoS value mapped .

The following example displays the IP-PRE-DSCP mapping.

```
FS# show mls qos maps ip-prec-dscp

ip-precedence dscp

------------- ----
```

```
0 0
1 8
2 16
3 24
4 32
5 40
6 48
7 56
```

The fields in the output of this command are described in the following table.

Field	Description
ip-precedence	Indicates the IP-PRE value.
dscp	Indicates the DSCP value mapped .

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.22 Show Mls Qos Queueing

Use this command to display the QoS queuing configuration.

show mls qos queueing

Parameter Description

Parameter	Description
N/A	

Defaults N/A

Command Mode Privileged EXEC mode, global configuration mode, interface configuration mode.

Usage Guide N/A

Configuration Examples The following example displays the QoS queuing configuration.

```
FS# show mls qos queueing
Cos-queue map:
cos qid
--- ---
0     1
```

```
1     2
2     3
3     4
4     5
5     6
6     7
7     8

wrr bandwidth weights:
qid weights
--- -------
1     1
2     2
3     3
4     4
5     5
6     6
7     7
8     8

drr bandwidth weights:
qid weights
--- -------
1     3
2     3
3     3
4     3
5     3
6     3
7     3
8     3

wfq bandwidth weights:
qid weights
```

```
--- -------
1     3
2     4
3     5
4     6
5     7
6     8
7     9
8     10
```

The fields in the output of this command are described in the following table.

Field	Description
Cos-queue map	Indicates the mapping between the CoS value and the queue ID.
wrr bandwidth weights	Indicates the WRR queue weight.
drr bandwidth weights	Indicates the DRR queue weight.
wfq bandwidth weights	Indicates the WFQ queue weight.
cos	Indicates the CoS value.
qid	Indicates the queue ID.
weights	Indicates the weight value

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.23 Show Mls Qos Rate-limit

Use this command to display the rate limiting configuration of the interface.

show mls qos rate-limit [**interface** *interface-id*]

Parameter Description

Parameter	Description
interface-id	Interface name

Defaults N/A

Command Mode Privileged EXEC mode, global configuration mode, interface configuration mode.

Usage Guide N/A

Configuration Examples

The following example displays the rate limiting configuration of all interfaces.

```
FS# show mls qos rate-limit
Interface: GigabitEthernet 0/1
  rate limit input Kbps = 10240 burst = 256
Interface: GigabitEthernet 0/3
  rate limit output Kbps = 102400 burst = 4096
```

The fields in the output of this command are described in the following table.

Field	Description
Interface	Indicates the interface name.
rate limit input Kbps = x burst = y	Indicates the input rate limit value, and the input burst traffic limit value.
rate limit output Kbps = x burst = y	Indicates the output rate limit value, and the output burst traffic limit value.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

2.24 Show Mls Qos Scheduler

Use this command to display the queue scheduling policy.

show mls qos scheduler

Parameter Description

Parameter	Description
N/A	

Defaults

None

Command Mode

Privileged EXEC mode, global configuration mode, interface configuration mode.

Usage Guide

N/A

Configuration Examples

The following example displays the queue scheduling policy.

```
FS# show mls qos scheduler
Global Multi-Layer Switching scheduling
 Weighted Round Robin
```

The fields in the output of this command are described in the following table.

Field	Description
Weighted Round Robin	Indicates that the queue scheduling policy is WRR. The other queue scheduling policies are listed as follows: SP: Strict Priority RR: Round Robin DRR: Deficit Round Robin WFQ: Weighted Fair Queue

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.25 Show Mls Qos Virtual-group

Use this command to display the policy map configuration on the virtual group.

show mls qos virtual-group [*virtual-group-number* | **policers**]

Parameter Description

Parameter	Description
virtual-group-number	Virtual group number. The range is from 1 to 128.
policers	Displays the policy map configuration on all virtual groups.

Defaults None

Command Mode Privileged EXEC mode, global configuration mode, interface configuration mode.

Usage Guide N/A

Configuration Examples The following example displays the policy map configuration on all virtual groups.

```
FS# show mls qos virtual-group policers
Virtual-group: 1
Attached input policy-map: pmap1
Virtual-group: 20
Attached output policy-map: pmap2
```

The fields in the output of this command are described in the following table.

Field	Description
Virtual-group	Indicates the virtual group number.
Attached input policy-map	Indicates the policy map applied on the input virtual group.
Attached output policy-map	Indicates the policy map applied on the output virtual group.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.26 Show Policy-map

Use this command to display policy maps.

show policy-map [*policy-map-name* [**class** *class-map-name*]]

Parameter Description

Parameter	Description
policy-map-name	Policy map name
class-map-name	Class map name

Defaults None

Command Mode Privileged EXEC mode, global configuration mode, interface configuration mode.

Usage Guide N/A

Configuration Examples The following example displays configuration of policy map “pmap1”.

```
FS# show policy-map pmap1


 Policy Map pmap1
     Class cmap1
        set ip dscp 16
     Class cmap2
        police 10240 256 exceed-action dscp 8
     Class cmap3
        police 512000 4096 exceed-action drop
```

The fields in the output of this command are described in the following table.

Field	Description
Policy Map	Indicates the policy map name.
Class	Indicates the class map name.
set	Indicates that the DSCP value is modified in this example.
police	Indicates bandwidth limit configuration and the action policy for the violated packets.

The following example displays the action policy for the traffic of class map “cmap1” in policy map “pmap1” .

```
FS#show policy-map pmap1 class cmap1
Class cmap1
set ip dscp 16
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.27 Show Qos Bandwidth

Use this command to display the bandwidth configuration.

show qos bandwidth [**interfaces** *interface-id*]

Parameter Description

Parameter	Description
interface-id	Interface name

Defaults None

Command Mode Privileged EXEC mode, global configuration mode, interface configuration mode.

Usage Guide N/A

Configuration Examples The following example displays the bandwidth configuration of interface GigabitEthernet 0/1.

```
FS# show qos bandwidth interface gigabitEthernet 0/1
Interface: GigabitEthernet 0/1
 ----------------------------------------------
 queue-id | minimum-bandwidth | maximum-bandwidth
 --------     -----------------     -----------------
```

```
        1                5120                10240
        2                2048                    0
        3                   0                    0
        4                   0                    0
        5                   0                    0
        6                   0                    0
        7                   0                    0
        8                   0                    0
-----------------------------------------------
Total minimum-bandwidth:                     7168
Total maximum-bandwidth:                    10240
```

The fields in the output of this command are described in the following table.

Field	Description
Interface	Indicates the interface name.
queue-id	Indicates the queue ID.
minimum-bandwidth	Indicates the minimum bandwidth configuration. The unit is Kbps.
maximum-bandwidth	Indicates the maximum bandwidth configuration. The unit is Kbps.
Total queue minimum-bandwidth Total queue maximum-bandwidth	Indicates the total bandwidth of minimum and maximum when both unicast and multicast queues are displayed.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.28 Show Virtual-group

Use this command to display the member port in the virtual group.

show virtual-group [*virtual-group-number* | **summary**]

Parameter Description

Parameter	Description
virtual-group-number	Virtual group number. The range is from 1 to 128.
summary	Displays the member port in all virtual groups.

Defaults N/A

Command Privileged EXEC mode, global configuration mode, interface configuration mode.

Mode

Usage Guide N/A

Configuration Examples The following example displays the member port in all virtual groups.

```
FS# show virtual-group summary
  virtual-group          member
  -------------          -------------------------
  1                        Gi0/1 Gi0/2
  2                        Gi0/0
```

The fields in the output of this command are described in the following table.

Field	Description
virtual-group	Indicates the virtual group number.
member	Indicates the member port in the virtual group.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

2.29 Virtual-group

Use this command to create a virtual group in global configuration mode.

Use this command to configure add an interface to a virtual group in interface configuration mode.

Use the **no** or **default** form of this command to remove a virtual group in global configuration mode.

Use the **no** or **default** form of this command to remove an interface from a virtual group in interface configuration mode.

virtual-group *virtual-group-number*

no virtual-group *virtual-group-number*

default virtual-group *virtual-group-number*

Parameter Description

Parameter	Description
virtual-group-number	Virtual group number. The range is from 1 to 128.

Defaults No virtual group is configured, or no interface is added to a virtual group, by default.

Command Mode Interface configuration mode, global configuration mode.

Usage Guide The member port added to the virtual group must be a physical port or an aggregate port member.

Configuration Examples

The following example sets the interface gigabitEthernet 1/3 as the member of virtual group 3:

```
FS(config)# interface gigabitethernet 1/3
FS(config-if)# virtual-group 3
```

Related Commands

Command	Description
show virtual-group [*virtual-group-number* | **summary**]	Displays the virtual group configuration.

Platform Description

N/A

2.30 Wfq-queue Bandwidth

Use this command to configure the WFQ queue weight ratio. Use the **no** or **default** form of this command to restore the default setting.

wfq-queue bandwidth *weight1 ... weight8*

no wfq-queue bandwidth

default wfq-queue bandwidth

Parameter Description

Parameter	Description
weight1...weight8	8 queue weights. The default queue weight ratio is 1:1:1:1:1:1:1:1. For the products supporting the SP scheduling policy, the weight range is from 0 to 15. For the products not supporting the SP scheduling policy, the weight range is from 1 to 15.

Defaults

The default queue weight ratio is 1:1:1:1:1:1:1:1.

Command Mode

Global configuration mode.

Usage Guide

If the weight value is 0, the SP scheduling policy is applied.

Configuration Examples

The following example configures the WFQ queue weight ratio to 1:1:2:4:4:4:6:8.

```
FS(config)# wfq-queue bandwidth 1 1 2 4 4 4 6 8
```

Related Commands

Command	Description
show mls qos queueing	Displays the QoS queuing configuration.

Platform

N/A

Description

2.31 Wrr-queue Bandwidth

Use this command to set the WRR weight ratio. Use the **no** or **default** form of this command to restore the default setting.

wrr-queue bandwidth *weight1 ... weight8*

no wrr-queue bandwidth

default wrr-queue bandwidth

Parameter Description

Parameter	Description
weight1...weight8	8 queue weights. The default queue weight ratio is 1:1:1:1:1:1:1:1. For the products supporting the SP scheduling policy, the weight range is from 0 to 15. For the products not supporting the SP scheduling policy, the weight range is from 1 to 15.

Defaults The default queue weight ratio is 1:1:1:1:1:1:1:1.

Command Mode Global configuration mode

Usage Guide If the weight value is 0, the SP scheduling policy is applied.

Configuration Examples The following example configures the WRR queue weight ratio to 1:1:1:1:2:2:4:8.

```
FS(config)# wrr-queue bandwidth 1 1 1 1 2 2 4 8
```

Related Commands

Command	Description
show mls qos queuing	Displays the QoS queuing configuration.

Platform Description N/A

3. MMU Commands

3.1 mmu buffer-mode

Use this command to configure global buffer mode.

mmu buffer-mode { **normal | burst-enhance |qos-enhance | flowctrl-enhance** }

Use the **no** form of this command to restore the default setting.

no mmu buffer-mode

Parameter Description

Parameter	Description
normal	Normal buffer mode
burst-enhance	Burst enhancement
qos-enhance	QoS enhancement
flowctrl-enhance	Flow control enhancement

Defaults The default buffer mode varies from product.

Command Mode Global configuration mode

Default Level 14

Usage Guide N/A

Configuration Examples The following example configures the normal buffer mode.

```
FS# mmu buffer-mode normal
```

Platform Description N/A

3.2 clear queue-buffer peaked

Use this command to clear the historical peak value of the queue buffer.

clear queue-buffer peaked

Parameter Description

Parameter	Description
N/A	

Command Mode Privileged EXEC mode

Default Level 14

Usage Guide N/A

Configuration Examples The following example clears the historical peak value of the buffer.

```
FS# clear queue-buffer peaked
FS#
```

Platform Description N/A

3.3 clear queue-counters

Use this command to clear queue statistics.

clear queue-counter [interface *interface _id***]**

Parameter Description

Parameter	Description
interface_id	Port Number

Command Mode Privileged EXEC mode

Default Level 14

Usage Guide N/A

Configuration Examples The following example clears all queue statistics.

```
FS# clear queue-counter
FS#
```

The following example clears queue statistics of an interface.

```
FS# clear queue-counter Interface TenGigabitEthernet 1/9
FS#
```

Platform Description N/A

3.4 mmu usage-warn-limit

Use this command to configure the usage warning threshold.

mmu usage-warn-limit [{ **unicast** } {*queue-id1* [*queue-id2* [*queue-idN*]}**] set** *value*

Use the **no** form of this command to restore the default setting.

no mmu usage-warn-limit

Parameter Description

Parameter	Description

unicast	Performs buffer management on the output unicast queue.
queue-idN	Queue ID
priority-idN	Priority group ID
value	Usage warning threshold.

Defaults The default threshold is 0.

Command Mode Global configuration mode/Interface configuration mode

Default Level 14

Usage Guide If the buffer usage for the port group exceeds the global threshold, a warning log is printed. If the buffer usage for the queue exceeds the queue threshold, a warning log is printed. To avoid producing excessive logs, the warning log for a port group/queue is printed only once within 30 seconds.

Configuration Examples The following example sets the usage warning threshold globally.

```
FS#config
FS(config)# mmu usage-warn-limit set 90
```

The following example sets the usage warning threshold for unicast queue 3 and 8 to 80%.

```
FS#config
FS(config)# int te1/1
FS(config-if)# mmu usage-warn-limit unicast 3 8 set    80
```

Platform Description N/A

3.5 mmu queue-guarantee

Use this command to configure the guaranteed buffer.

mmu queue-guarantee output { unicast } {*queue-id1* [*queue-id2* [*queue-idN*] { **set** *value*

Use the **no** form of this command to restore the default setting.

no mmu queue-guarantee output { unicast }

Parameter Description

Parameter	Description
output	Performs buffer management on the output queue.
unicast	Performs buffer management on the output unicast queue.
queue-idN	Queue ID
value	Sets the number of guaranteed buffer, in the unit of cells.

Defaults The default varies with different products.

Command Mode Interface configuration mode

Default Level 14

Usage Guide This command is executed in different ways on different devices.

Configuration Examples The following example configures guaranteed buffer for unicast queue.

```
FS#config
FS(config)# interface tenGigabitEthernet 1/9
FS(config-if)#mmu queue-guarantee ouput unicast 1 3 7 8 set 15
FS(config-if)#exit
FS(config)#exit
FS#
```

Platform Description N/A

3.6 mmu queue-thredshold

Use this command to configure the shared buffer.

mmu queue-thredshold output { unicast } { *queue-id1* [*queue-id2* [*queue-idN*]] } **set** *th%*

Use the **no** form of this command to restore the default setting.

no mmu queue-thredshold output { unicast }

Parameter Description

Parameter	Description
output	Performs buffer management on the output queue.
unicast	Performs buffer management on the output unicast queue.
queue-idN	Queue ID
th%	Total shared buffer * threshold = Available buffer

Defaults The default varies with different products.

Command Mode Interface configuration mode

Default Level 14

Usage Guide N/A

Configuration Examples

The following example configures shared buffer for unicast queue.

```
FS#config
FS(config)# interface tenGigabitEthernet 1/9
FS(config-if)#mmu queue-threshold ouput unicast 1 3 7 8 set 80
FS(config-if)#exit
```

Platform Description

N/A

3.7 mmu fc-threshold

Use this command to configure the inbound buffer threshold.

mmu fc-threshold set *th%*

Use the **no** form of this command to restore the default setting.

no mmu fc-threshold

Parameter Description

Parameter	Description
th%	Indicates the percentage of inbound buffer threshold.

Defaults

The default varies with different products.

Command Mode

Interface configuration mode

Usage Guide

This command is executed in different ways on different devices.

This command only takes effect when flow control/PFC is enabled.

Configuration Examples

The following example configures inbound buffer threshold of priority group.

```
FS#config
FS(config)# interface tenGigabitEthernet 0/9
FS(config-if)#mmu fc-threshold set 80
FS(config-if)#exit
```

Platform Description

N/A

3.8 show queue-buffer interface

Use this command to display buffer usage of interfaces.

show queue-buffer interface { *interface-id*}

Parameter Description

Parameter	Description
interface-id	Interface

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Default Level 14

Usage Guide N/A

Configuration Examples The following example displays buffer usage of the specified interface based on output queue.

```
FS(config)#show queue-buffer interface hundredGigabitEthernet 0/1
Interface HundredGigabitEthernet 0/1:
Slice 1:
Type        Queue   Used cells   Available cells   Usage   Usage warn limit   Usage warn count   Peaked cells
Unicast     1       42288        0                 100%    0%                 0
42288
Unicast     2       0            42280             0%      0%                 0                  0
Unicast     3       0            42280             0%      0%                 0                  0
Unicast     4       0            42280             0%      0%                 0                  0
Unicast     5       0            42280             0%      0%                 0                  0
Unicast     6       0            42280             0%      0%                 0                  0
Unicast     7       0            42280             0%      0%                 0                  0
Unicast     8       0            42280             0%      0%                 0                  0
Multicast   1       0            668               0%      0%                 0                  3442
Multicast   2       0            668               0%      0%                 0                  0
Multicast   3       0            668               0%      0%                 0                  0
Multicast   4       0            668               0%      0%                 0                  0
Multicast   5       0            668               0%      0%                 0                  0
Multicast   6       0            668               0%      0%                 0                  0
Multicast   7       0            668               0%      0%                 0                  0
Multicast   8       0            668               0%      0%                 0                  0

Slice 3:
Type        Queue   Used cells   Available cells   Usage   Usage warn limit   Usage warn count   Peaked cells
Unicast     1       0            42287             0%      0%                 0                  0
Unicast     2       0            42287             0%      0%                 0                  0
Unicast     3       0            42287             0%      0%                 0                  0
Unicast     4       0            42287             0%      0%                 0                  0
Unicast     5       0            42287             0%      0%                 0                  0
Unicast     6       0            42287             0%      0%                 0                  0
Unicast     7       0            42287             0%      0%                 0                  0
Unicast     8       0            42287             0%      0%                 0                  0
Multicast   1       0            5292              0%      0%                 0                  0
Multicast   2       0            5292              0%      0%                 0                  0
Multicast   3       0            5292              0%      0%                 0                  0
```

```
Multicast  4    0          5292          0%    0%          0          0
Multicast  5    0          5292          0%    0%          0          0
Multicast  6    0          5292          0%    0%          0          0
Multicast  7    0          5292          0%    0%          0          0
Multicast  8    0          5292          0%    0%          0          0

Slot    Slice   PortGroup   Total cells   Total usage   Usage warn limit   Static used cells   Global shared cells
Available shared cells
0       1       1           53248         79%           90%                8                   47564
5284
0       2       1           53248         79%           90%                8                   47564
5284
0       3       1           53248         0%            90%                0                   47564
47564
0       4       1           53248         0%            90%                0                   47564
47564
```

Field	Description
Slice	No. of the module on the chip for buffer division
Type	Queue type, including unicast queue and multicast queue
Queue	Queue No., ranging from 1 to 8 by default and can be switched to 0 to 7 through configuration
Used cells	Size of the occupied buffer in a queue, in the unit of cell
Available cells	Size of the available buffer in a queue, in the unit of cell
Usage	Percentage of the occupied buffer in a queue
Usage warn limit	Buffer usage warning threshold of a specific port group or queue
Usage warn count	Number of times that the occupied buffer exceeds the warning threshold
Peaked cells	Historical peak value of the used buffer
Slot	Slot No. of the line card
PortGroup	Port group No., starting from 1
Total cells	Total buffer on a specified slice
Total usage	Percentage of the occupied buffer on a specified slice
Static used cells	Size of the occupied guarantee buffer on a specified slice
Global shared cells	Total shared buffer on a specified slice
Available shared cells	Size of the available shared buffer on a specified slice

The following example displays the buffer queue information of all interfaces.

```
FS#show queue-buffer
Interface HundredGigabitEthernet 0/1:
Slice 1:
Type        Queue   Used cells   Available cells   Usage   Usage warn limit   Usage warn count   Peaked cells
Unicast     1       22383        1                 99%     50%                686
42288
Unicast     2       0            22384             0%      0%                 0                  0
Unicast     3       0            22384             0%      0%                 0                  0
Unicast     4       22391        0                 100%    0%                 0
22416
Unicast     5       0            22384             0%      0%                 0                  0
Unicast     6       0            22384             0%      0%                 0                  0
Unicast     7       0            22384             0%      0%                 0                  0
Unicast     8       0            22384             0%      0%                 0                  0
Multicast   1       0            357               0%      0%                 0                  3442
Multicast   2       0            357               0%      0%                 0                  0
Multicast   3       0            357               0%      0%                 0                  0
Multicast   4       0            357               0%      0%                 0                  0
Multicast   5       0            357               0%      0%                 0                  0
Multicast   6       0            357               0%      0%                 0                  0
Multicast   7       0            357               0%      0%                 0                  0
Multicast   8       0            357               0%      0%                 0                  0

Slice 3:
Type        Queue   Used cells   Available cells   Usage   Usage warn limit   Usage warn count   Peaked cells
Unicast     1       0            42287             0%      50%                0                  0
Unicast     2       0            42287             0%      0%                 0                  0
Unicast     3       0            42287             0%      0%                 0                  0
Unicast     4       0            42287             0%      0%                 0                  0
Unicast     5       0            42287             0%      0%                 0                  0
Unicast     6       0            42287             0%      0%                 0                  0
Unicast     7       0            42287             0%      0%                 0                  0
Unicast     8       0            42287             0%      0%                 0                  0
Multicast   1       0            5292              0%      0%                 0                  0
Multicast   2       0            5292              0%      0%                 0                  0
Multicast   3       0            5292              0%      0%                 0                  0
Multicast   4       0            5292              0%      0%                 0                  0
Multicast   5       0            5292              0%      0%                 0                  0
Multicast   6       0            5292              0%      0%                 0                  0
Multicast   7       0            5292              0%      0%                 0                  0
Multicast   8       0            5292              0%      0%                 0                  0
```

```
Slot    Slice   PortGroup   Total cells   Total usage   Usage warn limit   Static used cells   Global shared cells
Available shared cells
0       1       1           53248         84%           90%                16                  47564
2797
0       2       1           53248         0%            90%                0                   47564
47564
0       3       1           53248         0%            90%                0                   47564
47564
0       4       1           53248         0%            90%                0                   47564
47564
......
Interface HundredGigabitEthernet 0/64:
Slice 2:
Type        Queue   Used cells   Available cells   Usage   Usage warn limit   Usage warn count   Peaked cells
Unicast     1       0            42287             0%      0%                 0
42288
Unicast     2       0            42287             0%      0%                 0                  0
Unicast     3       0            42287             0%      0%                 0                  0
Unicast     4       0            42287             0%      0%                 0                  0
Unicast     5       0            42287             0%      0%                 0                  0
Unicast     6       0            42287             0%      0%                 0                  0
Unicast     7       0            42287             0%      0%                 0                  0
Unicast     8       0            42287             0%      0%                 0                  0
Multicast   1       0            5292              0%      0%                 0                  3442
Multicast   2       0            5292              0%      0%                 0                  0
Multicast   3       0            5292              0%      0%                 0                  0
Multicast   4       0            5292              0%      0%                 0                  0
Multicast   5       0            5292              0%      0%                 0                  0
Multicast   6       0            5292              0%      0%                 0                  0
Multicast   7       0            5292              0%      0%                 0                  0
Multicast   8       0            5292              0%      0%                 0                  0

Slice 4:
Type        Queue   Used cells   Available cells   Usage   Usage warn limit   Usage warn count   Peaked cells
Unicast     1       0            42287             0%      0%                 0                  0
Unicast     2       0            42287             0%      0%                 0                  0
Unicast     3       0            42287             0%      0%                 0                  0
Unicast     4       0            42287             0%      0%                 0                  0
Unicast     5       0            42287             0%      0%                 0                  0
Unicast     6       0            42287             0%      0%                 0                  0
Unicast     7       0            42287             0%      0%                 0                  0
Unicast     8       0            42287             0%      0%                 0                  0
Multicast   1       0            5292              0%      0%                 0                  0
Multicast   2       0            5292              0%      0%                 0                  0
```

```
Multicast  3    0          5292          0%    0%    0    0
Multicast  4    0          5292          0%    0%    0    0
Multicast  5    0          5292          0%    0%    0    0
Multicast  6    0          5292          0%    0%    0    0
Multicast  7    0          5292          0%    0%    0    0
Multicast  8    0          5292          0%    0%    0    0

Slot    Slice   PortGroup   Total cells   Total usage   Usage warn limit   Static used cells   Global shared cells
Available shared cells
0       1       1           53248         84%           90%                16                  47564
2797
0       2       1           53248         0%            90%                0                   47564
47564
0       3       1           53248         0%            90%                0                   47564
47564
0       4       1           53248         0%            90%                0                   47564
47564
```

Platform Description N/A

3.9 show queue-counter interface

Use this command to display buffer queue statistics of interfaces.

show queue-counter interface *interface-id*

Parameter Description

Parameter	Description
interface-id	Interface

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Default Level 14

Usage Guide N/A

Configuration Examples The following example displays buffer queue statistics of the specified interface based on output queue.

```
FS#show queue-counter interface gigabitEthernet 0/9
Interface HundredGigabitEthernet 4/1:
  Unicast
  Queue      Transmitted Bytes          Dropped Bytes      Frame Loss Rate(%)      Transmit Rate(bps)
      1                  0                  0                  0
0
      2                  0                  0                  0
```

```
0
        3                    0                    0                    0
0
        4                    0                    0                    0
0
        5                    0                    0                    0
0
        6                    0                    0                    0
0
        7                    0                    0                    0
0
        8                62797                    0                    0
656
    Multicast
    Queue      Transmitted Bytes          Dropped Bytes      Frame Loss Rate(%)      Transmit Rate(bps)
        1                    0                    0                    0
0
        2                    0                    0                    0
0
        3                    0                    0                    0
0
        4                    0                    0                    0
0
        5                    0                    0                    0
0
        6                    0                    0                    0
0
        7                    0                    0                    0
0
        8                    0                    0                    0
0
    Unicast
    Queue     Transmitted Packets        Dropped Packets      Frame Loss Rate(%)      Transmit Rate(pps)
        1                    0                    0                    0
0
        2                    0                    0                    0
0
        3                    0                    0                    0
0
        4                    0                    0                    0
0
        5                    0                    0                    0
0
        6                    0                    0                    0
```

```
0
        7                    0                    0                    0
0
        8                  472                    0                    0
0
  Multicast
  Queue     Transmitted Packets        Dropped Packets      Frame Loss Rate(%)     Transmit Rate(pps)
        1                    0                    0                    0
0
        2                    0                    0                    0
0
        3                    0                    0                    0
0
        4                    0                    0                    0
0
        5                    0                    0                    0
0
        6                    0                    0                    0
0
        7                    0                    0                    0
0
        8                    0                    0                    0
0
```

The following example displays buffer queue statistics of all interfaces.

```
FS#show queue-counter
Interface HundredGigabitEthernet 0/1:
  Unicast
  Queue      Transmitted Bytes          Dropped Bytes      Frame Loss Rate(%)     Transmit Rate(bps)
        1            117380835776        1056130216960                 89.99
50525032
        2                    0                    0                    0
0
        3                    0                    0                    0
0
        4             2736178496          24624019520                 89.99
50525056
        5                    0                    0                    0
0
        6                    0                    0                    0
0
        7                    0                    0                    0
0
        8              1200887                    0                    0
```

```
664
  Multicast
  Queue       Transmitted Bytes            Dropped Bytes      Frame Loss Rate(%)      Transmit Rate(bps)
      1                24098176                233925440                    90.66
0
      2                       0                        0                        0
0
      3                       0                        0                        0
0
      4                       0                        0                        0
0
      5                       0                        0                        0
0
      6                       0                        0                        0
0
      7                       0                        0                        0
0
      8                       0                        0                        0
0
  Unicast
  Queue     Transmitted Packets          Dropped Packets      Frame Loss Rate(%)      Transmit Rate(pps)
      1               1834075559             16502034640                    89.99
75183
      2                       0                        0                        0
0
      3                       0                        0                        0
0
      4                42752789                384750305                    89.99
75183
      5                       0                        0                        0
0
      6                       0                        0                        0
0
      7                       0                        0                        0
0
      8                    9306                        0                        0
0
  Multicast
  Queue     Transmitted Packets          Dropped Packets      Frame Loss Rate(%)      Transmit Rate(pps)
      1                  376534                  3655085                    90.66
0
      2                       0                        0                        0
0
      3                       0                        0                        0
```

```
0
        4                       0                       0                       0
0
        5                       0                       0                       0
0
        6                       0                       0                       0
0
        7                       0                       0                       0
0
        8                       0                       0                       0
0Gi0/24          0                       0                       0                       0.000
……
Interface HundredGigabitEthernet 0/64:
   Unicast
   Queue       Transmitted Bytes           Dropped Bytes       Frame Loss Rate(%)      Transmit Rate(bps)
        1              83892643136             754894738496                    89.99
0
        2                       0                       0                       0
0
        3                       0                       0                       0
0
        4                       0                       0                       0
0
        5                       0                       0                       0
0
        6                       0                       0                       0
0
        7                       0                       0                       0
0
        8                 1203321                       0                       0
664
   Multicast
   Queue       Transmitted Bytes           Dropped Bytes       Frame Loss Rate(%)      Transmit Rate(bps)
        1             126178880              1208592000                    90.54
0
        2                       0                       0                       0
0
        3                       0                       0                       0
0
        4                       0                       0                       0
0
        5                       0                       0                       0
0
        6                       0                       0                       0
```

```
0
      7                    0                    0                    0
0
      8                    0                    0                    0
0
  Unicast
  Queue    Transmitted Packets        Dropped Packets      Frame Loss Rate(%)     Transmit Rate(pps)
      1              1310822549              11795230289                    89.99
0
      2                    0                    0                    0
0
      3                    0                    0                    0
0
      4                    0                    0                    0
0
      5                    0                    0                    0
0
      6                    0                    0                    0
0
      7                    0                    0                    0
0
      8                 9317                    0                    0
0
  Multicast
  Queue    Transmitted Packets        Dropped Packets      Frame Loss Rate(%)     Transmit Rate(pps)
      1               1971545               18884250                    90.54
0
      2                    0                    0                    0
0
      3                    0                    0                    0
0
      4                    0                    0                    0
0
      5                    0                    0                    0
0
      6                    0                    0                    0
0
      7                    0                    0                    0
0
      8                    0                    0                    0
0
```

Platform Description

N/A

Chapter 9 Reliability Configuration Commands

1. REUP Commands
2. RLDP Commands
3. DLDP Commands
4. VRRP Commands
5. VRRP Plus Commands
6. BFD Commands
7. IP Event Dampening Commands
8. stacking Commands
9. RNS&Track Commands

1. REUP Commands

1.1 Link State Group

Use this command to add the port into the specified link state track group. The **no** form of this command is used to delete a port from the specified link state track group.

link state group *num* { **upstream** | **downstream** }

no link state group

Parameter Description

Parameter	Description
num	ID of the link state track group.
upstream	Configures the port to be an upstream port in the link state track group.
downstream	Configures the port to be a downstream port in the link state track group.

Defaults

The port is not added into any link state track group.

Command Mode

Interface configuration mode.

Usage Guide

First create a link state track group and then add a port into the specified link state track group.

Configuration Examples

The following example shows how to add the port fa0/2 into the link state track group:

```
FS(config)# link state track 1
FS(config)# interface fa 0/2
FS(config-if)# link state group 1 upstream
```

Related Commands

Command	Description
link state track	Enables a link state track group.

Platform Description

N/A.

1.2 Link State Track

Use this command to enable the link state track group. The **no** form of this command is used to disable a link state track group

link state track [*num*]

no link state track [*num*]

Parameter Description

Parameter	Description
num	Interface ID of the link aggregation group.

Defaults

N/A.

Command Mode Global configuration mode.

Usage Guide First create a link state track group and then add a port into the specified link state track group.

Configuration Examples The following example shows how to create a link state track group:

```
FS(config)# link state track 1
```

Related Commands

Command	Description
link state group	Adds the port to the specified link state track group.

Platform Description N/A.

1.3 Mac-address-table Move Update Max-update-rate

Use this command to configure the maximum number of MAC address update packets sent per second.

mac-address-table move update max-update-rate *pkts-per-second*

no mac-address-table move update max-update-rate

Parameter Description

Parameter	Description
pkts-per-second	The maximum number of MAC address update packets sent per second. It ranges from 0 to 32000, and the default value is 150.

Defaults A maximum of 150 MAC address update packets are sent per second.

Command Mode Global configuration mode.

Usage Guide When a link is switched, REUP sends a certain number of MAC address update packets to an uplink device in every second to recover downlink data transmission of the uplink device.

Configuration Examples The following example shows how to configure the maximum number of MAC address update packets sent per second:

```
FS(config)# mac-address-table move update max-update-rate 20
```

Related Commands

Command	Description
N/A.	N/A.

Platform Description N/A.

1.4 Mac-address-table Move Update Receive

Use this command to enable REUP to receive the mac-address-table update messages.

mac-address-table move update receive

no mac-address-table move update receive

Parameter Description

Parameter	Description
N/A.	N/A.

Defaults

Disabled.

Command Mode

Global configuration mode.

Usage Guide

The dual link backup switchover will lead to the loss of downstream data flow, for the MAC address for the uplink switch has not been updated in time. Therefore, it is necessary to update the MAC address table of the uplink switch, to reduce the loss of L2 data flow. You need to enable the switch of receiving the MAC address update messages on the uplink switch.

Configuration Examples

```
FS(config)# mac-address-table move update receive
```

Related Commands

Command	Description
mac-address-table move update transit	Enables REUP to transmit the mac-address-table update messages.

Platform Description

N/A.

1.5 Mac-address-table Move Update Receive Vlan

Use this command to configure the VLANs processing MAC address update packets.

mac-address-table move update receive vlan *vlan-range*

no mac-address-table move update receive vlan *vlan-range*

Parameter Description

Parameter	Description
vlan-range	Range of the VLANs processing MAC address update packets.

Defaults

All VLANs process MAC address update packets.

Command Mode

Global configuration mode.

Usage Guide This command can be used to disable some VLANs from processing MAC address update packets. VLANs disabled from processing MAC address update packets can still recover downlink data transmission of the uplink device using MAC address update packets, but the capability to provide convergence on link failure will be degraded.

Configuration Examples The following example configures VLANs processing MAC address update packets:

```
FS(config)# no mac-address-table move update receive vlan 20
```

Related Commands

Command	Description
mac-address-table move update receive	Enables REUP to receive MAC address update packets.

Platform Description N/A.

1.6 Mac-address-table Move Update Transit

Use this command to enable REUP to transmit the mac-address-table update messages.

mac-address-table move update transit

no mac-address-table move update transit

Parameter Description

Parameter	Description
N/A.	N/A.

Defaults Disabled.

Command Mode Global configuration mode.

Usage Guide In order to reduce the link switchover and the loss of the downstream data flow, it is necessary to enable the switch of receiving the MAC address update messages on the uplink switch.

Configuration Examples

```
FS(config)# mac-address-table move update transit
```

Related Commands

Command	Description
mac-address-table move update transit vlan	Enables REUP to transmit the mac-address-table update messages.

Platform Description N/A.

1.7 Mac-address-table Move Update Transit Vlan

Use this command to enable REUP to transmit the mac-address update messages.

mac-address-table move update transit vlan *vid*

no mac-address-table move update transit vlan

Parameter Description

Parameter	Description
vid	ID of the VLAN transmitting MAC address update packets.

Defaults

Transmit the MAC-address update messages in the default VLAN on the port.

Command Mode

Interface configuration mode.

Usage Guide

When a link is switched, the VLAN enabled to transmit MAC address update packets will send MAC address update packets to its uplink device.

Configuration Examples

The following example configures VLANs transmitting MAC address update packets:

```
FS(config)# mac-address-table move update transit
```

Related Commands

Command	Description
mac-address-table move update transit	Enables REUP to receive the mac-address-table update messages.

Platform Description

N/A.

1.8 Mac-address-table Update Group

Use this command to set the mac-address-table update group.

mac-address-table update group [*group-num*]

no mac-address-table update group

Parameter Description

Parameter	Description
group-num	The mac-address-table update group ID.

Defaults

By default, no mac-address-table update group is configured.

Command Mode

Interface configuration mode.

Usage Guide

In order to reduce the flood due to the MAC address update and the influence on the normal data transmission of

the switch, FS products add a configuration of MAC address update group. Only if all the interfaces are added to a MAC address update group, the downstream data transmission be restored rapidly.

Configuration Examples

```
FS(config-if)# mac-address-table update group 2
```

Related Commands

Command	Description
show mac-address-table update group detail	Displays the mac-address-table update group information.

Platform Description

N/A.

1.9 Show Interfaces Switchport Backup

Use this command to display the dual link backup information on the interfaces.

show interfaces [*interface-id*] **switchport backup** [**detail**]

Parameter Description

Parameter	Description
interface-id	The interface id of the dual link backup.
detail	Displays the detailed information about the dual link backup.

Defaults

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

N/A.

Configuration Examples

```
FS # show interfaces switchport backup detail
Switch Backup Interface Pairs:
Active Interface        Backup Interface        State
-------------------------------------------------------
Gi0/23                  Gi0/24                  Active Up/Backup Standby
Interface Pair : Gi0/23, Gi0/24
Preemption Mode : Off
Preemption Delay : 35 seconds
Bandwidth : Gi0/23(1000 Mbits), Gi0/24(1000 Mbits)
```

Related Commands

Command	Description
N/A.	N/A.

Platform Description N/A.

1.10 Show Link State Group

Use this command to display the information of a link state track group.

show link state group

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A.

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A.

Configuration Examples The following example displays the link state track group:

```
FS # show link state group
Link State Group:1     Status: Enabled, UP
Upstream Interfaces :Gi0/1(Up)
Downstream Interfaces :Gi0/3(Dwn), Gi0/4(Dwn)
Link State Group:2     Status: Disabled, Down
Upstream Interfaces :
Downstream Interfaces :
(Up):Interface up (Dwn):Interface Down (Dis):Interface disabled
```

Related Commands

Command	Description
N/A.	N/A.

Platform Description N/A.

1.11 Show Mac-address-table Move Update

Use this command to display the statistics about the MAC address updates tranceived on the interface.

show mac-address-table move update

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A.

Configuration Examples

```
FS#show mac-address-table move update
Mac address table move update status:
Transit:disable
Receive:disable
Max-update-rate:150
Receive vlan:1-4094

Pair: Ag1,Ag2
Members          Status     Transit Count     Transit VLAN     Last Transit Time
-----------------------------------------------------------------------------------
Ag1              Down       0
Ag2              Down       0
Pair: Ag3,Gi0/6
Members          Status     Transit Count     Transit VLAN     Last Transit Time
-----------------------------------------------------------------------------------
Ag3              Down       0
Gi0/6            Down       0
Pair: Gi0/1,Gi0/2
Members          Status     Transit Count     Transit VLAN     Last Transit Time
-----------------------------------------------------------------------------------
Gi0/1            Up         0
Gi0/2            Standby    0
```

Related Commands

Command	Description
N/A.	N/A.

Platform Description N/A.

1.12 Show Mac-address-table Update Group

Use this command to display the mac-address-table update group information.

show mac-address-table update group detail

Parameter Description

Parameter	Description
detail	Displays the detailed information about the mac-address-table update group.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A.

Configuration Examples

```
FS# configure terminal
FS (config)# mac-address-table move update receive
FS (config)# interface range gigabitEthernet 0/3-4
FS (config-if-range)# mac-address-table update group
FS(config-if-range)# end
FS # show mac-address-table update group detail
Mac-address-table Update Group:1
Received mac-address-table update message count:7
Group member    Receive Count    Last Receive Switch-ID    Receive Time
-------------------------------------------------------
GigabitEthernet 0/3    0                    0000.0000.0000
GigabitEthernet 0/4    0                    0000.0000.0000
```

Related Commands

Command	Description
N/A.	N/A.

Platform Description N/A.

1.13 Switchport Backup Interface

Use this command to configure the REUP dual link backup interface.

switchport backup interface *interface-id*

no switchport backup

Parameter Description

Parameter	Description
interface-id	Interface ID of the backup link.

Defaults N/A.

Command Mode Interface configuration mode.

Usage Guide Enter the primary interface configuration mode, the interface-id in the parameter is for the backup interface.

When the active link fails, the backup link transmission is restored rapidly

Configuration Examples

The following example shows how to set the dual link backup, with fa 0/1 and fa 0/2 as primary interface and backup interface:

```
FS(config)# interface fa 0/1
FS(config-if)# switchport backup interface fa 0/2
```

Related Commands

Command	Description
show interface switchport backup	Displays the dual link backup configuration on the switch.

Platform Description

N/A.

1.14 Switchport Backup Interface Preemption

Use this command to configure the REUP link preemption function.

switchport backup interface *interface-id* **preemption mode** { **forced** | **bandwidth** | **off** }

switchport backup interface *interface-id* **preemption delay** *delay-time*

no switchport backup interface *interface-id* **preemption delay**

Parameter Description

Parameter	Description
interface-id	The interface id of the backup link.
delay-time	The preemption delay time.

Defaults

The preemption function is disabled by default.

The default preemption delay time is 35s.

Command Mode

Interface configuration mode.

Usage Guide

The preemption mode includes **forced, bandwidth and off**. In the **bandwidth** preemption mode, the interface with high bandwidth has priority over other interfaces to transmit the data. In the **forced** preemption mode, the primary has priority over backup interfaces to transmit the data. No preemption event occurs in the **off** preemption mode. By default, the preemption mode is off.

The preemption delay refers to the delay time of the link switchover after the restoration of the link failure.

Configuration Examples

The following example shows how to set the dual link backup, with fa 0/1 and fa 0/2 as the primary interface and backup interface, set the bandwidth preemption mode and 40s preemption delay:

```
FS(config)# interface fa 0/1
FS(config-if)# switchport backup interface fa 0/2
preemption mode bandwitdh
FS(config-if)# switchport backup interface fa 0/2
preemption delay 40
```

Related Commands

Command	Description
show interface switchport backup	Displays the dual link backup configuration.

Platform Description

N/A.

1.15 Switchport Backup Interface Prefer

Use this command to configure VLAN load balancing on a link. The **no** form of this command is used to delete the configured VLAN load strategy.

switchport backup interface *interface-id* **prefer instance** *instance-range*

no switchport backup interface *interface-id* **prefer**

Parameter Description

Parameter	Description
interface-id	Interface ID of the backup link.
instance-range	Instance range of loading on the backup interface.

Defaults

No VLAN load on the backup interface.

Command Mode

Interface configuration mode.

Usage Guide

MSTP instance mapping can be used to modify the mapping between an instance and a VLAN.

Configuration Examples

The following example configures VLAN load balancing on dual links.

```
FS(config)# interface gigabitEthernet 0/1
FS(config-if)# switchport backup interface gigabitEthernet 0/2 prefer instance 1
```

Related Commands

Command	Description
show interface switchport backup	Displays the configuration of dual-link backup on the switch.
spanning-tree mst configuration	Configures MSTP instances.

Platform Description

N/A.

2. RLDP Commands

2.1 Rldp Detect-interval

Use this command to configure the interval at which the RLDP sends the detection message on the port. Use the **no** form of this command to restore the default value.

rldp detect-interval *interval*

no rldp detect-interval

Parameter Description

Parameter	Description
interval	Detection interval in the range 1 to 15 seconds

Defaults

3 seconds.

Command Mode

Global configuration mode.

Usage Guide

In the environment where STP is enabled, it is recommended that the product of interval multiplying the maximum number of detections is less than the topology convergence time of STP.

Configuration Examples

The following example shows how to set the detection interval as 5s:

```
FS(config)# rldp detect-interval 5
```

Related Commands

Command	Description
rldp detect-max	Sets the maximum number of detections.

Platform Description

N/A.

2.2 Rldp Detect-max

Use this command to set the maximum number of sending detection packets on the port. If the neighboring port does not respond when this detection number is exceeded, the link is considered faulty. Use the **no** form of this command to restore it to the default value.

rldp detect-max *num*

no rldp detect-max

Parameter Description

Parameter	Description
num	Maximum number of detections in the range 2 to 10

Defaults

2.

Command

Global configuration mode.

Mode

Usage Guide This command is used together with the detection interval to specify the maximum number of detections.

Configuration Examples The following example shows how to set the maximum number of detections as 5:

```
FS(config)# rldp detect-max 5
```

Related Commands

Command	Description
rldp detect-interval	Sets the detection interval.

Platform Description N/A.

2.3 Rldp Enable

Use this command to enable RLDP globally. Use the **no** form of this command to disable the function.

rldp enable

no rldp enable

Parameter Description

Parameter	Description
N/A.	N/A.

Defaults Disabled.

Command Mode Global configuration mode.

Usage Guide You can enable RLDP on the interface only when the global RLDP is enabled.

Configuration Examples The following example shows how to enable RLDP:

```
FS(config)# rldp enable
```

Related Commands

Command	Description
rldp port	Enables the RLDP function on the port.

Platform Description N/A.

2.4 Rldp Error-recover Interval

Use this command to configure the interval at which the RLDP recovers the state of the failed port. Use the **no** form of this command to disable this function.

rldp error-recover interval *interval*

no rldp error-recover interval

Parameter Description

Parameter	Description
interval	Time interval in the range 30 to 86400 seconds

Defaults This function is disabled by default.

Command Mode Global configuration mode.

Usage Guide This command is used to regularly restore the state of the failed port (in error state). When the port state is recovered from Error, RLDP will perform detection again. If the failure is resolved, RLDP will keep the normal port state; if not, RLDP will change the port state to Error.

Configuration Examples The following example shows how to set the time interval for port state restoration as 600s:

```
FS(config)# rldp error-recover interval 600
```

Related Commands

Command	Description
rldp detect-max	Sets the maximum number of detections.

Platform Description N/A.

2.5 Rldp Neighbor-negotiation

Use this command to enable RLDP neighbor negotiation. Use the **no** form or **default** form of this command to restore the default setting.

rldp neighbor-negotiation

no rldp neighbor-negotiation

default rldp neighbor-negotiation

Parameter Description

Parameter	Description
N/A.	N/A.

Defaults RLDP neighbor negotiation is disabled by default.

Command Mode Global configuration mode.

Usage Guide With neighbor negotiation enabled, RLDP unidirectional-/bidirectional-link detection starts only after the neighbor negotiation is successful. (Receiving the Prob message from the neighbor indicates the neighbor negotiation is successful.)

Configuration Examples

The following example shows how to enable RLDP neighbor negotiation:

```
FS#config
FS(config)#rldp neighbor-negotiation
```

Related Commands

Command	Description
rldp port	Enables the RLDP function on the port.

Platform Description

N/A.

2.6 Rldp Port

Use this command to enable RLDP on the port and specify detection type and troubleshooting method. Use the **no** form of this command to disable the function.

rldp port { **unidirection-detect** | **bidirection-detect** | **loop-detect** } { **warning** | **shutdown-svi** | **shutdown-port** | **block** }

no rldp port { **unidirection-detect** | **bidirection-detect** | **loop-detect | vlan-loop-detect** }

Use this command to enable the VLAN-based loop detection function, and specify the failure treatment.

rldp port vlan-loop-detect { **warning | isolate-vlan** }

Parameter Description

Parameter	Description
unidirection-detect	Sets unidirectional link detection.
bidirection-detect	Sets bidirectional link detection.
loop-detect	Sets loop detection type.
vlan-loop-detect	Sets the VLAN-based loop detection.
warning	Warns the user.
shutdown-svi	Shutdowns the SVI the port belongs to.
shutdown-port	Shutdowns the port.
block	Disables learning and forwarding of a port.
isolate-vlan	Isolates the faulty VLAN.

Defaults

N/A

Command Mode

Interface configuration mode.

Usage Guide

The RLDP detection on the port takes effect only when the global RLDP is enabled.

Configuration Examples

The following example shows how to enable the RLDP detection and specify the failure treatment as **block**.

```
FS(config)# interface GigabitEthernet 2/0/9
```

```
FS(config-if-GigabitEthernet 2/0/9)# rldp port loop-detect block
```

The following example shows how to configure the VLAN-based loop detection, and specify the failure treatment as **isolate-vlan**.

```
FS(config)# interface GigabitEthernet 2/0/10
FS(config-if-GigabitEthernet 2/0/10)# switchport mode trunk
FS(config-if-GigabitEthernet 2/0/10)# rldp port vlan-loop-detect isolate-vlan vlan 2-10
```

Related Commands

Command	Description
rldp enable	Enables RLDP globally.

Platform Description

N/A.

2.7 Rldp Reset

Use this command to make all the ports that have been handled using rldp shutdown or disable to perform RLDP detection again.

rldp reset

Parameter Description

Parameter	Description
N/A.	N/A.

Defaults

N/A.

Command Mode

Privileged EXEC mode.

Usage Guide

This command is used to recover the faulty port. The **errdisable recovery** can be also used for the purpose. For details, refer to the *Configuring Interface* chapter.

Configuration Examples

The example below demonstrates how to use this command:

```
FS# rldp reset
```

Related Commands

Command	Description
rldp enable	Enables RLDP globally.

Platform Description

N/A.

2.8 Show Rldp

Use this command to display the RLDP information.

show rldp [**interface** *interface-id*]

Parameter Description

Parameter	Description
interface-id	Interface ID

Defaults

N/A.

Command Mode

Privileged EXEC mode.

Usage Guide

N/A.

Configuration Examples

N/A.

Related Commands

Command	Description
N/A.	N/A.

Platform Description

N/A.

3. DLDP Commands

3.1 Clear Dldp

Use this command to clear statistics about the times that DLDP is down or up at a specified monitoring point for renewing statistics.

clear dldp [**interface** *interface-name* [*ip-address*]]

Parameter Description

Parameter	Description
interface-name	Name of an Layer 3 interface
ip-address	IP address of a peer device

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

DLDP records statistics about the times that DLDP is down or up. You can use this command to clear statistics about the times that DLDP is down or up at a specified monitoring point and renew statistics. If an L3 interface or a device IP address is specified, statistics about the times that DLDP is down or up on the interface at one or all monitoring points will be cleared. If no L3 interface or IP address is specified, statistics about the times that DLDP is down or up at all monitoring points on all interfaces will be cleared.

Configuration Examples

The following example clears statistics about the times that DLDP is down or up at all monitoring points on all interfaces.

```
FS#clear dldp
```

The following example clears statistics about the times that DLDP is down or up at all monitoring points on the interface *vlan 1*.

```
FS#clear dldp interface vlan 1
```

The following example clears statistics about the times that DLDP is down or up about the peer device 10.83.132.1 on the interface *vlan 1*.

```
FS# clear dldp interface vlan 1 10.83.132.1
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.2 Dldp

Use this command to configure DLDP detection.

Use the **no** form of this command to disable this function .

dldp *ip-address* [*next-hop-ip*] [**mac-address** mac-addr] [**interval** *tick* | **retry** *retry-num* | **resume** *resume-num*]

no dldp *ip-address*

Parameter Description

Parameter	Description
ip-address	IP address of the peer device to be detected
next-hop-ip	Next-hop IP address specified when the device to be detected belongs to another different network
mac-address *mac-addr*	The bound MAC address. If a next hop exists, its MAC address is configured.
interval *tick*	Detection interval. The value range is from 1 to 6,000 in the unit of ticks, where 1 tick is equal to 10 milliseconds. The value must be an integral multiple of five.
retry *retry-num*	Number of retry times. The value range is from 1 to 3,600.
resume *resume-num*	Number of recovery times of the link to the peer device to be detected, indicating the number of consecutive packets received before a down link turns up. The value range is from 1 to 200.

Defaults

By default, *tick* is 100, indicating that the detection interval is 1 second.

The values of *retry-num* and *resume-num* are both 3.

Command Mode

Interface configuration mode

Usage Guide

You can use this command to enable DLDP detection to quickly detect Ethernet link faults.

DLDP detection detects multiple IP addresses on Layer 3 ports. If they respond no ICMP packets, they are considered down; if one of them recovers response, they are considered up.

Configuration Examples

The following example enables DLDP detection for the device 10.83.132.10.

```
FS#config
FS(config)#interface vlan 1
FS(config-if-VLAN 1)#ip address 10.83.132.1 255.255.255.0
FS(config-if-VLAN 1)#dldp 10.83.132.10
```

The following example enables DLDP detection for the device 10.83.132.10 in another different network segment.

```
FS#config
FS(config)#interface vlan 1
FS(config-if-VLAN 1)#ip address 10.83.132.1 255.255.255.0
FS(config-if-VLAN 1)#dldp 10.83.131.10 10.83.132.2
```

The following example disables DLDP detection for the device 10.83.132.10.

```
FS#config
FS(config)#interface vlan 1
FS(config-if-VLAN 1)#no dldp 10.83.132.10
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.3 Dldp Interval

Use this command to set the DLDP detection interval.

Use the **no** form of this command to restore the default setting.

dldp interval *tick*

no dldp interval

Parameter Description

Parameter	Description
tick	Detection interval (in ticks), in the range from 5 to 6,000. The value must be a multiple of 5. (1tick = 10 milliseconds)

Defaults

The default is 10 ticks (100 ms).

Command Mode

Global configuration mode

Usage Guide

This command is used to set the DLDP detection interval.

If a device does not receive the reply packets from the peer device within the specific period (the time of this period is equal to that of the *detection packet retransmission interval* multiplied by the *retry count*), the device takes the L3 port as DOWN (though the physical link is up). Once the device receives the reply packets from the peer device, the device takes the L3 port as UP.

Configuration Examples

The following example sets the DLDP detection interval to 20 ticks.

```
FS#config
FS(config)#dldp interval 20
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.4 Dldp Passive

Use this command to set DLDP to the passive mode.

Use the **no** form of this command to restore the default setting.

dldp passive

no dldp passive

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The default is the active mode.

Command Mode

Interface configuration mode

Usage Guide

If DLDP is enabled on devices at both ends of a link on a network and ICMP Echo packets are sent to each other for link detection, excessive packets exist between the two devices. If only one device sends ICMP Echo packets to the peer device on which the same detection parameters are configured, the peer device can detect whether the packets arrive in time and whether the link between them is normal. This method saves bandwidth and CPU resources.

You can set DLDP to the active mode for one device to initiate ICMP Echo packets, and set DLDP to the passive mode for the other device to passively receive the packets.

Configuration Examples

The following example sets DLDP to the passive mode.

```
FS#config
FS(config)#interface vlan 1
FS(config-if-VLAN 1)#ip address 10.83.132.1 255.255.255.0 //Set an IP address for vlan1.
FS(config-if-VLAN 1)#dldp passive
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.5 Dldp Resume

Use this command to set the DLDP recovery count.

Use the **no** form of this command to restore the default setting.

dldp resume *resume-num*

no dldp resume

Parameter Description

Parameter	Description
resume-num	Recovery count of the peer device link, in the range from 1 to 200. The parameter indicates the number of DLDP detection packets received consecutively from the peer device before the link status goes from DOWN to UP.

Defaults

The default is 3.

Command Mode

Global configuration mode

Usage Guide

This command is used to set the DLDP recovery count.

Configuration Examples

The following example sets the DLDP recovery count to 4.

```
FS#config
FS(config)#dldp resume 4
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.6 Dldp Retry

Use this command to set the DLDP retry count.

Use the **no** form of this command to restore the default setting.

dldp retry *retry-num*

no dldp retry

Parameter Description

Parameter	Description
retry-num	Retry count, in the range from 1 to 3,600

Defaults

The default is 3.

Command Mode

Global configuration mode

Usage Guide

This command is used to set the DLDP retry count.

Configuration Examples

The following example sets the DLDP retry count to 4.

```
FS#config
FS(config)#dldp retry 4
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.7 Show Dldp

Use this command to display DLDP configuration information or statistics at various monitoring points.

show dldp [**interface** *interface-name*] [**statistic**]

Parameter Description

Parameter	Description
interface-name	Name of an L3 interface
statistic	Statistics

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide You can use this command with the keyword **statistics** to display statistics at all monitoring points on all interfaces or a specific Layer 3 interface. If a Layer 3 interface is specified, this command displays DLDP configuration and statistics at all monitoring points on the Layer 3 interface.

Configuration Examples The following example displays DLDP configuration information at all monitoring points on all interfaces.

```
FS#show dldp
Interface   Type        Ip          Next-hop     Interval   Retry   Resume   State
---------   -------   -----------   -----------   --------   -----   ------   ------
Vl2         Passive   192.168.6.3   192.168.2.2   10         5       3        Up
Vl3         Passive   192.168.7.3                 10         5       3        Up
Vl4         Passive   192.168.3.3   192.168.4.2   10         5       3        Up
```

The following example displays DLDP configuration information at all monitoring points on the Layer 3 interface *vlan 2*.

```
FS#show dldp intface vlan2
Interface   Type        Ip          Next-hop     Interval   Retry   Resume   State
---------   -------   -----------   -----------   --------   -----   ------   ------
Vl2         Passive   192.168.6.3   192.168.2.2   10         5       3        Up
```

The following example displays DLDP statistics at all monitoring points on all interfaces.

```
FS#show dldp statistic
Interface   Type        Ip          record-time   Up-count   Down-count
---------   -------   -----------   -----------   --------   ----------
Vl2         Passive   192.168.6.3   2h34m5s       10         9
Vl4         Passive   192.168.3.3   1d2h3m52s     10         9
```

The following example displays DLDP statistics at all monitoring points on the Layer 3 interface *vlan 2*.

```
FS#show dldp statistic interface vlan 2
Interface   Type        Ip          record-time   Up-count   Down-count
---------   -------   -----------   -----------   --------   ----------
Vl2         Passive   192.168.6.3   2h34m5s       10         9
```

Field	Description
record-time	Time length for recording the number of times that DLDP is up or down. The time is displayed in *y***d**h**m**s format: y: year d: day h: hour

	m: minute s: second Using the *Up-count* and *Down-count* parameters, you can check statistics about the number of times that DLDP is up or down within this time length.
Up-count	Number of times that DLDP is up at the specific monitoring point
Down-count	Number times that DLDP is down at the specific monitoring point

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4. VRRP Commands

4.1 Show Vrrp

Use this command to display the VRRP information.

show [**ipv6**] **vrrp** [**brief** | *group*]

Parameter Description

Parameter	Description
ipv6	(Optional) Applies to IPv6 VRRP.
brief	(Optional) Displays the brief of the VRRP group.
group	Number of the VRRP group to be displayed

Defaults

N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

If no optional parameter is used, the information of all VRRP groups is displayed.

Configuration Examples

The following example displays the information of all VRRP groups.

```
FS# show vrrp
GigabitEthernet 0/0 - Group 1
State is Backup
Virtual IP address is 192.168.201.1 configured
Virtual MAC address is 0000.5e00.0101
Advertisement interval is 3 sec
Preemption is enabled
min delay is 0 sec
Priority is 100
Master Router is 192.168.201.213 , priority is 120
Master Advertisement interval is 3 sec
Master Down interval is 10.82 sec
GigabitEthernet 0/0 - Group 2
State is Master
Virtual IP address is 192.168.201.2 configured
Virtual MAC address is 0000.5e00.0102
Advertisement interval is 3 sec
Preemption is enabled
min delay is 0 sec
Priority is 120
Master Router is 192.168.201.217 (local), priority is 120
Master Advertisement interval is 3 sec
Master Down interval is 10.59 sec
FS#show ipv6 vrrp
GigabitEthernet 0/13 - Group 1
```

```
State is Master
Virtual IPv6 address is as follows:
  FE80::2
  1::2
Virtual MAC address is 0000.5e00.0201
Advertisement interval is 1 sec
Accept_Mode is enabled
Preemption is enabled
  min delay is 0 sec
Priority is 100
Master Router is FE80::1 (local), priority is 100
Master Advertisement interval is 1 sec
Master Down interval is 3.60 sec
```

Related Commands

Command	Description
vrrp *group* **ip** *ipaddress* [**secondary**]	Enables the VRRP function and set the IP address for the virtual device.

Platform Description N/A

4.2 Show Vrrp Interface

Use this command to display the information of the VRRP on the interface.

show [**ipv6**] **vrrp interface** *type number* [**brief**]

Parameter Description

Parameter	Description
ipv6	(Optional) Applies to IPv6 VRRP.
type	Interface type
number	Interface number
brief	(Optional) Displays the brief of the VRRP group on the interface.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the VRRP information on Ethernet interface E1/0.

```
FS# show vrrp interface fastethernet 0/0
FastEthernet 0/0 - Group 1
State is Backup
Virtual IP address is 192.168.201.1 configured
Virtual MAC address is 0000.5e00.0101
```

```
Advertisement interval is 3 sec
Preemption is enabled
min delay is 0 sec
Priority is 100
Master Device is 192.168.201.213 , pritority is 120
Master Advertisement interval is 3 sec
Master Down interval is 9 sec
FastEthernet 0/0 - Group 2
State is Master
Virtual IP address is 192.168.201.2 configured
Virtual MAC address is 0000.5e00.0102
Advertisement interval is 3 sec
Preemption is enabled
min delay is 0 sec
Priority is 120
Master Device is 192.168.201.217 (local), priority is 120
Master Advertisement interval is 3 sec
Master Down interval is 9 sec
```

Related Commands

Command	Description
vrrp *group* **ip** *ip address* [**secondary**]	Enables the VRRP function and set the IP address for the virtual device

Platform Description N/A

4.3 Show Vrrp Packet Statistics

Use this command to display the statistics of the VRRP packet transmission.

show vrrp packet statistics [*interface-type interface-number*]

Parameter Description

Parameter	Description
interface-type interface-number	Interface type and number

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the statistics of VRRP packet transmission on all interfaces.

```
FS# show vrrp packet statistics

Total
```

```
    InReceives: 966043 packets, InOctets: 38641824, InErrors: 38826
    OutTransmits: 306079, OutOctets: 7798564
GigabitEthernet 3/0/1
    InReceives: 799665 packets, InOctets: 31986600, InErrors: 19657
    OutTransmits: 272931, OutOctets: 6675320
GigabitEthernet 3/0/2
    InReceives: 0 packets, InOctets: 0, InErrors: 0
    OutTransmits: 681, OutOctets: 16344
```

The following example displays the statistics of VRRP packets on the interface gigabitEthernet 3/0/1.

```
FS#show vrrp packet statistics gigabitEthernet 3/0/1
GigabitEthernet 3/0/1
    InReceives: 799911 packets, InOctets: 31996440, InErrors: 19657
    OutTransmits: 273053, OutOctets: 6677760
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.4 Vrrp Accept_Mode

Use this command to enable the packet accepting function on the IPv6 VRRP virtual router.

Use the **no** form of this command to disable this function.

vrrp ipv6 *group* **accept_mode**

no vrrp ipv6 *group* **accept_mode**

Parameter Description

Parameter	Description
group	VRRP group number

Defaults The master IPv6 VRRP is not allowed to accept packets whose destination IPv6 address is the IPv6 address of a virtual router. However, the NA and NS packets should be accepted regardless of the configuration of Accept_Mode. Also, the master IPv6 VRRP virtual router in the owner state will accept and process any packets whose destination IPv6 address is the IPv6 address of a virtual router, regardless of the configuration of Accept_Mode.

Command Mode Interface configuration mode

Usage Guide Configuration of the network interface is effective for the master virtual router.

Only IPv6 VRRP has this configuration mode.

Configuration Examples

The following example enables the accept mode on the group 1.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ipv6 enable
FS(config-if-GigabitEthernet 0/0)#ipv6 address 2001::2/64
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 FE80::1
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 2001::1
FS(config-if-GigabitEthernet 0/0)# vrrp ipv6 1 accept_mode
```

Platform Description

N/A

4.5 Vrrp Authentication

Use this command to enable VRRP authentication.

Use the **no** form of this command to disable this function.

vrrp *group* **authentication** *string*

no vrrp *group* **authentication**

Parameter Description

Parameter	Description
group	VRRP group number
string	String for the VRRP group authentication (within 8 bytes, plaintext password)

Defaults

This function is disabled by default. Even if the VRRP function is enabled, no authentication password is configured by default.

Command Mode

Interface configuration mode

Usage Guide

In a VRRP group, the same authentication password should be configured for routers. The plain text authentication password cannot guarantee security but only prevents/prompts wrong VRRP configurations. This command is only applicable to VRRPv2 instead of VRRPv3.

Authentication is abolished for VRRPv3 (IPv4 VRRP and IPv6 VRRP) packets. If VRRPv2 is chosen for an IPv4 VRRP group, the command is effective; if VRRPv3 is chosen, the command is ineffective.

Configuration Examples

The following example sets the authentication password for VRRP group 1.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ip address 10.0.1.1 255.255.255.0
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 10.0.1.20
FS(config-if-GigabitEthernet 0/0)# vrrp 1 authentication x30dn78k
```

Platform Description N/A

4.6 Vrrp Delay

Use this command to set the reload latency of the VRRP group on the interface.

Use the **no** form of this command to restore the default setting.

vrrp delay { **minimum** *min-seconds* | **reload** *reload-seconds* }

no vrrp delay

Parameter Description

Parameter	Description
minimum *min-seconds*	When the interface is up, VRRP group shall be reloaded after at least min-seconds.
reload *reload-seconds*	The reload latency of the VRRP group. If the configured *min-seconds* is greater than *reload-seconds*, the actual reload latency of the VRRP group will be min-seconds.

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide After the delay is configured for a VRRP group on an interface, the VRRP group starts after the delay instead of immediately upon system startup or the interface's resumption, ensuring non-preemption. If the interface receives a VRRP packet during the delay, the delay will be canceled and the VRRP will be started immediately. The two types of delay share a value range of 0 to 60 seconds. This configuration will be effective for both IPv4 and IPv6 VRRP groups of an interface.

Configuration Examples The following example sets the VRRP reload latency on E0 to 10 seconds. When E0 is up, VRRP group 1 shall be reloaded in 10 seconds.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#vrrp delay minimum 10 reload 10
FS(config-if-GigabitEthernet 0/0)#ip address 10.0.1.1 255.255.255.0
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 10.0.1.20
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

4.7 Vrrp Description

Use this command to specify a descriptor for the VRRP.

Use the **no** form of this command to restore the default setting.

vrrp [**ipv6**] *group* **description** *text*

no vrrp [**ipv6**] *group* **description**

Parameter Description

Parameter	Description
ipv6	Applies to IPv6 VRRP.
group	VRRP group number
text	VRRP group descriptor

Defaults

This function is disabled by default. Even if the VRRP function is enabled, no VRRP group descriptor is configured by default.

Command Mode

Interface configuration mode

Usage Guide

This command will set the descriptor for the VRRP group to facilitate the identification of the VRRP group.

Configuration Examples

The following example labels the VRRP group 1 on Ethernet interface E0 as Building A – Marketing and Administration.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#ip address 10.0.1.1 255.255.255.0
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 10.0.1.20
FS(config-if-GigabitEthernet 0/0)#vrrp 1 description “Building A - Marketing and Administration”
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 fe80::1
FS(config-if-GigabitEthernet 0/0)#vrrp ipv6 1 description “Building B - Marketing and Administration”
```

Related Commands

Command	Description
vrrp *group* **ip** *ip-address* [**secondary**]	Enables the VRRP function and set the IP address for the virtual device

Platform Description

N/A

4.8 Vrrp Ip

Use this command to enable VRRP on the interface and specify the related virtual IP address.

Use the **no** form of this command to restore the default setting.

vrrp *group* **ip** *ipaddress* [**secondary**]

no vrrp *group* **ip** *ipaddress* [**secondary**]

Parameter Description

Parameter	Description
group	VRRP group number of the virtual device
ipaddress	IP address of the virtual device
secondary	Specifies the secondary IP address of the virtual device.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

If the **secondary** parameter is not used, the IP address set here will become the master IP address of the virtual device.

Configuration Examples

The following example enables the VRRP function on Ethernet interface 0. The VRRP group number is 1, primary IP address of the virtual device is 10.0.1.20 and secondary IP address is 10.0.2.20.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ip address 10.0.1.1 255.255.255.0
FS(config-if-GigabitEthernet 0/0)#ip address 10.0.2.1 255.255.255.0 secondary
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 10.0.1.20
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 10.0.2.20 secondary
```

Related Commands

Command	Description
show vrrp [**brief** | **group**]	Displays the VRRP configuration.

Platform Description

N/A

4.9 Vrrp Ipv6

Use this command to enable IPv6 VRRP on the interface and specify the related virtual IPv6 address. Use the **no** form of the command to restore the default setting.

vrrp *group* **ipv6** *ipv6-address*

no vrrp *group* **ip** *ipv6-address*

Parameter Description

Parameter	Description
group	VRRP group number of the virtual device
ipv6-address	IPv6 address of the virtual device

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide IPv6 VRRP and IPv4 VRRP share group numbers ranging from 1 to 255. One VRRP group number of an interface is applicable to both IPv4 VRRP and IPv6 VRRP at the same time. The first configured address should be the link's local address, which cannot be deleted until the other virtual addresses are deleted.

Configuration Examples The following example enables the IPv6 VRRP function on Ethernet interface FastEthernet 0/0 with VRRP group number 1and virtual IPv6 address FE80::1 and 2001::1.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ipv6 enable
FS(config-if-GigabitEthernet 0/0)#ipv6 address 2001::2/64
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 FE80::1
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 2001::1
```

Related Commands

Command	Description
show ipv6 vrrp [**brief | group**]	Displays the IPv6 VRRP configuration.

Platform Description N/A

4.10 Vrrp Preempt

Use this command to set the preemption mode of the VRRP group.

Use the **no** form of this command to restore the default setting.

vrrp [**ipv6**] *group* **preempt** [**delay** *seconds*]

no vrrp [**ipv6**] *group* **preempt** [**delay**]

Parameter Description

Parameter	Description
ipv6	Applies to IPv6 VRRP.
group	VRRP group number
delay *seconds*	(Optional)Specifies the delay before a device declares itself master. The default value is 0.

Defaults This function is disabled by default. Once the VRRP function is enabled, the VRRP group will work in the preemption mode by default.

Command Mode Interface configuration mode

Usage Guide If the VRRP group is working in the preemption mode, once a device finds its priority is higher than the priority of the master, it will become the master device of the VRRP group. If the VRRP group is not working in the preemption mode, even if a device finds its priority is higher than the master's priority, it will not become the master device of the VRRP group. In case the VRRP group is using the Ethernet interface IP address, the setting of the preemption mode does not make sense, because that VRRP group has the highest priority and thus automatically becomes the master device in the VRRP group.

Configuration Examples

The following example enables IPv4 VRRP on interface GigabitEthernet 0/0.When VRRP group 1 finds its priority (200) is higher than that of the current master device, it will declare its preemption of master after a delay of 15 seconds.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ip address 10.0.1.1 255.255.255.0
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 10.0.1.20
FS(config-if-GigabitEthernet 0/0)#vrrp 1 preempt delay 15
FS(config-if-GigabitEthernet 0/0)#vrrp 1 priority 200
```

The following example enables IPv4 VRRP on interface GigabitEthernet 0/0. When VRRP group 1 finds its priority (200) is higher than that of the current master device, it will declare its preemption of master after a delay of 15 seconds.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ipv6 enable
FS(config-if-GigabitEthernet 0/0)#ipv6 address 2001::2/64
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 FE80::1
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 2001::1
FS(config-if-GigabitEthernet 0/0)#vrrp ipv6 1 preempt delay 15
FS(config-if-GigabitEthernet 0/0)#vrrp ipv6 1 priority 200
```

Related Commands

Command	Description
vrrp *group* **ip** *ipaddress* [**secondary**]	Enables the VRRP function and set the IP address for the virtual device.
vrrp *group* **priority** *level*	Sets the VRRP group priority.

Platform Description

N/A

4.11 Vrrp Priority

Use this command to specify the priority of the VRRP group.

Use the **no** form of this command to restore the default setting.

vrrp [**ipv6**] *group* **priority** *level*

no vrrp [**ipv6**] *group* **priority**

Parameter Description

Parameter	Description
ipv6	Specifies the priority of the IPv6 VRRP group.
group	VRRP group number
level	VRRP group priority

Defaults

This function is disabled by default. Once the VRRP function is enabled, the default priority of the VRRP group is

100.

Command Mode Interface configuration mode

Usage Guide This command is used to manually configure the VRRP router priority.

Configuration Examples The following example sets the priority of IPv4 VRRP group 1 as 254.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ip address 10.0.1.1 255.255.255.0
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 10.0.1.20
FS(config-if-GigabitEthernet 0/0)#vrrp 1 priority 254
```

The following example sets the priority of IPv6 VRRP group 1 as 254.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ipv6 enable
FS(config-if-GigabitEthernet 0/0)#ipv6 address 2001::2/64
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 FE80::1
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 2001::1
FS(config-if-GigabitEthernet 0/0)#vrrp ipv6 1 priority 254
```

Related Commands

Command	Description
vrrp *group* **ip** *ipaddress* [**secondary**]	Enables the VRRP function and set the IP address for the virtual device.
vrrp *group* **preempt** [**delay** *seconds*]	Sets the VRRP in the preemption mode.

Platform Description N/A

4.12 Vrrp Timers Advertise

Use this command to specify the interval for the master device to send the VRRP advertisement.

Use the **no** form of this command to restore the default setting.

vrrp [**ipv6**] *group* **timers advertise** { *advertise-interval* | **csec** *centisecond-interval* }

no vrrp [**ipv6**] *group* **timers advertise**

Parameter Description

Parameter	Description
ipv6	Applies to IPv6 VRRP.
group	VRRP group number
advertise-interval	Sets the interval time in seconds between sending VRRP advertisement.
csec *centisecond-interval*	Sets the interval time in milliseconds between sending advertisement frames

	from the master VRRP router in the backup group. The range is from 50 to 99. This value is not set by default. This parameter takes effect only for VRRPv3.

Defaults

This function is disabled by default. Once the VRRP function is enabled, the default advertisement interval of the master device is one second.

Command Mode

Interface configuration mode

Usage Guide

If the current device becomes the master device in the VRRP group, it will notify its VRRP status, priority and other information by sending the VRRP advertisement in the set interval.

Based on the RFC specification, the maximum advertisement interval of the IPv4/IPv6 VRRPv3 group is 40 seconds. The advertisement interval can be configured larger than 40 seconds, but the effective advertisement interval is 40 seconds.

Configuration Examples

The following example sets the IPv4 VRRP advertisement interval as 4 seconds.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ip address 10.0.1.1 255.255.255.0
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 10.0.1.20
FS(config-if-GigabitEthernet 0/0)#vrrp 1 timers advertise 4
```

The following example sets the IPv6 VRRP advertisement interval as 4 seconds.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ipv6 enable
FS(config-if-GigabitEthernet 0/0)#ipv6 address 2001::2/64
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 FE80::1
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 2001::1
FS(config-if-GigabitEthernet 0/0)#vrrp ipv6 1 timers advertise 4
```

The following example sets the IPv4 VRRP advertisement interval as 50 centi-seconds.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ip address 10.0.1.1 255.255.255.0
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 10.0.1.20
FS(config-if-GigabitEthernet 0/0)#vrrp 1 timers advertise csec 50
```

The following example sets the IPv6 VRRP advertisement interval as 50 centi-seconds.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ipv6 enable
```

```
FS(config-if-GigabitEthernet 0/0)#ipv6 address 2001::2/64
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 FE80::1
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 2001::1
FS(config-if-GigabitEthernet 0/0)#vrrp ipv6 1 timers advertise csec 50
```

Related Commands

Command	Description
vrrp *group* **ip** *ipaddress* [**secondary**]	Enables the VRRP function and set the IP address for the virtual device.
vrrp group timers learn	Enables the timer learning function.

Platform Description

N/A

4.13 Vrrp Timers Learn

Use this command to enable the timer learning function.

Use the **no** form of this command to restore the default setting.

vrrp [**ipv6**] *group* **timers learn**

no vrrp [**ipv6**] *group* **timers learn**

Parameter Description

Parameter	Description
ipv6	Applies to IPv6 VRRP.
group	VRRP group number

Defaults

This function is disabled by default. Even if the VRRP function is enabled, the timer learning function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

Once the timer learning function is enabled, if the current device is a VRRP backup device, it will learn the VRRP advertisement interval from the VRRP advertisement of the master device, with which it calculates the master device's failure interval instead of the VRRP advertisement interval configured locally. This command may synchronize the VRRP advertisement timer with the master device.

Configuration Examples

The following example enables the timer learning function on the IPv4 VRRP group 1.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ip address 10.0.1.1 255.255.255.0
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 10.0.1.20
FS(config-if-GigabitEthernet 0/0)#vrrp 1 timers learn
```

The following example to enables the timer learning function on the IPv6 VRRP group 1.

```
vrrp ipv6 1 timers learn
```

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ipv6 enable
FS(config-if-GigabitEthernet 0/0)#ipv6 address 2001::2/64
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 FE80::1
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ipv6 2001::1
FS(config-if-GigabitEthernet 0/0)#vrrp ipv6 1 timers learn
```

Related Commands

Command	Description
vrrp *group* **ip** *ipaddress* [**secondary**]	Enables the VRRP function and set the IP address for the virtual device.
vrrp *group* **ipv6** *ipaddress*	Enables the VRRP function and set the IPv6 address for the virtual device.
vrrp *group* **timers advertise** *interval*	Sets the IPv4 VRRP advertising interval.
vrrp ipv6 *group* **timers advertise** *interval*	Sets the IPv6 VRRP advertising interval.

Platform Description

N/A

4.14 Vrrp Track

Use these commands to enable the IPv4/IPv6 VRRP track in the interface configuration mode. Use the no form of these commands to restore the default setting.

vrrp *group* **track** { *interface-type interface-number* } [*priority*]

vrrp ipv6 *group* **track** *interface-type interface-number* [*priority*]

no vrrp [**ipv6**] *group* **track** *interface-type interface-number*

Use these commands to enable VRRP IPv4/IPv6 address track. Use the **no** form of these commands to restore the default setting.

vrrp *group* **track** *ipv4-address* [**interval** *interval-value*] [**timeout** *timeout-value*] [**retry** *retry-value*] [*priority*]

vrrp ipv6 *group* **track** { *ipv6-global-address* | *ipv6-linklocal-address interface-type interface-number* } [**interval** *interval-value*] [**timeout** *timeout-value*] [**retry** *retry-value*] [*priority*]

no vrrp *group* **track** *ipv4-address*

no vrrp ipv6 *group* **track** { *ipv6-global-address* | *ipv6-linklocal-address interface-type interface- number* }

Parameter Description

Parameter	Description
group	VRRP group number
interface-type interface-number	Type of monitored interface
priority	VRRP priority change range when the interface or ip address reachability status changes. If this parameter is not selected, the default value is 10.
ipv6	Applies to IPv6 VRRP.
ipv4-address	Monitored IPv4 address. With BFD configured, it refers to the neighbor IP address.
interval *interval-value*	The interval of time to probe whether the monitored ip address is reachable

	or not. If this parameter is not selected, the default value is 3 seconds.
timeout *timeout-value*	The timeout time of the unreachable monitored ip address. If this parameter is not selected, the default value is 1 seconds.
retry *retry-value*	Track retries. If the value is reached, the link is thought unreachable. If this parameter is not configured, the default value is 3.
ipv6-global-address	Global unicast IPv6 address
ipv6-linklocal-address	Local link IPv6 address

Defaults

This function is disabled by default. Even if the VRRP function is enabled, no interface or IP address is specified.

Command Mode

Interface configuration mode

Usage Guide

- This command can be used to monitor the outlet links. Note that layer-3 routable logical interfaces can be monitored (such as Routed Port, SVI, Loopback and Tunnel).
- If a host is monitored, specify the IPv4 address for the IPv4 VRRP router or the IPv6 address for the IPv6 VRRP router.
- If the host IP address is link-local, an interface must be specified.
- If a VRRP router owns the IP address of the physical interface, the priority is 255. Keep the priority when the monitored IP address or interface is set.

Configuration Examples

The following example enables the VRRP group 1 to monitor the routed port Fa1/1. If the Fa1/1 link is disconnected, the priority of the VRRP group decreases by 30. When the Fa1/1 link recovers, the priority of VRRP group 1 is restored.

```
FS#configure terminal
FS(config)#interface    GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ip address 10.0.1.1 255.255.255.0
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 10.0.1.20
FS(config-if-GigabitEthernet 0/0)#vrrp 1 priority 254
FS(config-if-GigabitEthernet 0/0)#vrrp 1 track GigabitEthernet 1/1 30
```

Related Commands

Command	Description
vrrp *group* **ip** *ipaddress* [**secondary**]	Enables the VRRP function and set the IP address for the virtual device.
vrrp *group* **priority** *level*	Sets the VRRP group priority.

Platform Description

N/A

4.15 Vrrp Version

Use this command to configure the version of sending the IPv4 VRRP multicast packets.

For the IPv4 VRRP, there are two versions: VRRPv2 and VRRPv3.

Use the **no** form of this command to restore the default setting.

vrrp *group* **version** { **2** | **3** }

no vrrp *group* **version**

Parameter Description

Parameter	Description
2	Uses the VRRPv2 version to send the packets.
3	Uses the VRRPv3 version to send the packets.

Defaults

The default is VRRPv2.

Command Mode

Interface configuration mode

Usage Guide

Considering the compatibility of VRRPv2 and VRRPv3 for the IPv4 VRRP, you can choose the version of VRRP packets based on the actual network environment. VRRPv2 is based on RFC3768 and VRRPv3 is based on RFC 5798.

This command is applicable to IPv4 VRRP only.

Configuration Examples

The following example configures the version of sending the IPv4 VRRP packets on the interface gi0/0.

```
FS#configure terminal
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#no switchport //used on the switch.
FS(config-if-GigabitEthernet 0/0)#ip address 10.0.1.1 255.255.255.0
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 10.0.1.20
FS(config-if-GigabitEthernet 0/0)# vrrp 1 version 3
```

Related Commands

Command	Description
vrrp *group* **ip** *ipaddress* [**secondary**]	Enables the VRRP function and set the IP address for the virtual device.
vrrp *group* **timers advertise** *interval*	Sets the interval of sending the VRRP advertisement.

Platform Description

N/A

5. VRRP Plus Commands

5.1 Show Vrrp Balance

Use this command to display the VRRP Plus brief or details.

show vrrp balance [**brief** | *group*]

Parameter Description

Parameter	Description
brief	(Optional) Displays the VRRP Plus brief.
group	(Optional) Displays the VRRP Plus details.

Defaults N/A

Command Mode Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide If no optional parameter is used, the details of all VRRP Plus group are displayed.

Configuration Examples The following example displays the details of all VRRP Plus groups.

```
FS#show vrrp balance
VLAN 1 - Group 1
  State is BVG
  Virtual IP address is 192.168.1.54
  Hello time 1 sec, hold time 3 sec
  Load balancing: host-dependent
  Redirect time 300 sec, forwarder time-out 14400 sec
  Weighting 90 (configured 100), thresholds: lower 1, upper 100
    Track object 1, state: down, decrement weight: 10
  There are 2 forwarders
  Forwarder 1 (local)
    MAC address:
      0000.5e00.0101
    Owner ID is 00d0.f822.33ab
  Forwarder 2
    MAC address:
      001a.a916.0201
Owner ID is 00d0.f822.8800
```

The following example shows the brief of the VRRP Plus group.

```
FS# show vrrp balance brief
Interface    Grp    State      Group Addr        MAC addr
VLAN 1        1      BVG      192.168.1.1      0000.5e00.0101
```

Related Commands

Command	Description
vrrp *group* **balance**	Enables the VRRP Plus function.
vrrp *group* **load-balancing** { **host-dependent** | **round-robin** | **weighted** }	Sets the load balancing policy of the VRRP Plus.
show vrrp balance interface *type number* [**brief**]	Displays the VRRP Plus running status of the specified interface.

Platform Description

N/A

5.2 Show Vrrp Balance Interface

Use this command to display the actions of the VRRP Plus group on the specified interface.

show vrrp balance interface *type number* [**brief**]

Parameter Description

Parameter	Description
interface *type number*	Specifies the interface type and number.
brief	(Optional) Displays the brief information.

Defaults

N/A

Command Mode

Privileged EXEC mode/Global configuration mode/Interface configuration mode

Usage Guide

N/A

Configuration Examples

The following example displays the actions of the VRRP Plus on FastEthernet 0/0.

```
FS# show vrrp balance interface FastEthernet 0/0
FastEthernet 0/0 - Group 1
  State is BVG
  Virtual IP address is 192.168.1.54
  Hello time 1 sec, hold time 3 sec
  Load balancing: host-dependent
  Redirect time 300 sec, forwarder time-out 14400 sec
  Weighting 90 (configured 100), thresholds: lower 1, upper 100
    Track object 1, state: down, decrement weight: 10
  There are 2 forwarders
  Forwarder 1 (local)
    MAC address:
      0000.5e00.0101
    Owner ID is 00d0.f822.33ab
  Forwarder 2
    MAC address:
```

```
    001a.a916.0201
  Owner ID is 00d0.f822.8800
```

Related Commands

Command	Description
vrrp *group* **balance**	Enables the VRRP Plus function.
vrrp *group* **load-balancing** { **host-dependent** | **round-robin** | **weighted** }	Sets the load balancing policy of the VRRP Plus.
show vrrp balance interface *type number* [**brief**]	Displays the VRRP Plus running status of the specified interface.

Platform Description N/A

5.3 Vrrp Balance

Use this command to enable the VRRP Plus function.

Use the **no** form of this command to disable this function.

vrrp *group* **balance**

no vrrp *group* **balance**

Parameter Description

Parameter	Description
group	Enables the VRRP Plus function on the VRRP of specified group ID.

Defaults VRRP Plus is disabled by default.

Command Mode Interface configuration mode

Usage Guide To enable VRRP Plus, you must configure the VRRP group first.

Configuration Examples The following example enables the VRRP Plus function on the Layer 3 interface GigabitEthernet0/0.

```
FS#config
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 192.168.1.1
FS(config-if-GigabitEthernet 0/0)#vrrp 1 balance
```

Related Commands

Command	Description
vrrp load-balancing	Sets the load balancing policy of the VRRP Plus.
show vrrp balance	Displays the VRRP Plus running status.
show vrrp balance interface	Displays the VRRP Plus running status of the specified interface.

Platform Description N/A

5.4 Vrrp Forwarder Preempt

Use this command to enable the forwarding preemption on the VRRP Plus backup group.

Use the **no** form of this command to disable this function.

vrrp *group* **forwarder preempt**

no vrrp *group* **forwarder preempt**

Parameter Description

Parameter	Description
group	VRRP group number. The range is from 1 to 255.

Defaults By default, forwarding preemption is enabled.

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example enables the forwarding preemption function of the VRRP Plus backup group on the Layer3 interface GigabitEthernet 0/0.

```
FS#config
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)#vrrp 1 ip 192.168.1.1
FS(config-if-GigabitEthernet 0/0)#vrrp 1 balance
FS(config-if-GigabitEthernet 0/0)#vrrp 1 forwarder preempt
```

Related Commands

Command	Description
vrrp *group* **balance**	Enables the VRRP Plus function.
show vrrp balance [**brief** | *group*]	Displays the VRRP Plus running status.
show vrrp balance interface *type number* [**brief**]	Displays the VRRP Plus running status of the specified interface.

Platform Description N/A

5.5 Vrrp Load-balancing

Use this command to set the VRRP Plus load balancing policy.

Use the **no** form of this command to restore the default setting.

Vrrp *group* **load-balancing** { **host-dependent** | **round-robin** | **weighted** }

no vrrp *group* **load-balancing** { **host-dependent** | **round-robin** | **weighted** }

Parameter Description

Parameter	Description
group	Specifies the VRRP group ID.
host-dependent	Sets the host-dependent load balancing policy, so as to use the different virtual MACs to reply the host's ARP request based on different hosts.
round-robin	Sets the round-robin balancing policy, so as to use the different virtual MACs to reply the host's ARP request in turn, which is the default setting.
weighted	Sets the weight balancing policy, so as to perform the ARP reply based on the device weight of the backup group.

Defaults The default is round-robin.

Command Mode Interface configuration mode

Usage Guide N/A

Configuration Examples The following example sets the load balancing policy of the VRRP Plus group1 on Layer 3 interface GigabitEthernet0/0 as host-dependent.

```
FS# config t
FS(config)# interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)# vrrp 1 ip 192.168.1.1
FS(config-if-GigabitEthernet 0/0)# vrrp 1 balance
FS(config-if-GigabitEthernet 0/0)# vrrp 1 load-balancing host-dependent
```

Related Commands

Command	Description
vrrp *group* **balance**	Enables the VRRP Plus function.
show vrrp balance [**brief** | *group*]	Displays the VRRP Plus running status.
show vrrp balance interface *type number* [**brief**]	Displays the VRRP Plus running status o the specified interface.

Platform Description N/A

5.6 Vrrp Timers Redirect

Use this command to set the redirection interval and timeout of the proxy virtual MAC address for the VRRP Plus backup group.

Use the **no** form of this command to restore the default value.

vrrp *group* **timers redirect** *redirect timeout*

no vrrp *group* **timers redirect**

Parameter Description

Parameter	Description
group	VRRP Plus backup group ID, in the range of 1 to 255.
redirect	The redirection time, 300 seconds (namely 5 minutes) by default, in the range of 0 to 3,600.
timeout	The timeout, 14,400 seconds (namely 4 hours) by default, in the range of (redirect+600) to 64,800.

Defaults

The default redirection interval is 300 seconds and redirection timeout is 14,400 seconds.

Command Mode

Interface configuration mode

Usage Guide

The VRRP Plus function should be enabled before setting the redirection interval and timeout of the proxy virtual MAC address for the VRRP Plus backup group.

Configuration Examples

The following example sets the redirection interval and timeout of the proxy virtual MAC address for the VRRP Plus backup group.

```
FS#config
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)# vrrp 1 ip 192.168.1.1
FS(config-if-GigabitEthernet 0/0)# vrrp 1 balance
FS(config-if-GigabitEthernet 0/0)# vrrp 1 timers redirect 300 6000
```

Related Commands

Command	Description
vrrp *group* **balance**	Enables the VRRP Plus function.
show vrrp balance [**brief** | *group*]	Displays the VRRP Plus running status.
show vrrp balance interface *type number* [**brief**]	Displays the VRRP Plus running status o the specified interface.

Platform Description

N/A

5.7 Vrrp Weighting

Use this command to set the weight and threshold of the VRPP Plus backup group.

Use the **no** form of this command to restore the default setting.

vrrp *group* **weighting** *maximum* [**lower** *lower*] [**upper** *upper*]

no vrrp *group* **weighting**

Parameter Description

Parameter	Description
group	VRRP Plus backup group ID, in the range of 1 to 255.

maximum	Weight, 100 by default, in the range of 2 to 254.
lower	Weight lower, 1 by default, in the range of 1 to (maximum-1)
upper	Weight upper, 100 by default, in the range of lower to maximum.

Defaults

VRRP Plus backup group weight: 100

Weight lower: 1

Weight upper: 100

Command Mode

Interface configuration mode

Usage Guide

The VRRP Plus function should be enabled before setting the weight and threshold of the VRRP Plus backup group

Configuration Examples

The following example sets the weight and threshold of the VRRP Plus group1.

```
FS#config t
FS(config)#interface GigabitEthernet 0/0
FS(config-if-GigabitEthernet 0/0)# vrrp 1 ip 192.168.1.1
FS(config-if-GigabitEthernet 0/0)# vrrp 1 balance
FS(config-if-GigabitEthernet 0/0)# vrrp 1 weighting 50 lower 30 upper 50
```

Related Commands

Command	Description
vrrp *group* **balance**	Enables the VRRP Plus function.
show vrrp balance [**brief** | *group*]	Displays the VRRP Plus running status.
show vrrp balance interface *type number* [**brief**]	Displays the VRRP Plus running status of the specified interface.

Platform Description

N/A

6. BFD Commands

6.1 bfd

Use this command to set the BFD session parameters.

Use the **no** form of this command to remove the setting.

bfd interval *milliseconds* **min_rx** *milliseconds* **multiplier** *multiplier-value*

no bfd interval

Parameter Description

Parameter	Description
interval *milliseconds*	Interval of sending the BFD control messages to the BFD session neighbor. *milliseconds:* The range is from 50 to 10,000 ms.
min_rx *milliseconds*	Expected interval of receiving the BFD control messages from the BFD session neighbor. *milliseconds:* The range is from 50 to 10,000 ms.
multiplier *multiplier-value*	Count of BFD control message not received from the peer in the configured interval. *multiplier-value:* The range is from 3 to 50.

Defaults

No BFD session parameter is configured by default.

Command Mode

Interface configuration mode for single-hop sessions, BFD template mode for multi-hop sessions

Usage Guide

The express forwarding must be enabled before enabling BFD on the routers.

BFD session parameters should be consistent on peers, so that associated protocols will take effect at the same time. If not, one-way forwarding will occur.

Set the parameters based on interface bandwidth. If **interval** and **min_rx** are too short, BFD sessions may occupy much bandwidth and influence data transmission.

If multi-hop session parameters need to be configured using a template, configure the template first and then configure BFD multi-hop session parameters.

Configuration Examples

The following example configures the BFD session parameters on routed port FastEthernet 0/2.

```
FS(config)# interface fastEthernet 0/2
FS(config)# no switchport
FS(config-if)# bfd interval 100 min_rx 100 multiplier 3
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.2 bfd bind peer-ip

Use this command to create a BFD session to correlate with an interface.

Use the **no** form of this command to remove this setting.

bfd bind peer-ip *ip-address* [**source-ip** *ip-address*] **process-pst**

no bfd bind peer-ip *ip-address*

Parameter Description

Parameter	Description
peer-ip *ip-address*	The peer IP address to be detected, which must be directly connected to the Layer 3 interface.
source-ip *ip-address*	Source IP address for sending the BFD packets, which avoids the packets dropped by the URPF in case that this function is used with other functions such the URPF at the same time.
process-pst	Correlates BFD for the Layer3 interface.

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

Note that this command must be configured a Layer 3 interface and the peer IP address detected must be the address directly-connected to the interface.

Configuration Examples

The following example detects the peer 1.1.1.2 through BFD on the routed port to generate the BFD status of the interface.

```
FS(config)# interface gigabitEthernet 0/2
FS(config-if –GigabitEthernet 0/2)#no sw
FS(config-if –GigabitEthernet 0/2)#ip address 1.1.1.1 255.255.255.0
FS(config-if –GigabitEthernet 0/2)#bfd bind peer-ip 1.1.1.2 source-ip 1.1.1.1 process-pst
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6.3 bfd cpp

Use this command to enable the BFD protection policy.

Use the **no** form of this command to disable this function.

bfd cpp

no bfd cpp

Parameter Description

Parameter	Description

N/A	N/A

Defaults This function is enabled by default.

Command Mode Global configuration mode

Usage Guide BFD protocol is so sensitive that if the device with BFD function enabled suffers from attack (for example, a large amount of Ping packets attack the device), which lead to the BFD session turbulence, the device can be protected by enabling the BFD protection policy. However, if the BFD function and the BFD protection policy are enabled at the same time, the loss of BFD packets on the attacked device occurs when the packets sent from the last-hop device go through this device, influencing the BFD session establishment between the last-hop device and other devices. This function is valid only for the switches.

Configuration Examples The following example enables the BFD protection policy.

```
FS(config)# bfd cpp
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

6.4 bfd echo

Use this command to enable echo mode.

Use the **no** form of this command to disable echo mode.

bfd echo

no bfd echo

Parameter Description

Parameter	Description
N/A	N/A

Defaults This function is disabled by default.

Command Mode Interface configuration mode

Usage Guide By default, with BFD session parameter configured, the system enables the echo mode automatically. The minimum sending and receiving interval for the echo packets are the values of the configured **interval** *milliseconds* and **min_rx** *milliseconds.*

This command cannot be configured on the AP port.

Before enabling BFD echo mode, it is necessary to use the **no ip redirects** command to disable the ICMP

redirection messages sending on the neighbor device of the BFD session, use the **no ip deny land** to disable the DDOS (Land-based attack prevention) function.

With both ends of the BFD session enabled, the echo mode takes effect.

In the process that the forwarding plane of the peer device returns echo packets transmitted by the local end to the local end, the echo packets may be lost due to congestion of the peer device, causing a session detection failure. In this case, configure Quality of Service (QoS) policies to ensure that echo packets are processed preferentially or disable the echo function.

The echo detection function of BFD does not support multi-hop detection. Ensure that the echo function is disabled when configuring multi-hops.

Configuration Examples

The following example enables the echo mode on the routed port FastEthernet 0/2:

```
FS(config)# interface fastEthernet 0/2
FS(config)# no switchport
FS(config-if)# bfd echo
```

Related Commands

Command	Description
bfd	Configures the BFD session parameter.
bfd slow-timer	Configures the slow-timer time.

Platform Description

N/A

6.5 bfd slow-timer

Use this command to set the slow timer, which is used to send the BFD packets in the BFD asynchronous mode.

Use the **no** form of this command to restore the default setting.

bfd slow-timer [*milliseconds*]

no bfd slow-timer

Parameter Description

Parameter	Description
milliseconds	BFD slow-timer time. The range is from 1,000 to 30,000. The unit is millisecond.

Defaults

The default slow-timer is 2,000 milliseconds.

Command Mode

Global configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the slow-timer to 14,000 milliseconds.

```
FS(config)# bfd slow-timer 14000
```

Related Commands

Command	Description
bfd echo	Enables the BFD echo function

Platform Description

N/A

6.6 bfd up-dampening

Use this command to set the BFD up-dampening time.

Use the **no** form of this command to restore the default setting.

bfd up-dampening [*milliseconds*]

no bfd up-dampening

Parameter Description

Parameter	Description
milliseconds	(Optional) Sets the BFD up-dampening time. The range is from 0 to 300,000. The unit is millisecond.

Defaults

The default is 0 millisecond, which means that the notification is sent to the related application once the session state is UP.

Command Mode

Interface configuration mode for single-hop sessions, BFD template mode for multi-hop sessions

Usage Guide

This function needs to be enabled only when the link is instable.

If a BFD session does not frequently switch over between Down and Up, the enabling of BFD flapping dampening will delay notifying an associated application of BFD Up.

If multi-hop session parameters need to be configured using a template, configure the template first and then configure BFD multi-hop session parameters.

Configuration Examples

The following example sets the BFD up-dampening time to 60,000 milliseconds.

```
FS(config)# bfd up-dampening 60000
```

Related Commands

Command	Description
bfd	Configures the BFD session parameter.

Platform Description

N/A

6.7 show bfd neighbors

Use this command to display the BFD session parameters.

show bfd neighbors [**vrf** *vrf-name*] [**client** { **ap** | **bgp** | **isis** | **ospf** | **ospfv3** | **rip** | **vrrp** | **static-route** | **pbr** | **vrrp-balance** | **pst** }] [**ipv4** *ip-address* | **ipv6** *ip-address*] [**details**]

Parameter Description

Parameter	Description
vrf *vrf-name*	(Optional) sets the neighbor VRF name.
client	(Optional) specifies the routing protocol.
ap	Displays the BFD session configuration for Layer 3 aggregate ports.
bgp	Displays the BFD session configuration for BGP.
isis	Displays the BFD session configuration for ISIS.
ospf	Displays the BFD session configuration for OSPF.
ospfv3	Displays the BFD session configuration for OSPFv3.
rip	Displays the BFD session configuration for RIP.
vrrp	Displays the BFD session configuration for VRRP.
static-route	Displays the BFD session configuration for the static route.
pbr	Displays the BFD session configuration for PBR.
vrrp-balance	Displays the BFD session configuration for the VRPP.
pst	Displays the BFD session configuration and the Layer3 interface status.
ipv4 *ip-address*	(Optional) Displays the session information of the specified IPv4 neighbor.
ipv6 *ip-address*	(Optional) Displays the session information of the specified IPv6 neighbor.
details	(Optional) Displays the configurations in detail.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

In the information displayed by the **show bfd neighbors** command, the OurAddr field means the source address of the session. The "-" is displayed if the source address is not specified, and it occurs in the BFD session for the LSP backward IP correlation.

Configuration Examples

The following example displays the BFD session configuration.

```
FS# sh bfd neighbors
IPV4 sessions: 1, UP: 1
IPV6 sessions: 0, UP: 0
OurAddr        NeighAddr        LD/RD          RH    Holdown(mult)   State    Int
192.168.24.2 192.168.24.1   8192/8192   Up    0(3)        Up       GigabitEthernet 0/1
```

The following example displays the BFD session configuration in detail.

```
FS#sh bfd neighbors
IPV4 sessions: 1, UP: 1
IPV6 sessions: 0, UP: 0
OurAddr          NeighAddr        LD/RD          RH/RS      Holdown(mult)   State   Int
192.168.24.2     192.168.24.1     8192/8192      Up         0(3    )        Up      GigabitEthernet 0/1
Session state is Up and using echo function with 50 ms interval.
Local Diag:     0,          Demand mode:     0,          Poll bit:     0
MinTxInt: 3000000,          MinRxInt: 3000000,          Multiplier:     3
```

```
Received MinRxInt 3000000, Multiplier: 3
Holdown (hits): 9000(0), Hello (hits): 3000(36)
Rx Count: 127, Rx Interval (ms) min/max/avg: 40/999/999
Tx Count: 135, Tx Interval (ms) min/max/avg: 1000/1000/999
Registered protocols: VRRP
Uptime: 0:01:19
Last packet:
 Version              :              1                          - Diagnostic        : 0
 State bit            :             Up                          - Demand bit        : 0
 Poll bit             :              0                          - Final bit         : 0
 Multplier            :              3                          - Length            : 24
 My Discr             :           8192                          - Your Discr        : 8192
 Min tx interval    :     3000000                               - Min rx interval: 3000000
 Min Echo interval:         50000
```

The following example displays the BFD session configuration for Layer 3 aggregate ports.

```
FS#show bfd neighbors client ap
IPV4 sessions: 1, UP: 0
IPV6 sessions: 0, UP: 0
OurAddr          NeighAddr          LD/RD        RH/RS     Holdown(mult) State    Int
192.168.23.1     192.168.23.2       8192/0       Admin     0(3     )     Down     GigabitEthernet 0/2 (AP 1)
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

7. IP Event Dampening Commands

7.1 Dampening

Use this command to enable the IP event dampening function on the interface. Use the **no** or **default** form of this command to disable this function.

dampening [*half-life-period* [*reuse-threshold suppress-threshold max-suppress* [**restart** [*restart-penalty*]]]]

no dampening

default dampening

Parameter Description

Parameter	Description
half-life-period	Configures the half-life period of suppression penalty. The range is from 1 to 30. The unit is seconds. The default value is 5 seconds.
reuse-threshold	Configures the penalty threshold to unsuppress the interface. The range is from 1 to 20,000. The default value is 1,000.
suppress-threshold	Configures the penalty threshold to suppress the interface. The range is from 1 to 20,000. The default value is 2,000.
max-suppress	Configures the maximum suppress time. The range is from 1 to 255. The default value is 4 times of the *half-life-period*.
restart-*penalty*	Configures the initial penalty value on the interface. The range is from 1 to 20,000. The default value is 2,000.

Defaults

IP event dampening is disabled by default.

Command mode

Interface configuration mode.

Usage Guide

This function will influence the modules of the directly-connected/host route, static route, dynamic route and VRRP. If one interface meets the configuration condition of this command, which is in the suppression status, the above influenced modules consider the status of this interface as DOWN, so as to delete the corresponding route and not transcieve the data packets on this interface.

Re-configuring the dampening command on the interface that has been configured this command makes all dampening information on this interface cleared. However, the interface flapping times will be remained unless use the clear counters command to clear the statistical information of the interface.

When a Layer-3 port on a switch is converted to a Layer-2 port (for example, from a routed port to a switch port), the IP Event Dampening configuration on the port will be deleted.

Configuration Examples

The following example configures the IP event dampening function.

```
FS(config)#interface gigabitEthernet 0/1
FS(config-if-GigabitEthernet 0/1)# no switchport
FS(config-if-GigabitEthernet 0/1)# dampening 30 1500 10000 100
```

Related Commands

Command	Description
clear counters	Clears the interface counters.
show dampening interface	Displays the statistics of the dampening interface.
show interface dampening	Displays details of the dampening interface.

Platform Description N/A

7.2 Show Dampening Interface

Use this command to show the statistics of the dampening interface.

show dampening interface

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command mode Privileged EXEC mode/ global configuration mode/ interface configuration mode

Usage Guide N/A

Configuration Examples The following example displays the statistics of the dampening interface.

```
FS# show dampening interface
3 interfaces are configured with dampening.
No interface is being suppressed.
```

Related Commands

Command	Description
dampening	Enables the IP event dampening function on the interface.
clear counters	Clears the interface counters.
show interface dampening	Displays details of IP event dampening configuration.

Platform Description N/A

7.3 Show Interface Dampening

Use this command to display the details of IP event dampening configuration.

show interface [*interface-Id*] **dampening**

Parameter Description

Parameter	Description
interface-id	Interface name

Defaults

N/A

Command mode

Privileged EXEC mode/ global configuration mode/ interface configuration mode

Usage Guide

If the interface-id is specified, only the dampening information of this specified interface is displayed.

Configuration Examples

The following example shows the details of IP event dampening configuration.

```
FS# show interface dampening Ethernet1/0
Flaps    Penalty    Supp ReuseTm HalfL ReuseV SuppV MaxSTm MaxP Restart
 0          0         FALSE    0       5      1000   2000    20      16000     0
```

Domain	Description
Flaps	Interface flapping times.
Penalty	The current penalty value on the interface.
Supp	Suppressed or not.
ReuseTm	Time to unsuppress the interface, in seconds.
HalfL	Half-life period, in seconds.
ReuseV	Unsuppressed threshold.
SuppV	Start suppression threshold.
MaxSTm	Maximum suppression time.
MaxP	Maximum penalty value.
Restart	The initial penalty value on the interface.

Related Commands

Command	Description
dampening	Enables the IP event dampening function.
clear counters	Clears the interface counters.
show dampening interface	Displays statistics of the dampening interface.

Platform Description

N/A

8. Stacking Commands

8.1 Dad Relay Enable

Use this command to enable the Dual-Active Detection (DAD) relay function.

Use the **no** form of this command to restore the default setting.

dad relay enable

no dad relay enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is disabled by default.

Command Mode

Interface configuration mode

Usage Guide

This command is only supported on the aggregate port (AP).

Configuration Examples

The following example enables the AP-based DAD relay function.

```
FS(config)#interface aggregateport 1
FS(config-if-AggregatePort 1)#dad relay enable
```

The following example disables the AP-based DAD relay function.

```
FS(config)#interface aggregateport 1
FS(config-if-AggregatePort 1)#no dad relay enable
FS(config-if-AggregatePort 1)#exit
```

Related Commands

Command	Description
dual-active detection	Configures DAD.
dual-active pair interface	Configures a pair of Bidirectional Forwarding Detection (BFD)-based DAD interfaces.
dual-active exclude interface	Configures an exclude interface of DAD.
show switch virtual dual-active	Displays the configuration and status of DAD.

Platform Description

N/A

8.2 Dual-active bfd Interface

Use this command to configure a BFD port.

Use the **no** form of this command to remove the setting.

dual-active bfd interface *interface-name*

no dual-active bfd interface *interface-name*

Parameter Description

Parameter	Description
interface-name	Interface name

Defaults N/A

Command Mode config-vs-domain configuration mode

Usage Guide The BFD port must be a routing port on the peer end.

Configuration Examples The following examples configures interface Gi 1/1/1 as a BFD port.

```
FS(config)# interface GigabitEthernet 1/1/1
FS(config-if- GigabitEthernet 1/1/1)# no switchport
FS(config)# interface GigabitEthernet 2/1/1
FS(config-if- GigabitEthernet 2/1/1)# no switchport
FS(config)# switch virtual domain 1
FS(config-vs-domain)# dual-active bfd interface GigabitEthernet 1/1/1
FS(config-vs-domain)# dual-active bfd interface GigabitEthernet 2/1/1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

8.3 Dual-active detection

Use this command to enable DAD.

Use the **no** form of this command to restore the default setting.

dual-active detection { **bfd | aggregateport** }

no dual-active detection { **bfd** | **aggregateport**}

Parameter Description

Parameter	Description
bfd	BFD-based DAD
aggregateport	AP-based DAD

Defaults This function is disabled by default.

Command Mode config-vs-domain configuration mode

Usage Guide Configure this command only in stacking mode.

Configuration Examples The following example enables BFD-based DAD.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)# dual-active detection bfd
```

The following example disables BFD-based DAD.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)# no dual-active detection bfd
```

The following example enables AP-based DAD.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)# dual-active detection aggregateport
```

The following example disables AP-based DAD.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)#no dual-active detection aggregateport
```

Related Commands

Command	Description
dual-active pair interface	Configures a DAD interface.
dual-active exclude interface	Configures an exclude interface of DAD.
show switch virtual dual-active	Displays the configuration and status of DAD.

Platform Description

N/A

8.4 Dual-active Exclude Interface

Use this command to configure an exclude interface of DAD.

Use the **no** form of this command to remove the exclude interface setting.

dual-active exclude interface *interface-name*

no dual-active exclude interface *interface-name*

Parameter Description

Parameter	Description
interface-name	Interface name

Defaults

N/A

Command Mode

config-vs-domain configuration mode

Usage Guide

Configure this command only in stacking mode.

An exclude interface must be a routing interface instead of a virtual switch link (VSL) interface.

Multiple exclude interfaces are supported.

Configuration Examples

The following example configures interface Gi 1/1/3 as an exclude interface of DAD.

```
FS(config)# interface GigabitEthernet 1/0/3
FS(config-if- GigabitEthernet 1/0/3)# no switchport
FS(config)# switch virtual domain 1
FS(config-vs-domain)# dual-active exclude interface GigabitEthernet 1/0/3
```

Related Commands

Command	Description
dual-active detection	Configures DAD.

dual-active pair interface	Configures a DAD interface.
show switch virtual dual-active	Displays the configuration and status of DAD.

Platform Description

N/A

8.5 Dual-active Interface

Use this command to configure an AP-based DAD interface.

Use the **no** form of this command to remove the setting.

dual-active interface *interface-name*

no dual-active interface

Parameter Description

Parameter	Description
interface-name	Interface type and interface number. An AP-based DAD interface must be specified.

Defaults

N/A

Command Mode

config-vs-domain configuration mode

Usage Guide

Only one AP-based detection interface can be configured. Create an AP-based interface before setting it to a detection interface. The previous detection interface will be overwritten by the current detection interface.

Configuration Examples

The following example configures AP 1 as the AP-based detection interface.

```
FS(config)# interface aggregateport 1
FS(config-if-AggregatePort 1)#exit
FS(config)# switch virtual domain 1
FS(config-vs-domain)# dual-active interface aggregateport 1
```

Related Commands

Command	Description
dual-active detection	Configures BFD-/AP-based DAD.
show switch virtual dual-active	Displays the configuration and status of DAD.

Platform Description

N/A

8.6 Port-member Interface

Use this command to add a VSL-AP member interface.

Use the **no** form of this command to delete a VSL-AP member interface.

port-member interface *interface-name* [**copper | fiber**]

no port-member interface *interface-name*

Parameter Description

Parameter	Description
interface-name	Interface name, for example, GigabitEthernet 0/1 and

	GigabitEthernet 0/3.
copper	Copper port
fiber	Fiber port

Defaults N/A

Command Mode config-vsl-port configuration mode

Usage Guide Configure this command in stacking mode or in standalone mode.

Configuration Examples The following example adds and deletes a VSL-AP member port in standalone mode.

```
FS(config)# vsl-port
FS(config-vsl-port)# port-member interface GigabitEthernet 0/1
FS(config-vsl-port)# no port-member interface GigabitEthernet 0/2
```

The following example adds and deletes a VSL-AP member port in stacking mode.

```
FS(config)# vsl-port
FS(config-vsl-port)# port-member interface GigabitEthernet 1/0/1
FS(config-vsl- port)# no port-member interface GigabitEthernet 1/0/1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

8.7 Led-blink

Use this command to configure LED blink function.

led-blink {enable | disable} [device *device_id***]**

Parameter Description

Parameter	Description
enable	Enables this function.
disable	Disables this function.
device_id	Device ID

Defaults This function is disabled by default.

Command Mode Privileged EXEC mode

Usage Guide In single-device mode, this function can be only enabled and disabled.

In stacking mode, a device can be specified. If not specified, all devices in the stacking will be configured.

If running for 30 minutes, this function is disabled automatically even without any operation.

The configuration cannot be saved. In case of restart or active/standby switch-over, it will be removed.

Configuration Examples

The following example enables and disables LED blink function.

```
FS#led-blink enable
FS#led-blink disable
```

The following example enables and disables LED blink function on Device 2.

```
FS#led-blink enable device 2
FS#led-blink disable device 2
```

The following example enables and disables LED blink function in stacking.

```
FS#led-blink enable
FS#led-blink disable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.8 Show Switch Id

Use this command to display the device ID.

show switch id

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the device ID in the standalone mode.

```
FS#show switch id
Switch ID is 2
```

The following example displays the device ID in the stacking device.

```
FS#show switch id
Switch ID is 1
```

Related Commands

Command	Description
show switch virtual	Displays the domain ID as well as the ID and role of each chassis.

Platform Description

N/A

8.9 Show Switch Virtual

Use this command to display the domain ID as well as the ID, status and role of the device.

show switch virtual

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the domain ID as well as the ID, status and role of the device in standalone mode.

```
FS# show switch virtual
Current system is running in "STANDALONE" mode.
```

The following example displays the domain ID as well as the ID, status and role of each device in stacking mode.

```
FS#show switch virtual
Switch_id      Domain_id      Priority      Status      Role          Description
-----------------------------------------------------------------------
1(1)           1(1)           100(100)      OK          ACTIVE        switch-1
2(2)           1(1)           100(100)      OK          CANDIDATE     switch-2
3(3)           1(1)           100(100)      OK          STANDBY       switch-3
```

Related Commands

Command	Description
switch	Modifies the device ID in standalone mode.
switch priority	Configures the device priority.
switch renumber	Modifies the device ID in stacking mode.
switch domain	Modifies the domain ID of a device in stacking mode.
switch virtual domain	Modifies the domain ID of a device in standalone mode.

Platform Description N/A

8.10 Show Switch Virtual Balance

Use this command to display the load balance configuration in stacking mode.

show switch virtual balance

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the load balance configuration of the device in stacking mode.

```
FS#show switch virtual balance
Aggregate port LFF：enable
```

Related Commands

Command	Description
show switch virtual	Displays the domain ID as well as the ID and role of the device.

Platform Description N/A

8.11 Show Switch Virtual Config

Use this command to display the stacking configuration of the device in standalone or stacking mode.

show switch virtual config [*switch_id*]

Parameter Description

Parameter	Description
switch_id	Displays the stacking configuration of the specified device.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide N/A

Configuration Examples The following example displays the stacking configuration of the device in standalone mode.

```
FS#show switch virtual config
mac: 00d0.f810.3323
!
switch virtual domain 1
!
switch 1
switch 1 priority 200
!
vsl-port
port-member interface GigabitEthernet 0/1
port-member interface GigabitEthernet 0/2
!
switch convert mode standalone
```

```
!
```

The following example displays the stacking configuration of the device in stacking mode.

```
FS#show switch virtual config
switch id: 1 (mac: 00d0.f810.1111)
!
switch virtual domain 1
!
switch 1
switch 1 priority 200
switch 1 description switch1
!
vsl-port
port-member interface GigabitEthernet 0/1
port-member interface GigabitEthernet 0/2
!
Switch convert mode virtual
!

switch_id: 2 (mac: 00d0.f810.2222)
!
switch virtual domain 1
!
switch 2
switch 2 priority 100
!
vsl-port
port-member interface GigabitEthernet Ethernet 0/1
port-member interface GigabitEthernet 0/2
!
Switch convert mode virtual
!
```

The following example displays the stacking configuration of the device 1 in stacking mode.

```
FS#show switch virtual config 1
switch_id: 1 (mac: 00d0.f810.1111)
!
switch virtual domain 1
!
switch 1
switch 1 priority 200
switch 1 description switch1
!
vsl-port
```

```
port-member interface GigabitEthernet 0/1
port-member interface GigabitEthernet 0/2
!
```

Related Commands

Command	Description
show switch virtual	Displays the domain ID as well as the ID and role of each chassis.

Platform Description

N/A

8.12 Show Switch Virtual Dual-active

Use this command to display the configuration of DAD.

show switch virtual dual-active { **bfd** | **aggregateport** | **summary** }

Parameter Description

Parameter	Description
bfd	Configuration of BFD-based DAD
aggregateport	Configuration of AP-based DAD
summary	Configuration and status of DAD

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the configuration and status of DAD.

```
FS# show switch virtual dual-active summary
BFD dual-active detection enabled: Yes
Aggregateport dual-active detection enabled: No
Interfaces excluded from shutdown in recovery mode:
GigabitEthernet 1/0/3
GigabitEthernet 1/0/4
In dual-active recovery mode: No
```

The following example displays the configuration of BFD-based DAD.

```
FS# show switch virtual dual-active bfd
BFD dual-active detection enabled: Yes
BFD dual-active interface configured:
    GigabitEthernet 1/0/1: UP
    GigabitEthernet 2/0/2: UP
```

The following example displays the status of AP-based DAD.

```
FS# show switch virtual dual-active aggregateport
Aggregateport dual-active detection enabled: Yes
```

```
Aggregateport dual-active interface configured:
AggregatePort 1:    UP
                GigabitEthernet 1/0/1: UP
                GigabitEthernet 2/0/1: UP
                GigabitEthernet 1/0/2: UP
                GigabitEthernet 2/0/2: UP
DAD relay enable AP list:
        AggregatePort 1
```

Related Commands

Command	Description
dual-active detection	Enables DAD.
dual-active pair interface	Configures a DAD interface.
dual-active exclude interface	Configures an exclude interface.

Platform Description

N/A

8.13 Show Switch Virtual Link

Use this command to display the status of a virtual switch link (VSL).

show switch virtual link [**port**]

Parameter Description

Parameter	Description
port	Displays the port status of a VSL.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays VSL link information.

```
FS# show switch virtual link
VSL-AP      State  Peer-VSL        Rx          Tx          Uptime
-------------------------------------------------------------------------------
1/1         UP         2/1              100000      100000      1d,4h,29m
2/1         UP         1/1              100000      100000      1d,4h,29m
```

The following example displays VSL port information.

```
FS# show switch virtual link port

switch 1:
Port                          AP   State     Peer-port                    Rx       Tx     Uptime
-------------------------------------------------------------------------------
GigabitEthernet 1/0/1   1    OK        GigabitEthernet 2/0/1          9000     9000  0d,0h,20m
```

```
GigabitEthernet 1/0/2   2     OK        GigabitEthernet 2/0/2          9000     9000  0d,0h,20m

Switch 2:
Port                            AP    State     Peer-port                      Rx        Tx     Uptime

-----------------------------------------------------------------------------------------
GigabitEthernet 2/0/1   1     OK        GigabitEthernet 1/0/1          9000     9000  0d,0h,20m
GigabitEthernet 2/0/2   2     OK        GigabitEthernet 1/0/2          9000     9000  0d,0h,20m
```

Related Commands

Command	Description
show switch virtual	Displays information about the stacking system.
show switch virtual role	Displays the ID, role, and priority of each device.

Platform Description

N/A

8.14 Show Switch Virtual Role

Use this command to display the ID, role, and priority of each chassis.

show switch virtual role

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the domain ID as well as the ID, status and role of the device in standalone mode.

```
FS# show switch virtual
Current system is running in "STANDALONE" mode.
```

The following example displays the domain ID as well as the ID, status and role of each device in stacking mode.

```
FS#show switch virtual
Switch_id        Domain_id        Priority        Status        Role              Description
-----------------------------------------------------------------------------
1(1)             1(1)             100(100)        OK            ACTIVE            switch-1
2(2)             1(1)             100(100)        OK            CANDIDATE         switch-2
3(3)             1(1)             100(100)        OK            STANDBY           switch-3
```

Related Commands

Command	Description
switch priority	Configures the priority of a device in the stacking system.
switch virtual domain	Modifies the domain ID of a device in standalone mode.
show switch virtual link	Displays VSL information.

Platform Description

N/A

8.15 Show Switch Virtual Topology

Use this command to display the stacking topology connection status.

show switch virtual topology

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays the topology status.

```
FS# show switch virtual topology
Introduction: '[num]' means switch num, '(num/num)' means vsl-aggregateport num.

Chain Topology:
[1](1/2)---(2/1)[2]

Switch[1]: ACTIVE, MAC: 00d0.f822.33d6, Description: Switch1
Switch[2]: STANDBY, MAC: 1234.5678.9003, Description: Switch2
```

Field Description

Field	Description
Ring Topology	Topology type.
Switch[-]	Device description.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.16 Switch

Use this command to specify the ID of a device in the stacking system.

Use the **no** form of this command to restore the default setting.

switch *switch_id*

no switch

Parameter Description

Parameter	Description
switch_id	ID of a device in the stacking system The range depends on products.

Defaults

The default is 1.

Command Mode

config-vs-domain configuration mode

Usage Guide

The device ID identifies each virtual device member. In stacking mode, the interface name format changes to "switch/slot/port" from "slot/port", in which "switch" is the device ID.

If either chassis are active or if the role of the just started chassis is uncertain and both have the same priority, the chassis with a smaller ID is elected as the active one.

This command can be only used to modify the device ID in standalone mode. In stacking mode, run the **switch renumber** command to modify the device ID. The modified device ID takes effect only after you restart the device, regardless of in standalone mode or in stacking mode.

Configuration Examples

The following example sets the ID of the device whose domain ID is 1 to **2** in the stacking system.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)# switch 2
FS(config-vs-domain)# exit
```

Related Commands

Command	Description
switch virtual domain	Modifies the domain ID of a device in standalone mode.
switch priority	Configures the priority of a device in the stacking system.
show switch virtual	Displays the domain ID as well as the ID and role of each chassis.

Platform Description

N/A

8.17 Switch Convert Mode

Use this command to perform conversion between the standalone mode and the stacking mode.

switch convert mode { **virtual** | **standalone** } [*switch_id*]

Parameter Description

Parameter	Description
virtual	stacking mode
standalone	Standalone mode
switch_id	Device ID

Defaults

The device is in standalone mode by default.

Command Mode Privileged EXEC mode

Usage Guide After you run the **switch convert mode virtual** command, the software automatically backs up the configuration file in standalone mode, saves it as a **standalone.text** file, and then deletes the **config.text** file. The software also prompts you whether to use the **virtual_switch.text** file to overwrite the **config.text** file, write the stacking-related configurations to the **config_VSU_dat** file, and then restart the device.

After you run the **switch convert mode standalone** command, the active chassis automatically backs up the configuration file in stacking mode, saves it as a **virtual_switch.text** file, and then deletes the **config.text** file. The active chassis also prompts you whether to use the **standalone.text** file to overwrite the **config.text** file and restart the device.

The **switch convert mode** command can be used in standalone mode or in stacking mode. In standalone mode, this command is used to switch the mode of the current chassis. In stacking mode, this command is used to switch the mode of the device specified by **switch_id** if **switch_id** is available and to switch the mode of the active device if **switch_id** is not available.

You are advised to first switch the mode of the standby device and then the mode of the active mode.

Configuration Examples The following example converts the device mode from the standalone mode into the stacking mode.

```
FS# switch convert mode virtual
```

The following example switches the modes of the standby device (**switch_id** set to **2**) and the active device (**switch_id** set to **1**) from the stacking mode to the standalone mode.

```
FS# switch convert mode standalone 2
FS# switch convert mode standalone 1
```

Related Commands

Command	Description
switch	Modify the device ID in standalone mode.
switch virtual domain	Modify the domain ID of a device in standalone mode.
switch priority	Configure the priority of a device in the stacking system.
show switch virtual	Display the domain ID as well as the ID and role of each chassis.

Platform Description N/A

8.18 Switch Crc

Use this command to configure parameters for frame error detection.

Use the **no** form of this command to restore the default setting.

switch crc errors *error_num* **times** *time_num*

no switch crc

Parameter Description

Parameter	Description
error_num	Limits the number of error frames increasing from that in the last detection. If the increased number is greater than *error_num*, it is taken as an error.
time_num	When the error count exceeds the *time_num*, the device will take actions (prompting a message or disabling the port).

Defaults

The default *error_num* is 3.

The default *time_num* is 10.

Command Mode

config-vs-domain configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the *error_time* and *time_num* parameters to 10 and 5 respectively.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)#
FS(config-vs-domain)#switch crc errors 10 times 5
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.19 Switch Description

Use this command to configure the description for a stacking switch.

Use the **no** form of this command to remove the setting.

switch *switch_id* **description** *dev-name*

no switch *switch_id* **description**

Parameter Description

Parameter	Description
switch_id	Device ID
dev_name	Device description, no greater than 32 characters.

Defaults

N/A

Command Mode

config-vs-domain configuration mode

Usage Guide

This command is configured on a device in whether standalone or stacking mode and takes effect immediately after configuration,

Configuration Examples

The following example configures the description for a stacking switch.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)# switch 1 description buildingA
FS(config-vs-domain)# exit
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

8.20 Switch Domain

Use this command to modify the domain ID of a device in stacking mode.

Use the **no** form of this command to restore the default setting.

switch *switch_id* **domain** *new_domain_id*

no switch *switch_id* **domain**

Parameter Description

Parameter	Description
switch_id	ID of the running device in stacking mode. The range depends on products. For details, see the *Configuration Guide*.
new_domain_id	New domain ID, in the range from 1 to 255.

Defaults

The default *new_domain_id* is 100 by default.

Command Mode

config-vs-domain configuration mode

Usage Guide

Use this command only in stacking mode. In addition, the setting can take effect only after the device is restarted.

Configuration Examples

The following example sets the domain ID of device 1 to 10 in stacking mode.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)# switch 1 domain 10
```

The following example sets the domain ID of device 2 to 10 in stacking mode.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)# switch 2 domain 10
```

The following example sets the domain ID of device 2 to the default value in stacking mode.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)# no switch 2 domain
```

Related Commands

Command	Description
switch virtual domain	Modifies the domain ID in standalone mode.
show switch virtual	Displays the domain ID as well as the ID and role of each chassis.

Platform Description

N/A

8.21 Switch Priority

Use this command to configure the priority of a device in the stacking system.

Use the **no** form of this command to restore the default setting.

switch *switch_id* **priority** *priority_num*

no switch *switch_id* **priority**

Parameter Description

Parameter	Description
switch_id	ID of a device in the stacking system. The range depends on products. For details, see the *Configuration Guide*.
priority_num	Priority of a device in the stacking system, ranging from 1 to 255.

Defaults

The default *priority_num* is 100.

Command Mode

config-vs-domain configuration mode

Usage Guide

A larger value means a higher priority. The chassis with a higher priority is elected as the active chassis.

You can use this command in standalone mode or in stacking mode. The modified priority takes effect only after you restart the device.

In stacking mode, **switch_id** indicates the ID of the running device. If the ID does not exist, the configuration does not effect.

Configuration Examples

The following example sets the priority of device 1 to **200**.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)# switch 1 priority 200
FS(config-vs-domain)# exit
```

The following example sets the priority of device 1 to **200** and restores the priority of device 2 to the default value in stacking mode.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)# switch 1 priority 200
FS(config-vs-domain)# no switch 2 priority
FS(config-vs-domain)# exit
```

Related Commands

Command	Description
switch	Modifies the device ID in standalone mode.
show switch virtual	Displays the domain ID as well as the ID and role of each chassis.

Platform Description

N/A

8.22 Switch Renumber

Use this command to modify the ID of any device in stacking mode.

Use the **no** form of this command to restore the default setting.

switch *switch_id* **renumber** *new_switch_id*

no switch *switch_id*

Parameter Description

Parameter	Description
switch_id	ID of the running device in stacking mode The range depends on products. For details, see the *Configuration Guide*.
new_switch_id	ID of the new switch The range depends on products. For details, see the *Configuration Guide*.

Defaults

N/A

Command Mode

config-vs-domain configuration mode

Usage Guide

This command is configured in stacking mode. In addition and takes affect after device restart.

The **no** form of this command will restore the switch ID to 1.

Configuration Examples

The following example modifies the ID of device 1 that is running to 2 in stacking mode.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)# switch 1 renumber 2
```

The following example restores the ID of device 2 that is running to the default value in stacking mode.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)# no switch 2
```

Related Commands

Command	Description
switch	Modifies the device ID in standalone mode.
show switch virtual	Displays the domain ID as well as the ID and role of each chassis.

Platform Description

N/A

8.23 Switch Virtual Aggregateport Lff Enable

Use this command to enable the locally-preferred forwarding function on the AP in stacking mode. Use the **no** form of this command to disable this function.

switch virtual aggregateport lff enable

no switch virtual aggregateport lff enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default.

Command Mode

config-vs-domain configuration mode

Usage Guide N/A

Configuration Examples The following example enables the locally-preferred forwarding function on the AP in stacking mode.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)# switch virtual aggregateport lff enable
```

Related Commands

Command	Description
show switch virtual balance	Displays the current traffic balancing mode.

Platform Description N/A

8.24 Switch Virtual Domain

Use this command to modify the domain ID of a device in standalone mode, or enter config-vs-domain configuration mode in stacking mode.

Use the **no** form of this command to restore the default setting.

switch virtual domain *domain_id*

no switch virtual domain

Parameter Description

Parameter	Description
domain_id	Domain ID of the stacking, in the range from 1 to 255.

Defaults The default is 100.

Command Mode Global configuration mode

Usage Guide Only two devices with the same domain ID can form a virtual device. The domain ID must be unique within the local area network (LAN).

Configuration Examples The following example sets the domain ID of the stacking to 1 in standalone mode.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)#
```

Related Commands

Command	Description
show switch virtual	Displays the domain ID as well as the ID and role of each chassis.
switch domain	Modifies the domain ID in stacking mode.

Platform Description N/A

8.25 Switch Virtual Ecmp Lff Enable

Use this command to enable the locally-preferred forwarding function on the ECMP interface in stacking mode.

Use the **no** form of this command to disable this function.

switch virtual ecmp lff enable

no switch virtual ecmp lff enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

This function is enabled by default.

Command Mode

config-vs-domain configuration mode

Usage Guide

N/A

Configuration Examples

The following example enables the locally-preferred forwarding function on the ECMP interface in stacking mode.

```
FS(config)# switch virtual domain 1
FS(config-vs-domain)#switch virtual ecmp lff enable
```

Related Commands

Command	Description
show switch virtual balance	Displays the current load balance mode.

Platform Description

N/A

8.26 Vsl-port

Use this command to enter VSL-PORT mode

vsl-port

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

This command is configured on a device in whether standalone mode or stacking mode.

Configuration Examples

The following example enters VSL-AP configuration mode on a device in standalone mode.

```
FS(config)# vsl-port
FS(config-vsl-port)#
```

The following example enters VSL-APPORT configuration mode on a device in stacking mode.

```
FS(config)# vsl-port
FS(config-vsl-port)#
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9. RNS &Track Commands

9.1 delay

Use this command to specify a period of time after which the tracked object status will change if the interface status changes.

Use the **no** form of this command to restore the default setting.

delay { **up** *seconds* [**down** *seconds*] | [**up** *seconds*] **down** *seconds* }

no delay

Parameter Description

Parameter	Description
up *seconds*	Sets the delay time from down to up in the range from 0 to 180. The unit is second.
down *seconds*	Sets the delay time from up to down in the range from 0 to 180. The unit is second.

Defaults

There is no delay by default.

Command Mode

Track configuration mode

Usage Guide

The continual oscillation of the tracked object status may cause the client of this tracked object changing also. This command can be used to delay advertising the change of the tracked object status. For example, the status of a tracked object changes from up to down, if the delay down 180 is configured, the down status will be advertised after 180 seconds. If the tracked object status changes to the up again in this period, it won't be advertised. For the client of the tracked object, the status of the tracked object is always up.

Configuration Examples

The following example sets the delay time to 30 seconds when the tracked object changes to up from down.

```
FS(config)# track 5 rns 10
FS(config-track)# delay up 30
FS(config-track)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.2 dns

Use this command to set an IP RNS object to send the DNS packets and to enter the IP RNS DNS mode.

dns {*destination-hostname* **name-server** *a.b.c.d* [**source-ipaddr** *ip-address*] [**out-interface** *type num* [**next-hop** *A.B.C.D*]] | **oob** *destination-hostname* **name-server** *a.b.c.d* [**source-ipaddr** *ip-address*] **via** *type num* **next-hop** *A.B.C.D}*

Parameter Description

Parameter	Description
destination-hostname	Sets the destination IP address or the destination host domain name.
oob	Enables management port detection.
a.b.c.d	Sets the IP address for the DNS server.
ip-address	Indicates the source IP address of RNS packets.
out-interface *type num*	Specifies the egress interface (non-management port) for RNS packets.
via *type num*	Specifies the management port as the egress interface (non-management port) for RNS packets.
A.B.C.D	Specifies the next-hop IP address for RNS packets.

Defaults

N/A

Command Mode

IP RNS configuration mode

Usage Guide

Use this command to set an IP RNS object to send the DNS packets and to enter the IP RNS DNS mode. If you want to change the probe type, you should delete the probe first by using the **no ip rns** command and then perform new configuration.

Configuration Examples

The following example sets the IP RMS object to send the DNS packets.

```
FS(config)# ip rns 1
FS(config-ip-rns)# dns www.FS.com.cn name-server 61.154.22.41
FS(config-ip-rns-dns)# exit
FS(config)# ip rns schedule 1 start-time now
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.3 frequency

Use this command to set the interval of sending the packets, which must be no smaller than the timeout time.

Use the **no** form of this command to restore the default setting.

frequency *milliseconds*

no frequency

Parameter Description

Parameter	Description
milliseconds	Sets the interval of sending the packets, in the range from10 to 604,800,000 in the unit of milliseconds.

Defaults The default is 60 seconds.

Command Mode
IP RNS ICMP echo configuration mode
IP RNS DNS configuration mode
IP RNS TCP configuration mode

Usage Guide Use this command to set the interval of sending the ICMP echo or DNS packets, which must accord with the following formula to ensure accuracy:
frequency *milliseconds* > **timeout** *milliseconds* >= **threshold** *milliseconds*

Configuration Examples The following example configures an ICMP echo probe whose destination address is 192.168.21.1. The frequency, timeout time and threshold are set to 30,000, 8,000 and 6,000 milliseconds respectively.

```
FS(config-ip-rns)#icmp-echo 192.168.21.1
FS(config-ip-rns-icmp-echo)#frequency 30000
FS(config-ip-rns-icmp-echo)#timeout 8000
FS(config-ip-rns-icmp-echo)#threshold 6000
```

Related Commands

Command	Description
timeout	Defines the timeout time of sending the packets.

Platform Description N/A

9.4 icmp-echo

Use this command to configure an ICMP echo RNS probe.
icmp-echo { *destination-ip-address* | *destination-hostname* [**name-server** *ip-address*] } [**source-ipaddr** *ip-address*] [**out-interface** *type num* [**next-hop** *A.B.C.D*]] | **oob** { *destination-ip-address* | *destination-hostname* [**name-server** *ip-address*] } [**source-ipaddr** *ip-address*] **via** *type num* **next-hop** *A.B.C.D*

Parameter Description

Parameter	Description
destination-hostname	Sets the destination IP address for the ICMP echo packets.
oob	Enables management port detection.
destination-hostname	Sets the destination host name within 127 characters. The exceeding characters are truncated automatically.
name-server *ip-address*	Sets the domain name server. The default domain name server is configured via the **ip name-server** command.
source-ipaddr *ip-address*	Sets the source IP address for the ICMP echo packets.
out-interface *type num*	Sets the egress port(non-management) for the probe packet.
via *type num*	Specifies the management port as the egress interface (non-management port) for probe packets.
next-hop *A.B.C.D*	Sets the next hop IP address.

Defaults N/A

Command Mode IP RNS configuration mode

Usage Guide This command is used to enable the IP RNS object to send ICMP echo packets containing the specified destination IP address. The default payload size of an ICMP echo packet is 36 bytes. The **request-data-size** command is used to modify the packet size.

You can modify the probe parameter after specifying the type of the IP RNS probe (such as ICMP echo probe). If you want to change the probe type, you should delete the probe first by using the **no ip rns** command and then perform new configuration.

Configuration Examples The following example enables the IP RNS object to send the ICMP echo packets containing the destination IP address 10.1.1.1.

```
FS(config)# ip rns 1
FS(config-ip-rns)# icmp-echo 10.1.1.1
FS(config-ip-rns-icmp-echo)# exit
FS(config)# ip rns schedule 1 start-time now life forever
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.5 ip rns

Use this command to define an IP RNS operation object and to enter the IP RNS configuration mode.

Use the **no** form of this command to delete an IP RNS operation object.

ip rns *operation-number* [{**dns** *destination-hostname* **name-server** *ip-address* | **icmp-echo** *destination-ip-address* | **tcp-connect** *destination-ip-address port-number*} [**frequency** *seconds*] [**timeout** *milliseconds*] [**threshold** *milliseconds*]]]

no ip rns *operation-number*

Parameter Description

Parameter	Description
operation-number	Sets the IP RNS operation object number, in the range from 1 to 500.
dns *destination-hostname* **name-server** *ip-address*	Brief DNS detection configuration. *destination-hostname*: Indicates the destination host name. A maximum of 127 characters can be entered. Characters out of this limit will be truncated. **name-server** *ip-address*: Indicates the IP address of the DNS server.
icmp-echo *destination-ip-address*	Brief ICMP-echo detection configuration. *destination-ip-address*: Indicates the destination IP address.

tcp-connect *destination-ip-address port-number*	Brief TCP-connect detection configuration. *destination-ip-address*: Indicates the destination IP address. *port-number*: Indicates the TCP port to be detected.
frequency *seconds*	Sets the detection interval. For details, see the **frequency** command.
timeout *milliseconds*	Sets the timeout time for one IP RNS detection operation. For details, see the **timeout** command.
threshold *milliseconds*	Sets the upper threshold for one IP RNS detection operation. For details, see the **threshold** command.

Defaults N/A

Command Mode Global configuration mode

Usage Guide Currently, the RNS supports only IPv4-related tests, but not IPv6-related tests. At most 500 tests can be configured, depending on the performance of devices. The test function is only a value-added function. When a large number of tests are configured and consume a lot of system resources, the test function may be temporary disabled to ensure normal operation of core services, such as route forwarding.

Detailed configuration (executing mandatory items of **ip rns** *operation-number*): Run this command and enter the IP-RNS configuration mode. In this mode, you can define various test types. If the test type is not configured, the RNS test is not created. After configuring an RNS test, you must run the **ip rns schedule** command to configure its schedule parameters; otherwise, the test cannot be conducted.

After configuring the type of an RNS test, you can run the **ip rns** command to enter the mode of the test type. To modify the type of an RNS instance, you need to first delete the RNS instance by running the **no ip rns** command in global configuration mode.

Configuration Examples The following example defines the IP RNS object 1.

```
FS(config)# ip rns 1
FS(config-ip-rns)# icmp-echo 10.1.1.1
FS(config-ip-rns-icmp-echo)# threshold 10000
FS(config-ip-rns-icmp-echo)# timeout 20000
FS(config-ip-rns-icmp-echo)# frequency 30000
FS(config-ip-rns-icmp-echo)# exit
FS(config)# ip rns schedule 1 start-time now life forever
```

Related Commands

Command	Description
show ip rns statistics	Displays the statistical data on the IP RNS object.

Platform Description N/A

9.6 ip rns reaction-configuration

Use this command to configure proactive threshold monitoring and trigger for the IP RNS probe.

Use the **no** form of this command to restore the default setting.

ip rns reaction-configuration *operation-number* **react** *monitored-element* **[action-type** *option* **]**

[threshold-type { average [*number-of-measurements* **] | consecutive [** *occurrences* **] | immediate | never |**

xofy [*x-value y-value* **] }] [threshold-value** *upper-threshold lower-threshold]*

no ip rns reaction-configuration *operation-number* [**react** *monitored-element]*

Parameter Description

Parameter	Description
operation-number	Operation index, in the range from 1 to 500.
monitored-element	● Monitored element. The available parameters are listed as follows: ● **allfail**: Failed to monitor all elements. The default action-type is **track**. This parameter is applied on the track module for communication. ● **rtt**: Packet round trip time (RTT) exceeds the threshold range. ● **•timeout**: Timeout in whatever direction.
action-type *option*	● The available parameters include: ● **none**: No action, which is the default setting ● **trigge**r: Only supports the **trigger** action. ● **track**: Only supports the **track** action. Only when **monitored-element is allfail is this parameter supported, which is available exclusively.**
average [*number-of-measurements*]	Triggers operation when the average value of **number-of-measurements c**onsecutive times exceeds the threshold range. For example. *number-of-measurements* is set to three. Upper and lower thresholds are 5000 **and 4000 respectively. The average value for three consecutive measurements 6000. 6000. 5000 is (6000+6000+5000)/3=5667, exceeding the upper threshold 5000. The valid range is from 1 to 16 and the default is 5.**
consecutive [*occurrences*]	Triggers operation when the value of monitored element exceeds the threshold range for *occurrences* consecutive times. The valid range is from 1 to 16. The default is 5.
immediate	Triggers operation immediately when the value of monitored element exceeds the threshold range.
never	Never triggers operation.
xofy [x-value y-value]	X probes among the latest Y ones exceed the threshold range. The valid X range is from 1 to 16 and the default is 5. The valid Y range is from 1 to 16 and the default is 5.
threshold-value *upper-threshold lower-threshold*	Configures upper and lower thresholds. When *monitored-element* is **rtt,** this parameter indicates time, in the range from 0 to 60,000 milliseconds. See **Usage Guide** for the default setting. When react type is timeout, you don't need to configure this parameter.

Defaults N/A

Command Mode Global configuration mode

Usage Guide One IP RNS object can be configured with multiple thresholds monitoring, each for one element. Monitored elements that are supported vary with different probe types.

monitored-element	icmp-echo	dns	tcp-connect
timeout	ü	ü	ü
rtt	ü	ü	ü

The default thresholds for monitored elements are listed as follows:

Monitored Element	Upper Threshold	Lower Threshold
timeout	-	-
rtt	5000 ms	0 ms

Configuration Examples The following example configures RNS1 and its threshold monitoring.

```
FS(config)# ip rns 1
FS(config-ip-rns)# icmp-echo 192.168.23.1
FS(config-ip-rns-icmp-echo)# exit
FS(config)# ip rns schedule 1 start-time now life forever
FS(config)#ip rns reaction-configuration 1 react timeout threshold-type immediate action-type triggerOnly
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.7 ip rns reaction-trigger

Use this command to enable the IP RNS probe which exceeds the monitoring threshold to trigger another IP RNS probe which is in the pending state.

Use the **no** form of this command to restore the default setting.

ip rns reaction-trigger *operation-number target-operation*

no ip rns reaction-trigger *operation-number target-operation*

Parameter Description

Parameter	Description
operation-number	The source operation number, in the range from 1 to 500
target-operation	The target operation number, in the range from 1 to 500

Defaults N/A

Command Mode Global configuration mode

Usage Guide The trigger function is applied in network fault diagnosis scenario

Configuration Examples The following example enables IP RNS1 to trigger IP RNS 2.

```
FS(config)# ip rns 1
FS(config-ip-rns)# icmp-echo www.google.com
FS(config-ip-rns-icmp-echo)# exit
FS(config)#ip rns schedule 1 start-time now life forever
FS(config)#ip rns reaction-configuration 1 react timeout threshold-type immediate action-type trigger
FS(config)# ip rns 2
FS(config-ip-rns)# dns www.baidu.com name-server 8.8.8.8
FS(config-ip-rns-dns)# exit
FS(config)#ip rns reaction-trigger 1 2
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.8 ip rns reset

Use this command to clear all IP RNS configuration.

ip rns reset

Parameter Description

Parameter	Description
N/A	N/A

Defaults N/A

Command Mode Global configuration mode

Usage Guide This command is used to clear all IP RNS configuration. This command is used only in extreme cases (for example, RNS probe configuration is wrong).

Configuration Examples The following example clears all IP RNS configuration.

```
FS(config)# ip rns reset
```

Related Commands

Command	Description
N/A	N/A

Platform N/A

Description

9.9 ip rns restart

Use this command to restart the IP RNS probe.

ip rns restart *operation-number*

Parameter Description

Parameter	Description
operation-number	Sets the IP RNS operation object number, in the range from 1 to 500.

Defaults N/A

Command Mode Global configuration mode

Usage Guide This command is used to restart the IP RNS probe whose schedule is in the pending state. This command is invalid for the IP RNS probe not configured with the scheduling policy.

Configuration Examples The following example restarts IP RNS 1.

```
FS(config)# ip rns restart 1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.10 ip rns schedule

Use this command to configure the scheduling strategy, start time and survival time for the IP RNS probe. Use the **no** form of this command to restore the default setting.

ip rns schedule operation-number [**life** { **forever** | *seconds* }] [**start-time** { *hh:mm* [*:ss*] [month *day* | *day month*] | **pending** | **now** | **after** *hh:mm:ss* }] [**recurring**]

no ip rns schedule *operation-number*

Parameter Description

Parameter	Description
operation-number	RNS operation index, in the range from 1 to 500
life forever	The RNS operation is valid forever.
life *seconds*	The RNS survival time, measured in seconds
*hh***:***mm* [**:***ss* **]**	Defines the time when the operation starts,
month	The month when the operation starts, in the range from January (Jan.) to December (Dec.). The default is the current month.
day	The day when the operation starts, in the range from 1 to 31. The default is

	the current day.
pending	The start time is pending.
now	The operation starts right now.
after *hh:mm:ss*	The operation starts after hh hours, mm minutes and ss seconds.
recurring	The operation starts automatically as scheduled every day.

Defaults

The IP RNS probe is in the pending state by default. In other words, the probe is not performed unless it is triggered by another RNS probe.

Command Mode

Global configuration mode

Usage Guide

The **ip rns schedule** command is used to configure the IP RNS probe with scheduling policy. Once the scheduling policy is configured, the RNS probe cannot be modified. You can modify the RNS probe after deleting the schedule with the **no ip rns schedule** command.

Life {seconds} refers to the survival time of the IP RNS probe. The probe will end after the survival time.

Configuration Examples

The following example configures the RNS probe with scheduling policy.

```
FS(config)# ip rns 1
FS(config-ip-rns)# icmp-echo 10.1.1.1
FS(config-ip-rns-icmp-echo)# exit
FS(config)#ip rns schedule 1 start-time now life forever
```

Once the scheduling policy is configured, the RNS probe cannot be modified. The RNS probe can be modified after the schedule is deleted.

```
FS(config)# ip rns 1
Entry already running and cannot be modified
        (only can delete (no) and start over)
        (check to see if the probe has finished exiting)
FS(config)# no ip rns schedule 1
FS(config)# ip rns 1
FS(config-ip-rns-icmp-echo)# exit
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.11 object

Use this command to add a tracked object to the object track list.

Use the **no** form of this command to delete a traced object.

object *object-number* [**not**]

no object *object-number*

Parameter Description

Parameter	Description
object-number	Tracked object number, in the range from 1 to 700

Defaults

No tracked object is configured by default.

Command Mode

Track configuration mode

Usage Guide

This command is used to add a tracked object to the object track list. The number of tracked objects is only restricted by the track list capacity.

object *object-number*: The tracked object must be in the up state for the track list to be in the up state.

object *object-number* not: track: The tracked object must be in the up state for the track list to be in the up state,

- This command is configured only in track configuration mode for the track list.
- The object cannot track itself.
- The objects cannot track each other. For example, if A tracks B, B cannot track A. Otherwise, both A and B are in oscillation.

Configuration Examples

The following example adds tracked object 4 to the object track list. When object 1 is in the up state, 2 down, 3 up, object 4 is in the up state.

```
FS(config)# track 4 list boolean and
FS(config-track)# object 1
FS(config-track)# object 2 not
FS(config-track)# object 3
FS(config-track)# end
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.12 request-data-size

Use the following example to set the protocol payload size of IP RNS probe packet.

Use the **no** form of this command to restore the default setting.

request-data-size *bytes*

no request-data-size

Parameter Description

Parameter	Description
bytes	The number of payload bytes. The minimum/maximum number of bytes

	varies with the probe type.

Defaults The default is the minimum payload byte, which varies with the probe type.

Command Mode IP RNS ICMP echo configuration mode

Usage Guide This command is used to fill bytes in the probe packet to probe for the bigger packet.

Probe Type	Range	Default
icmp-echo	[36, 1472]	36

Configuration Examples The following example sets the protocol payload size of the IP RNS probe packet to 50.

```
FS(config)# ip rns 1
FS(config-ip-rns)# icmp-echo 10.1.1.1
FS(config-ip-rns-icmp-echo)# request-data-size 50
FS(config-ip-rns-icmp-echo)# exit
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.13 show ip rns collection-statistics

Use this command to display statistics about the RNS probe.

show ip rns collection-statistics [*operation-number*]

Parameter Description

Parameter	Description
operation-number	Sets the IP RNS operation object number, in the range from 1 to 500. The default is all IP RNS operation objects.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to display statistics about an IP RNS probe.

Configuration Examples The following example displays statistics about the all RNS probes.

```
FS#show ip rns collection-statistics 1
Entry number: 1
Start Time Index: *2014-03-20 19:53:51
```

```
Number of successful operations: 919
Number of operations over threshold: 0
Number of failed operations due to a Disconnect: 0
Number of failed operations due to a Timeout: 2
Number of failed operations due to a Busy: 0
Number of failed operations due to a No Connection: 0
Number of failed operations due to an Internal Error: 2
Number of failed operations due to a Sequence Error: 0
Number of failed operations due to a Verify Error: 0
RTT Values:
RTTAvg: 18        RTTMin: 16        RTTMax: 37
NumOfRTT: 919     RTTSum: 16654     RTTSum2: 302786
```

Field	Description
Entry number	IP RNS operation index
Start Time Index:	Schedule start time
Number of successful operations:	Number of successful operation.
Number of operations over threshold:	Number of threshold violation
Number of failed operations due to a Disconnect:	Number of operation failure due to disconnection
Number of failed operations due to a Timeout:	Number of operation failure due to timeout
Number of failed operations due to a Busy:	Number of operation failure since the peer end is busy
Number of failed operations due to a No Connection:	Number of operation failure due to no connection
Number of failed operations due to an Internal Error:	Number of operation failure due to internal error
Number of failed operations due to a Sequence Error:	Number of operation failure due to sequence error
Number of failed operations due to a Verify Error:	Number of operation failure due to verification error
RTT Values	RTT value
RTTAvg:	Average RTT value
RTTMin:	Minimum RTT value
RTTMax:	Maximum RTT value
NumOfRTT:	Number of counting RTT value
RTTSum:	Sum of RTT value
RTTSum2:	Sum of squares of RTT value

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.14 show ip rns configuration

Use this command to display the RNS instance configuration.

show ip rns configuration [*operation-number*]

Parameter Description

Parameter	Description
operation-number	Sets the RNS instance number, in the range from 1 to 500.

Command Mode

Privileged EXEC mode

Usage Guide

This command is used to display the RNS instance configuration. The configuration varies with different packet types.

Configuration Examples

The following example displays the RNS 1 configuration.

```
FS# show ip rns configuration 1
Entry number: 1
Tag: FS555
Type of operation to perform: icmp-echo
Operation timeout (milliseconds): 5000
Operation frequency (milliseconds): 10000
Threshold (milliseconds): 5000
Recurring (Starting Everyday): FALSE
Life (seconds): 3500
Next Scheduled Start Time:Start Time already passed
Target address/Source address: 2.2.2.3/0.0.0.0
Request size (ARR data portion): 36
```

Field	Description
Entry number	IP RNS operation index
Tag	Instance tag.
Type of operation to perform	Operation type.
Operation timeout (milliseconds)	Operation timeout.
Operation frequency (milliseconds)	Operation frequency.
Threshold (milliseconds)	Threshold.
Recurring (Starting Everyday)	The operation starts every day.
Life (seconds)	Life time
Next Scheduled Start Time	Next scheduled start time.
Target address/Source address	Target address/Source address
Request size (ARR data portion)	Request packet size.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.15 show ip rns operational-state

Use this command to display operational state.

show ip rns operational-state [*operation-number*]

Parameter Description

Parameter	Description
operation-number	Sets the IP RNS operation object number, in the range from 1 to 500. The default is all RNS operation objects.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

This command is used to display the state information about an RNS probe.

Configuration Examples

The following example displays the state information about all RNS probes.

```
FS# show ip rns operational-state
Entry number: 1
Modification time: *2014-01-10 10:26:14
Current seconds left in Life: Forever
Operational state of entry: Active
Number of Octets Used by this Entry: 2272
Number of operations attempted: 232
Number of operations skipped: 0
Connection loss occurred: FALSE
Timeout occurred: FALSE
Over thresholds occurred: FALSE
Latest RTT (milliseconds): 4
Latest operation start time: 2014-01-10 10:26:55
Latest operation return code: OK
```

Field	Description
Entry number	IP RNS operation index
Modification time	Probe result recounting time (every time schedule is enabled, the result is counted again).
Number of Octets Used by this Entry	Number of octets contained in the probe packet.
Number of operations attempted	Number of attempted operation.
Number of operations skipped	Number of failed operation.
Current seconds left in Life	Probes for the left life.
Operational state of entry	Probes for the operational state (Active/Disactive).
Connection loss occurred	Connection loss occurred.
Timeout occurred	Send request timeout occurred,
Over thresholds occurred	Threshold violation occurred.

Latest RTT (milliseconds)	Latest RTT.
Latest operation start time	Latest operation start time.
Latest operation return code	Latest operation return code.

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.16 show ip rns reaction-configuration

Use this command to display the proactive threshold monitoring information of an IP RNS probe.

show ip rns reaction-trigger [*operation-number*]

Parameter Description

Parameter	Description
operation-number	The number of IP RNS operation objects, in the range from 1 to 500. The default is all RNS operation objects.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to display the proactive threshold monitoring information of an IP RNS probe.

Configuration Examples The following example displays the proactive threshold monitoring information of all IP RNS probes.

```
FS#show ip rns reaction-configuration
Entry number: 1
Reaction: rtt
Threshold Type: Never
Rising (milliseconds): 5000
Falling (milliseconds): 3000
Threshold Count: 5
Threshold Count2: 5
Action Type: trigger
Reaction: timeout
Threshold Type: Never
Threshold Count: 5
Threshold Count2: 5
Action Type: trigger
```

Field	Description
Entry number	IP RNS operation index

Reaction	Monitored object
Threshold Type	The available parameters are listed as follows: **never**: Never triggers operation. **consecutive**: Triggers operation when the value of monitored element exceeds the threshold range for *occurrences* consecutive times. **average**: Triggers operation when the average value of **number-of-measurements consecutive times** exceeds the threshold range. **immediate**: Triggers operation immediately when the value of monitored element exceeds the threshold range. **xofy:** X probes among the latest Y ones exceed the threshold range.
Rising (milliseconds)	Upper threshold
Falling (milliseconds)	Lower threshold
Threshold Count	The parameter refers to the x value when the threshold-type is **xofy** or the average count when the threshold-type is **average**.
Threshold Count2	The parameter refers to the y value when the threshold-type is **xofy** or the consecutive count when the threshold-type is **consecutive**.
Action Type	Action type

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.17 show ip rns reaction-trigger

Use this command to display the reaction trigger information for all RNS objects.

show ip rns reaction-trigger [*operation-number*]

Parameter Description

Parameter	Description
operation-number	The number of IP RNS operation object, in the range from 1 to 500. The default is all RNS operation objects.

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide This command is used to display the reaction trigger information for all RNS objects.

Configuration Examples The following example displays the reaction trigger information for all RNS objects.

```
FS#show ip rns reaction-trigger
Entry number: 1
Target rns index: 2
Status of Entry (SNMP RowStatus): active
Operational State: pending
```

Field	Description
Entry number	RNS index
Target rns index	Target RNS index
Status of Entry (SNMP RowStatus)	Status of RNS entry
Operational State	Reaction-trigger state

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.18 show ip rns statistics

Use this command to display the RNS object statistics.

show ip rns statistics [*operation-number*]

Parameter Description

Parameter	Description
operation-number	Sets the IP RNS operation object number, in the range from 1 to 500

Defaults N/A

Command Mode Privileged EXEC mode

Usage Guide The statistics vary with different packet types.

Configuration Examples The following example displays the RNS object statistics.

```
FS#show ip rns statistics 1
Round trip time(RTT) Index 1
Operation time to live: Forever
Latest RTT: 1 ms
Latest operation start time: 2014-01-20 10:21:38
Latest operation return code: OK
```

```
Number of successes: 386
Number of failures: 12
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.19 show track

Use this command to display statistics of the tracked object.

show track [*track-number*]

Parameter Description

Parameter	Description
track-number	Sets the tracked object number, in the range from 1 to 700.

Defaults

N/A

Command Mode

Privileged EXEC mode

Usage Guide

N/A

Configuration Examples

The following example displays statistics of all tracked objects.

```
FS#show track
Track 1
  Reliable Network Service 5
  The state is Up
    1 change, current state last: 120 secs
  Delay up 30 secs, down 50 secs
Track 3
  Interface FastEthernet 1/0
  The state is Down, delayed Up (5 secs remaining)
    3 change, current state last: 300 secs
  Delay up 60 secs, down 60 secs
Track 4
  List boolean and
   Object 1
   Object 2 not
  The state is Up
   1 change, current state last: 100 secs
```

Delay up 0 secs, down 0 secs	
Field	**Description**
Track x	Tracked object ID
Reliable Network Service x	Tracked RNS object
The state is x	Tracked object state
x change	Tracked object change count
current state last: x secs	The time for which the current state lasts
Delay up x secs, down x secs	The delay state of the tracked object
Interface x x	Tracked interface
The state is x, delayed y (c secs remaining)	The tracked object state is x, and will turn to y in c seconds.
List boolean and	The Boolean expression enables calculation by using "and" operator.
Object x	Object x is in the up state.
Object x not	Object x is in the down state.

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.20 tag

Use this command to set the tag for IP RNS probe.

Use the **no** form of this command to restore the default setting.

tag *text*

no tag

Parameter Description

Parameter	Description
text	Sets the tag for IP RNS probe, which is composed of up to 79 printable characters.

Defaults

N/A

Command Mode

IP RNS DNS configuration mode

IP RNS ICMP echo configuration mode

Usage Guide

Tag is used to identify the probe. When the tag exceeds 79 characters, the surplus characters are truncated.

Configuration Examples

The following example sets the tag for IP RNS probe to telecom gateway.

```
FS(config)# ip rns 1
FS(config-ip-rns)# icmp-echo 10.1.1.1
```

```
FS(config-ip-rns-icmp-echo)# tag telecom_gateway
FS(config-ip-rns-icmp-echo)# exit
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.21 tcp-connect

Use this command to configure TCP connectivity probe.

tcp-connect { *destination-ip-address* | *destination-hostname* [**name-server** *ip-address*] } *port-number*

Parameter Description

Parameter	Description
destination-ip-address	Destination IP address
destination-hostname	Destination domain name
name-server *ip-address*	IP address of the DNS server
port-number	TCP port number

Defaults

N/A

Command Mode

IP RNS configuration mode

Usage Guide

TCP connectivity probe detects the connection with the TCP server.

If no peer TCP server exist, enable the IP RNS server function on peer FS devices.

Configuration Examples

The following example configures TCP connectivity probe.

```
FS(config)# ip rns 1
FS(config)# tcp-connect www.FS.net name-server 8.8.8.8 999
FS(config-ip-rns-tcp-connect)# exit
FS(config)# ip rns schedule 1 start-time now life forever
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.22 threshold

Use this command to configure the upper threshold value for IP RNS probe.

Use the **no** form of this command to restore the default setting.

threshold *milliseconds*

no threshold

Parameter Description

Parameter	Description
milliseconds	Sets the upper threshold value, in the range from 0 to 60,000 in the unit of milliseconds.

Defaults

The default is 5,000 milliseconds.

Command Mode

IP RNS DNS configuration mode

IP RNS ICMP echo configuration mode

IP RNS TCP configuration mode

Usage Guide

The threshold value must be no greater than the timeout value. See **Usage Guide** of the **frequency** command for the relationship among timeout, frequency and threshold.

Configuration Examples

The following example sets the upper threshold value for IP RNS probe to 8,000 milliseconds.

```
FS(config)# ip rns 1
FS(config-ip-rns)# icmp-echo 10.1.1.1
FS(config-ip-rns-icmp-echo)# threshold 8000
FS(config-ip-rns-icmp-echo)# exit
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.23 timeout

Use this command to set the timeout time of an IP RNS probe.

Use the **no** form of this command to restore the default setting.

timeout *milliseconds*

no timeout

Parameter Description

Parameter	Description
milliseconds	Sets the timeout time, in the range from 10 to 604,800,000 in the unit of milliseconds. The default is 5,000 milliseconds.

Defaults

The default timeout of an IP RNS probe varies with the detection type, which can be displayed by using **show ip rns configuration** command.

Command Mode

IP RNS ICMP echo configuration mode
IP RNS DNS configuration mode
IP RNS TCP configuration mode

Usage Guide

The timeout value must be no smaller than the threshold value. See **Usage Guide** of the **frequency** command for the relationship among timeout, frequency and threshold.

Configuration Examples

The following example sets the timeout time of an IP RNS probe to 10,000 milliseconds.

```
FS(config)# ip rns 1
FS(config-ip-rns)# icmp-echo 10.1.1.1
FS(config-ip-rns-icmp-echo)# timeout 10000
FS(config-ip-rns-icmp-echo)# exit
```

Related Commands

Command	Description
frequency *milliseconds*	Sets the interval of sending the packets.

Platform Description

N/A

9.24 tos

Use this command to set the Type of Service (ToS) field in the IPv4 header of an IP RNS probe packet.

Use the **no** form of this command to restore the default setting.

tos *number*

no tos

Parameter Description

Parameter	Description
number	Sets the ToS field in the IPv4 header of an IP RNS probe packet, in the range from 0 to 255.

Defaults

The default is 0.

Command Mode

IP RNS DNS configuration mode
IP RNS ICMP echo configuration mode
IP RNS TCP configuration mode

Usage Guide

ToS is an 8-bit field of an IPv4 packet. ToS can be used to set probe packet priority. Different ToS corresponds to different priority.

Configuration Examples

The following example sets the ToS field in the IPv4 header of an IP RNS probe packet to 128.

```
FS(config)# ip rns 1
FS(config-ip-rns)# icmp-echo 10.1.1.1
```

```
FS(config-ip-rns-icmp-echo)# tos 128
FS(config-ip-rns-icmp-echo)# exit
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

9.25 track interface line-protocol

Use this command to configure a tracked object to track the interface status and enter the track mode.

Use the **no** form of this command to delete a tracked object.

track *object-number* **interface** *interface-type interface-number* **line-protocol**

no track *object-number*

Parameter Description

Parameter	Description
object-number	Sets the tracked object number, in the range of 1 to 700.
interface-type interface-number	Sets the interface type and the interface number.

Defaults N/A

Command Mode Global configuration mode

Usage Guide This command is used to configure a tracked object to track the link state of the interface. If the link state of the interface is up, the state of the corresponding tracked object is up too.

Configuration Examples The following example configures the object "track 3" to track the link state of ethernet 0/1.

```
FS(config)# track 3 interface ethernet 0/1 line-protocol
```

Related Commands

Command	Description
track rns	Configures a tracked object to track the operating status of an rns object.
show track	Displays the tracked object related information.

Platform Description N/A

9.26 track list

Use this command to configure a tracked list object and specify the state of the tracked list based on a Boolean calculation.

Use the **no** form of this command to restore the default setting.

track *object-number* **list boolean { and | or }**

no track *object-number*

Parameter Description

Parameter	Description
object-number	Sets the number of the tracked object, in the range from 1 to 700.

Defaults

N/A

Command Mode

Global configuration mode

Usage Guide

This command is used to configure a tracked list object and specify the state of the tracked list based on a Boolean calculation

- **track** *object-number* **list boolean and:** Configure a tracked list with a Boolean expression using "AND" operator.
- **track** *object-number* **list boolean or**: Configure a tracked list with a Boolean expression using "OR" operator.

Configuration Examples

The following example configures tracked list object "4" and specifies the state of the tracked list based on a Boolean calculation using operator "AND".

```
FS(config)# track 4 list boolean and
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

9.27 track rns

Use this command to configure a tracked object to track the operating status of an RNS object and enter the track mode.

Use the **no** form of this command is used to delete a tracked object.

track *object-number* **rns** *entry-number*

no track *object-number*

Parameter Description

Parameter	Description
object-number	Sets the tracked object number, in the range from 1 to 700.
entry-number	Sets the RNS object number, in the range from 1 to 500.

Defaults

N/A

Command Mode Global configuration mode

Usage Guide The RNS object status is determined by whether the response packets are received. If so, the RNS object status is up and the status of the corresponding tracked object that tracks this RNS is also up.

Configuration Examples The following example configures the object "track 5" to track the RNS instance "rns 7".

```
FS(config)# track 5 rns 7
```

Related Commands

Command	Description
track interface line-protocol	Tracks the status of one interface and enter the track mode.
show track [*track-number*]	Displays the tracked object related information.

Platform Description N/A

9.28 track rns-list

Use this command to configure a tracked object to track the detection result of an RNS list instance.

Use the **no** form of this command to delete a tracked object.

track *object-number* **rns-list** *men-list* { **and | or** }

no track *object-number*

Parameter Description

Parameter	Description
object-number	Indicates the number of the tracked object. The value ranges from 1 to 700.
men-list	Indicates the RNS list to be tracked. The value can be an RNS detection instance or a range of RNS detection instances. The instance range begins with a smaller RNS ID, ends with a larger RNS ID and is separated with an en dash (–), for example, 10–20. The value of an RNS ID ranges from 1 to 500.

Defaults N/A

Command Mode Global configuration mode

Default Level 1

Usage Guide This command is used to configure a tracked object and specify the status of an RNS list based on a Boolean calculation.

- track object-number rns-list men-list and: Configures a tracked object to track the status of a tracked list with a Boolean expression using the "AND" operator.
- **track** *object-number* **rns-**list *men-list* or: Configures a tracked object to track the status of an RNS list with a

Boolean expression using the "OR" operator.

Configuration Examples

The following example configures tracked object numbered 5 to track RNS instances numbered 1, 2–5, and 8.

```
FS(config)# track 5 rns-list 1,2-5,8 and
```

Verification

Run the **show track** command to display statistics of the tracked object.

Prompts

1. If resources on the device are insufficient when a tracked object is configured, an error will be displayed.

```
Failed to create track obj, no resource.
```

2. If the **no track** command is executed to delete a specified tracked object but this object does not exist on the device, an error will be displayed.

```
the track object does not exist.
```

Common Errors

1. A tracked object is configured to track an RNS list but the relevant RNS instance is not configured.

Platform Description

N/A

9.29 vrf

Use this command to set the VRF where the IP RNS probe resides.

Use the **no** form of this command to restore the default setting.

vrf *vrf-name*

no vrf

Parameter Description

Parameter	Description
vrf-name	Sets the VRF name.

Defaults

N/A

Command Mode

IP RNS ICMP echo configuration mode

IP RNS DNS configuration mode

IP RNS TCP configuration mode

Usage Guide

N/A

Configuration Examples

The following example sets the VRF where the IP RNS probe resides to VPN1.

```
FS(config)# ip rns 1
FS(config-ip-rns)# icmp-echo 192.168.23.1
FS(config-ip-rns-icmp-echo)# vrf VPN1
FS(config-ip-rns-icmp-echo)# exit
FS(config)# ip rns schedule 1 start-time now life forever
```

Related Commands

Command	Description
frequency *milliseconds*	Sets the interval of sending the packets.

Platform Description

N/A

Chapter 10 Network Management & Monitoring Commands

1. SNMP Commands
2. RMON Commands
3. NTP Commands
4. SNTP Commands
5. SPAN-RSPAN Commands
6. ERSPAN Commands
7. sFlow Commands

1. SNMP Commands

1.1 Clear Snmp Locked-ip

Use this command to clear the source IP addresses which are locked after continuous SNMP authentication failures.

clear snmp locked-ip [**ipv4** *ipv4-address* | **ipv6** *ipv6-address*]

Parameter Description

Parameter	Description
ipv4 *ipv4-address*	Clears a specified IPv4 address.
ipv6 *ipv6-address*	Clears a specified IPv6 address.

Defaults

N/A

Command mode

Privileged EXEC mode.

Usage Guide

Use this command to clear the source IP addresses which are locked after continuous SNMP authentication failures. You can clear the whole source IP address table or a specific source IP address.

After the source IP addresses locked are cleared, the SNMP packets with these source IP addresses could be authenticated again.

Configuration Examples

The following example clears the whole source IP address table locked after continuous SNMP authentication failures.

```
FS#clear snmp locked-ip
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.2 No Snmp-server

Use this command to disable the SNMP agent function.

no snmp-server

Parameter Description

Parameter	Description
N/A	N/A

Defaults

SNMP agent is enabled by default.

Command

Global configuration mode.

mode

Usage Guide This command disables the SNMP agent services of all versions supported on the device.

Configuration Examples The following example disables the SNMP agent.

```
FS(config)# no snmp-server
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.3 Show Snmp

Use this command to display the SNMP configuration.

show snmp [**mib** | **user** | **view** | **group** | **host** | **locked-ip** | **process-mib-time**]

Parameter Description

Parameter	Description
mib	Displays the SNMP MIBs supported.
user	Displays the SNMP user information.
view	Displays the SNMP view information.
group	Displays the SNMP user group information.
host	Displays the explicit host configuration.
locked-ip	Displays the source IP addresses locked after continuous SNMP authentication failures.
process-mib-time	Displays the MIB node requiring the longest processing time.

Defaults N/A

Command mode Privileged EXEC mode.

Usage Guide N/A

Configuration Examples The example below displays the SNMP configuration:

```
FS# show snmp
Chassis: 60FF60
0 SNMP packets input
        0 Bad SNMP version errors
        0 Unknown community name
        0 Illegal operation for community name supplied
        0 Encoding errors
```

```
        0 Number of requested variables
        0 Number of altered variables
        0 Get-request PDUs
        0 Get-next PDUs
        0 Set-request PDUs
0 SNMP packets output
        0 Too big errors (Maximum packet size 1472)
        0 No such name errors
        0 Bad values errors
        0 General errors
        0 Response PDUs
        0 Trap PDUs
SNMP global trap: disabled
SNMP logging: disabled
SNMP agent: enabled
```

Related Commands

Command	Description
snmp-server chassis-id	Specifies the SNMP system sequence number.

Platform Description

N/A

1.4 Snmp Trap Link-status

Use this command to enable the interface to send link traps. Use the **no** form of this command to disable the interface to send link traps.

snmp trap link-status

no snmp trap link-status

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Sending link traps on the interface is enabled by default. If the interface link status changes, SNMP link traps will be sent.

Command mode

Interface configuration mode

Usage Guide

This command can be configured on the Ethernet interface, aggregate ports and SVI interfaces.

Configuration Examples

The following example disables the interface to send link traps.

```
FS(config)# interface gigabitEthernet 1/1
FS(config-if–GigabitEthernet 1/1)# no snmp trap link-status
```

The following example enables the interface to send link traps.

```
FS(config)# interface gigabitEthernet 1/1
FS(config-if–GigabitEthernet 1/1)# snmp trap link-status
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.5 Snmp-server Authentication Attempt

Use this command to configure the maximum number of continuous SNMP authentication failures, and specified the action policy for the authentication failure. Use the **no** form of this command to remove the limit of continuous SNMP authentication failures and the related action policies.

snmp-server authentication attempt *times* **exceed** { **lock** | **lock-time** *minutes* | **unlock** }

no snmp-server authentication attempt *times* **exceed** { **lock** | **lock-time** *minutes* | **unlock** }

Parameter Description

Parameter	Description
times	The maximum number of continuous SNMP authentication failures. The range is from 1 to 10.
exceed	Indicates the action policy in the case that the maximum number of continuous SNMP authentication failures is exceeded.
lock	Indicates that the source IP address is permanently locked to be authenticated and can be unlocked only by the administrator's manual configuration.
lock-time *minutes*	Indicates that the source IP address is locked for a period of time. The *minutes* indicates the lock time, ranging from 1 to 65,535. The unit is minute.
unlock	Indicates that no action policy is configured for the authentication failed user, that is, the SNMP authentication for this user is allowed.

Defaults SNMP attack prevention is disabled by default.

Command mode Global configuration mode

Usage Guide The IP address of the SNMP authentication failed user is added to the blacklist. When the maximum number of continuous SNMP authentication failures is exceeded, the system will perform the related authentication limit actions according the configured policy.:

1. For the permanently locked IP addresses: The source IP addresses can be authenticated only after the administrator unlock them manually.
2. For the IP addresses locked for a period time: The source IP addresses can be authenticated only after the

lock time expires or the administrator unlock them manually.

3. For the unlocked IP addresses: The source IP address can pass the authentication as long as the correct community (for SNMPv1 and SNMPv2) or username (for SNMPv3) is used.

Configuration Examples

The following example configures the maximum number of continuous SNMP authentication failures to 4, and sets the IP address lock time to 30 seconds.

```
FS(config)# snmp-server authentication attempt 4 exceed lock-time 30
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.6 Snmp-server Chassis-id

Use this command to specify the SNMP chassis ID. Use the **no** form of this command to restore the default chassis ID.

snmp-server chassis-id *text*

no snmp-server chassis-id

Parameter Description

Parameter	Description
text	SNMP chassis ID: numerals or characters.

Defaults

The default is 60FF60.

Command mode

Global configuration mode.

Usage Guide

The SNMP chassis ID is generally the serial number of the device to facilitate identification. The SNMP chassis ID can be displayed through the **show snmp** command.

Configuration Examples

The following example specifies the SNMP chassis ID as 123456:

FS(config)# **snmp-server chassis-id** *123456*

Related Commands

Command	Description
show snmp	Displays the SNMP configuration.

Platform Description

N/A

1.7 Snmp-server Community

Use this command to specify the SNMP community access string. Use the **no** form of this command to remove the SNMP community access string.

snmp-server community [0 | 7] *string* [**view** *view-name*] [[**ro** | **rw**] [**host** *ipaddr*] [**ipv6** *ipv6-aclname*] [*aclnum*] [*aclname*]

no snmp-server community [0 | 7] *string*

Parameter Description

Parameter	Description
0	Indicates that the community string is in plaintext.
7	Indicates that the community string is in ciphertext.
string	Community string, which is the communication password between the NMS and the SNMP agent
view-name	View name
ro	Indicates that the NMS can only read the variables of the MIB.
rw	Indicates that the NMS can read and write the variables of the MIB.
aclnum	Access list number (1 to 199, and 1300 to 2699), which specifies the IPV4 addresses that are permitted to access the MIB.
aclname	Access list name, which specifies the IPV4 addresses that are permitted to access the MIB.
ipv6-aclname	IPv6 access list name, which specifies the IPv6 addresses that are permitted to access the MIB.
ipaddr	Specifies the IP address of the NMS to access the MIB.

Defaults

All communities are read only by default.

Command mode

Global configuration mode.

Usage Guide

This command is an essential command to enable the SNMP agent function, such as specifying the community attribute and IP addresses of NMS to access the MIB.

To disable the SNMP agent function, use the **no snmp-server** command.

Configuration Examples

The following example defines a SNMP community access string named public, which can be read-only.

FS(config)# **snmp-server community public ro**

Related Commands

Command	Description
access-list	Defines an access list.

Platform Description

N/A

1.8 Snmp-server Contact

Use this command to specify the system contact string. Use the **no** form of this command to remove the system contact string.

snmp-server contact *text*

no snmp-server contact

Parameter Description

Parameter	Description
text	Defines a system contact string.

Defaults No system contact string is set by default.

Command mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example specifies the SNMP system contract i-net800@i-net.com.cn:

FS(config)# **snmp-server contact** *i-net800@i-net.com.cn*

Related Commands

Command	Description
show snmp-server	Displays the SNMP configuration.
no snmp-server	Disables the SNMP agent function.

Platform Description N/A

1.9 Snmp-server Enable Traps

Use this command to enable the SNMP agent to send the SNMP trap massage to NMS. Use the **no** form of this command to disable the SNMP agent to send the SNMP trap massage to NMS.

snmp-server enable traps [*notification-type*]

no snmp-server enable traps

Parameter Description

Parameter	Description
notification-type	Specifies the type of trap messages. snmp: SNMP trap message bridge: Bridge trap message. mac-notification: MAC trap message. ospf: OSPF trap message. vrrp: VRRP trap message. web-auth: Web authentication trap message.

Defaults Sending trap message to the NMS is disabled by default.

Command mode Global configuration mode.

Usage Guide This command must be used together with the **snmp-server host** command to send the trap message. Specifying no trap type indicates all trap messages are sent.

Configuration Examples The following example enables the SNMP agent to send the SNMP trap message.

```
FS(config)# snmp-server enable traps snmp
FS(config)# snmp-server host 192.168.12.219 public snmp
```

Related Commands

Command	Description
snmp-server host	Specifies the SNMP host to send the SNMP trap message.

Platform Description N/A

1.10 Snmp-server Flow-control

Use this command to configure the SNMP flow control. Use the **no** form of this command to restore the default setting.

snmp-server flow-control pps [*count*]

no snmp-server flow-control pps

Parameter Description

Parameter	Description
count	Indicates the number of SNMP requests processed per second, ranging from 50 to 65,535.

Defaults The default count is 300.

Command mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example configures the number of SNMP requests processed per second to 200.

```
FS(config)# snmp-server flow-control pps 200
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.11 Snmp-server Group

Use this command to configure a new SNMP group**.** Use the **no** form of this command to remove a specified SNMP group.

snmp-server group *groupname* { **v1** | **v2c** | **v3** { **auth** | **noauth** | **priv** } } [**read** *readview*] [**write** *writeview*] [**access** { [**ipv6** *ipv6_aclname* | *aclnum* | *aclname* }]

no snmp-server group *groupname* {**v1** | **v2c** | **v3** { **auth** | **noauth** | **priv** } }

Parameter Description

Parameter	Description
v1 | **v2c** | **v3**	Specifies the SNMP version
auth	Specifies authentication of a packet without encrypting it. This applies to SNMPv3 only.
noauth	Specifies no authentication a packet. This applies to SNMPv3 only.
priv	Specifies authentication of a packet with encryption. This applies to SNMPv3 only.
readview	Specifies a read-only view for the SNMP group. This view enables you to view only the contents of the agent.
writeview	Specifies a write view for the SNMP group. This view enables you to enter data and configure the contents of the agent.
aclnum	Access list number, which specifies the IPV4 addresses that are permitted to access the MIB.
aclname	Name of the access list, which specifies the IPV4 addresses that are permitted to access the MIB.
ipv6_aclname	Name of the IPv6 access list, which specifies the IPv6 addresses that are permitted to access the MIB.

Defaults No SNMP groups are configured by default.

Command mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example configures a new SNMP group.

```
FS(config)# snmp-server group mib2user v3 priv read mib2
```

Related Commands

Command	Description
show snmp group	Displays the SNMP group configuration.

Platform N/A

Description

1.12 Snmp-server Host

Use this command to specify the SNMP host (NMS) to send the trap message. Use the **no** form of this command to remove the specified SNMP host.

snmp-server host { *host-addr* | **ipv6** *ipv6-addr* } [**traps | informs**] [**version** { **1** | **2c** | **3** [**auth** | **noauth** | **priv**]] *community-string* [**udp-port** *port-num*] [*notification-type*]

no snmp-server host { *host-addr* | **ipv6** *ipv6-addr* } [**traps | informs**] [**version** { **1** | **2c** | **3** { **auth** | **noauth** | **priv** }] *community-string* [**udp-port** *port-num*]

Parameter Description

Parameter	Description
host-addr	SNMP host address
ipv6-addr	SNMP host address(ipv6)
trap | informs	Enables the host to send the SNMP notification as traps or informs.
version	SNMP version: V1, V2C or V3
auth | **noauth** | **priv**	Security level of SNMPv3 users
community-string	Community string or username (SNMPv3 version)
port-num	Port of the SNMP host
notification-type	The type of the SNMP trap message, such as **snmp**. If no type of the SNMP trap message is specified, all types of the SNMP trap message will be included.

Defaults No SNMP host is specified by default.

Command mode Global configuration mode.

Usage Guide This command must be used together with the **snmp-server enable traps** command to send the SNMP trap messages to NMS.

Multiple SNMP hosts can be configured to receive the SNMP trap messages. One host can use different combinations of the types of the SNMP trap message, but the last configuration for the same host will overwrite the previous configurations. In other words, to send different SNMP trap messages to the same host, different combination of SNMP trap messages can be configured.

Configuration Examples The following example specifies an SNMP host to receive the SNMP event trap:

```
FS(config)# snmp-server host 192.168.12.219 public snmp
```

Related Commands

Command	Description
snmp-server enable traps	Enables the SNMP agent to send the SNMP trap message.

Platform N/A

Description

1.13 Snmp-server Inform

Use this command to configure the resend times for inform requests and the inform request timeout**.** Use the **no** form of this command to restore the default settings.

snmp-server inform [**retries** *retry-time* | **timeout** *time*]

no snmp-server inform

Parameter Description

Parameter	Description
retry-num	Specifies the resend times for inform requests, ranging from 0 to 255.
time	Specifies the inform request timeout, ranging from 0 to 21,474,836.

Defaults The default *retry-num* is 3, and the default **timeout** *time* is 15 seconds.

Command mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example configures the resend times of inform requests to 5.

```
FS(config)# snmp-server inform retries 5
```

The following example configures the inform request timeout to 20 seconds.

```
FS(config)# snmp-server inform timeout 20
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.14 Snmp-server Location

Use this command to set the system location string. Use the **no** form of this command to remove the system location string.

snmp-server location *text*

no snmp-server location

Parameter Description

Parameter	Description
text	String that describes the system location information.

Defaults No system location string is set by default.

Command mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example sets the system location information:

```
FS(config)# snmp-server location start-technology-city 4F of A Buliding
```

Related Commands

Command	Description
snmp-server contact	Sets the system contact information.

Platform Description N/A

1.15 Snmp-server Net-id

Use this command to configure the network element coding information of the device. Use the **no** form of this command to remove the network element coding information.

snmp-server net-id *text*

no snmp-server net-id

Parameter Description

Parameter	Description
text	Configures the network element coding information of the device. The text length ranges from 1 to 255. The text is case-sensitive, and may contain spaces.

Defaults No network element coding information is configured by default.

Command mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example configures the network element coding text to FZ_CDMA_MSC1.

```
FS(config)# snmp-server net-id FZ_CDMA_MSC1
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.16 Snmp-server Packetsize

Use this command to specify the largest size of the SNMP packet. Use the **no** form of this command to restore the default value.

snmp-server packetsize *byte-count*

no snmp-server packetsize

Parameter Description

Parameter	Description
byte-count	Packet size. The range is from 484 to 17,876 bytes

Defaults

The default is 1,472 bytes.

Command mode

Global configuration mode.

Usage Guide

The following example specifies the largest size of SNMP packet as 1,492 bytes:

```
FS(config)# snmp-server packetsize 1492
```

Configuration Examples

N/A

Related Commands

Command	Description
snmp-server queue-length	Specifies the length of the message queue for each SNMP trap host.

Platform Description

N/A

1.17 Snmp-server Queue-length

Use this command to specify the length of the message queue for each SNMP trap host. Use the **no** form of this command to restore the default value.

snmp-server queue-length *length*

no snmp-server queue-length

Parameter Description

Parameter	Description
length	Queue length. The range is from 1 to 1000.

Defaults

The default is 10.

Command mode

Global configuration mode.

Usage Guide

Use this command to adjust the length of message queue for each SNMP trap host for the purposes of controlling

the speed of sending the SNMP trap messages.

Configuration Examples

The following example specifies the length of message queue as 100.

```
FS(config)# snmp-server queue-length 100
```

Related Commands

Command	Description
snmp-server packetsize	Specifies the largest size of the SNMP packet.

Platform Description

N/A

1.18 Snmp-server System-shutdown

Use this command to enable the SNMP message reload function. Use the **no** form of this command to disable the SNMP message reload function.

snmp-server system-shutdown

no snmp-server system-shutdown

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The SNMP message reload function is disabled by default.

Command mode

Global configuration mode.

Usage Guide

Use this command to enable the SNMP message reload function which may enable the system to send the device reload traps to the NMS before the device is reloaded or rebooted.

Configuration Examples

The following example enables the SNMP message reload function:

```
FS(config)# snmp-server system-shutdown
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

1.19 Snmp-server Trap-format Private

Use this command to configure the SNMP traps with private fields. Use the **no** form of this command to restore the default trap format.

snmp-server trap-format private

no snmp-server trap-format private

Parameter Description

Parameter	Description
N/A	N/A

Defaults The private field is not carried in the SNMP trap by default.

Command mode Global configuration mode.

Usage Guide Use this command to configure the SNMP trap format with the private field. Currently, the supported data in the private field is alarm occurrence time. For the specific data type and range of each field, refer to FS-TRAP-FORMAT-MIB.mib file.

This command does not work if the traps are sent with SNMPv1.

Configuration Examples The following example configures the SNMP trap format with the private field.

```
FS(config)# snmp-server trap-format private
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.20 Snmp-server Trap-source

Use this command to specify the source interface of the SNMP trap message. Use the **no** form of this command to restore the default value.

snmp-server trap-source *interface*

no snmp-server trap-source

Parameter Description

Parameter	Description
interface	Specifies the source interface of the SNMP trap messages.

Defaults By default, the IP address of the interface from which the SNMP packet is sent is just the source address.

Command mode Global configuration mode.

Usage Guide For easy management and identification, you can use this command to fix a local IP address as the SNMP source address.

Configuration Examples

The following example specifies the IP address of Ethernet interface 0/1 as the source address of the SNMP trap message:

```
FS(config)# snmp-server trap-source fastethernet 0/1
```

Related Commands

Command	Description
snmp-server enable traps	Enables t the SNMP agent to send the SNMP trap massage to NMS.
snmp-server host	Specifies the NMS host to send the SNMP trap message.

Platform Description

N/A

1.21 Snmp-server Trap-timeout

Use this command to define the retransmission timeout time of the SNMP trap message. Use the **no** form of this command to restore the default value.

snmp-server trap-timeout *seconds*

no snmp-server trap-timeout

Parameter Description

Parameter	Description
seconds	Timeout (in seconds) of retransmit the SNMP trap message. The range is from 1 to 1,000.

Defaults

The default is 30 seconds.

Command mode

Global configuration mode.

Usage Guide

N/A

Configuration Examples

The following example specifies the timeout period as 60 seconds.

```
FS(config)# snmp-server trap-timeout 60
```

Related Commands

Command	Description
snmp-server queue-length	Specifies the length of message queue for the SNMP trap host.
snmp-server host	Specifies the NMS host to send the SNMP trap message.
snmp-server trap-source	Specifies the source address of the SNMP trap message.

Platform Description N/A

1.22 Snmp-server Udp-port

Use this command to specify a port to receive SNMP packets**.** Use the **no** form of this command to restore the default setting.

snmp-server udp port *port-number*

no snmp-server udp port

Parameter Description

Parameter	Description
port-number	Specifies a port to receive the SNMP packets.

Defaults The default is 161.

Command mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example specifies port 15000 to receive the SNMP packets.

```
FS(config)# snmp-server udp-port 15000
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

1.23 Snmp-server User

Use this command to configure a new user to an SNMP group**.** Use the **no** form of this command to remove a user from an SNMP group.

snmp-server user *username groupname* { **v1** | **v2c** | **v3** [**encrypted**] [**auth** { **md5** | **sha** } *auth-password*] [**priv des56** *priv-password*] } [**access** { [**ipv6** *ipv6_aclname*] [*aclnum* | *aclname* }]]

no snmp-server user *username groupname* { **v1** | **v2c** | **v3** }

Parameter Description

Parameter	Description
username	Name of the user on the host that connects to the agent.
groupname	Name of the group to which the user belongs.
v1 | v2c | v3	Specifies the SNMP version. But only SNMPv3 supports the following security parameters.

encrypted	Specifies whether the password appears in cipher text. In cipher text format, you need to enter continuous hexadecimal numeric characters. Note that the authentication password of MD5 has a length of 16 bytes, while that of SHA has a length of 20 bytes. Two characters make a byte. The encrypted key can be used only by the local SNMP engine on the switch.
auth	Specifies which authentication level should be used.
auth-password	Password string (no more than 32 characters) used by the authentication protocol. The system will change the password to the corresponding authentication key.
priv	Encryption mode. des56 refers to 56-bit DES encryption protocol. *priv-password*: password string (no more than 32 characters) used for encryption. The system will change the password to the corresponding encryption key.
md5	Enables the MD5 authentication protocol. While the **sha** enables the SHA authentication protocol.
aclnumber	Access list number, which specifies the IPV4 addresses that are permitted to access the MIB.
aclname	Name of the access list, which specifies the IPV4 addresses that are permitted to access the MIB.
ipv6_aclname	Name of the IPv6 access list, which specifies the IPv6 addresses that are permitted to access the MIB.

Defaults N/A

Command mode Global configuration mode.

Usage Guide N/A

Configuration Examples The following example configures an SNMPv3 user with MD5 authentication and DES encryption:

```
FS(config)# snmp-server user user-2 mib2user v3 auth md5 authpassstr priv des56 despassstr
```

Related Commands

Command	Description
show snmp user	Displays the SNMP user configuration.

Platform Description N/A

1.24 Snmp-server View

Use this command to configure an SNMP view**.** Use the **no** form of this command to remove an SNMP view.

snmp-server view *view-name oid-tree* { **include** | **exclude** }

no snmp-server view *view-name* [*oid-tree*]

Parameter Description

Parameter	Description
view-name	View name
oid-tree	Specifies the MIB object to associate with the view.
include	Includes the sub trees of the MIB object in the view.
exclude	Excludes the sub trees of the MIB object from the view.

Defaults

By default, a view is set to access all MIB objects.

Command mode

Global configuration mode.

Usage Guide

N/A

Configuration Examples

The following example sets a view that includes all MIB-2 sub-trees (oid is 1.3.6.1).

```
FS(config)# snmp-server view mib2 1.3.6.1 include
```

Related Commands

Command	Description
show snmp view	Displays the SNMP view configuration.

Platform Description

N/A

2. RMON Commands

2.1 Rmon Alarm

Use this command to monitor a MIB variable. Use the **no** form of this command to remove the alarm entry.

rmon alarm *number variable interval* {**absolute** | **delta** } **rising-threshold** *value* [*event-number*] **falling-threshold** *value* [*event-number*] [**owner** *ownername*]

no rmon alarm *number*

Parameter description

Parameter	Description
number	Alarm number. The value ranges from 1-65,535.
variable	Alarm variable. The value is a character string consisting of 1 to 255 characters in OID dotted format (the format is entry.integer.instance or a leaf node named .instance, for example. 1.3.6.1.2.1.2.1.10.1).
interval	Sampling interval. The valye ranges from 1 to 2,147,483,647 in the unit of second.
absolute	Absolute sampling. In this mode, when the sampling time arrives, the system directly invokes the variable value.
delta	Delta sampling. In this mode, when the sampling time arrives, the system invokes the delta value of the variable within the sampling interval.
rising-threshold *value*	Rising threshold and the corresponding event number when the threshold is reached. The threshold ranges from -2,147,483,648 to +2,147,483,647.
event-number	The event number ranges from 1 to 65,535.
falling-threshold *value*	Falling threshold and the corresponding event number when the threshold is reached. The threshold ranges from -2,147,483,648 to +2,147,483,647
owner *ownername*	Owner of an entry. The value is a character string consisting of 1 to 63 characters that are case sensitive.

Default

N/A.

Command mode

Global configuration mode.

Usage guidelines

The FSOS allows you to modify the configured history information of the Ethernet network, including variable, absolute/delta, owner, rising-threshold/falling-threshold, and the corresponding events. However, the modification does not take effect immediately until the system triggers the monitoring event at the next time.

Examples

The example below monitors the MIB variable instance ifInNUcastPkts.6.

FS(config)# rmon alarm *10 1.3.6.1.2.1.2.2.1.12.6 30* delta rising-threshold *20 1* falling-threshold *10 1* owner *zhangsan*

Related commands

Command	Description
rmon event *number* [**log**] [**trap** *community*] **description** *string* [**owner** *owner-string*]	Adds an event definition.

2.2 Rmon Collection History

Use this command to enable history statistics on the Ethernet interface. Use the **no** form of this command to remove the history entry.

rmon collection history *index* [**owner** *ownername*] [**buckets** *bucket-number*] [**interval** *seconds*]

no rmon collection history *index*

Parameter description

Parameter	Description
index	Index of a history entry. The value ranges from 1 to 65,535.
owner *ownername*	Owner of an entry. The value is a character string consisting of 1 to 63 characters that are case sensitive.
buckets *bucket-number*	Capacity of a history entry (that is, the maximum number of history entries). The value ranges from 1 to 65,535. The default value is 10.
interval *seconds*	Statistics period. The unit is second. The value ranges from 1 to 3,600. The default value is 1,800 seconds.

Default

N/A.

Command mode

Interface configuration mode.

Usage guidelines

The configured history control entry parameters cannot be modified. And the history entry can be removed from the interface where the entry configured.

Examples

The example below enables log statistics on interface GigabitEthernet 0/1.

```
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#interface gigabitEthernet 0/1
FS(config-GigabitEthernet0/1)#rmon collection history 1 owner UserA buckets 5 interval 60
```

Related commands

Command	Description
rmon collection stats *index* [owner *owner-name*]	Adds a statistical entry on the Ethernet interface.

2.3 Rmon Collection Stats

Use this command to monitor an Ethernet interface. Use the **no** form of this command to remove the configuration.

rmon collection stats *index* [**owner** *owner-string*]

no rmon collection stats *index*

Parameter description

Parameter	Description
index	Index of the statistic table. The value ranges from 1 to 65,535.
owner *ownername*	Owner of an entry. The value is a character string consisting of 1 to 63 characters that are case sensitive and do not contain spaces.

Default N/A.

Command mode Interface configuration mode.

Usage guidelines N/A.

Examples

The example below enables monitoring the statistics of interface GigabitEthernet 0/1.

```
FS# configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#interface gigabitEthernet 0/1
FS(config-GigabitEthernet0/1)# rmon collection stats 1 owner UserA
```

Related commands

Command	Description
rmon collection history *index* [**owner** *owner-name*] [**buckets** *bucket-number*] [**interval** *seconds*]	Adds a history control entry.

2.4 Rmon Event

Use this command to define an event. Use the **no** form of this command to remove the event entry.

rmon event *number* [**log**] [**trap** *community*] [*description-string*] [**description** *description-string*] [**owner** *owner-name*]

no rmon event *number*

Parameter description

Parameter	Description
number	Event number. The value ranges from 1 to 65,535.
log	(Optional) Log event. When a log event is triggered, the system records a log.
trap *community*	(Optional) Trap event. When a trap event is triggered, the system sends trap with the group named “community”.
description *description-string*	(Optional) Description of the event. The value is a character string consisting of 1 to 127 characters.
owner *owner-name*	(Optional) Owner of an entry. The value is a character string consisting of 1 to 63 characters that are case sensitive.

Default N/A.

Command mode Global configuration mode.

Usage guidelines N/A.

Examples

The example below defines the event actions: log event and send trap message.

```
FS#configure terminal
Enter configuration commands, one per line.    End with CNTL/Z.
FS(config)#rmon event 1 log trap public description "ifInNUcastPkts is abnormal" owner UserA
```

Related commands

Command	Description
rmon alarm *number variable interval* {**absolute** | **delta** } **rising-threshold** *value* [*event-number*] **falling-threshold** *value* [*event-number*] [**owner** *ownername*]	Adds an alarm entry.

2.5 Show Rmon

Default

Use this command to display the RMON configuration.

show rmo

Default

N/A.

Command mode

Privileged EXEC mode.

Usage guidelines

N/A.

Examples

The example below displays the RMON configuration.

```
FS#show rmon
ether statistic table:
                index = 1
                interface = GigabitEthernet 0/1
                owner = admin
                status = 0
                dropEvents = 61
                octets = 170647461
                pkts = 580375
                broadcastPkts = 2135
                multiPkts = 3615
                crcAlignErrors = 0
                underSizePkts = 0
                overSizePkts = 0
                fragments = 0
                jabbers = 0
                collisions = 0
                packets64Octets = 3254668
                packets65To127Octets = 1833370
                packets128To255Octets = 2098146
                packets256To511Octets = 126716
                packets512To1023Octets = 363621
                packets1024To1518Octets = 1077865

rmon history control table:
                index = 1
                interface = GigabitEthernet 0/1
                bucketsRequested = 5
                bucketsGranted = 5
```

```
                    interval = 60
                    owner = UserA
                    stats = 1

rmon history table:
                    index = 1
                    sampleIndex = 2485
                    intervalStart = 7d:22h:56m:38s
                    dropEvents = 0
                    octets = 5840
                    pkts = 27
                    broadcastPkts = 0
                    multiPkts = 0
                    crcAlignErrors = 0
                    underSizePkts = 0
                    overSizePkts = 0
                    fragments = 0
                    jabbers = 0
                    collisions = 0
                    utilization = 0
rmon alarm table:
                    index: 1
                    interval: 60
                    oid = 1.3.6.1.2.1.2.2.1.12.6
                    sampleType: 2
                    alarmValue: 0
                    startupAlarm: 3
                    risingThreshold: 20
                    fallingThreshold: 10
                    risingEventIndex: 1
                    fallingEventIndex: 1
                    owner: UserA
                    status: 1

rmon event table:
                    index = 1
                    description = ifInNUcastPkts is abnormal
                    type = 4
                    community = public
                    lastTimeSent = 0d:0h:0m:0s
                    owner =UserA
                    status = 1

rmon log table:
```

```
eventIndex = 1
index = 1
logTime = 6 d:19 h:21 m:48 s
logDescription = ifInNUcastPkts is abnormal
```

Related commands

Command	Description
N/A	N/A

2.6 Show Rmon Alarm

Default

Use this command to display the RMON alarm table.

show rmon alarm

Default

N/A.

Command mode

Privileged EXEC mode.

Usage guidelines

N/A.

Examples

The example below displays the RMON alarm table.

```
FS#show rmon alarm
rmon alarm table:
        index: 1
        interval: 60
        oid = 1.3.6.1.2.1.2.2.1.12.6
        sampleType: 2
        alarmValue: 0
        startupAlarm: 3
        risingThreshold: 20
        fallingThreshold: 10
        risingEventIndex: 1
        fallingEventIndex: 1
        owner: UserA
        status: 1
```

Related commands

Command	Description
rmon alarm *number variable interval* {**absolute** | **delta** } **rising-threshold** *value* [*event-number*] **falling-threshold** *value* [*event-number*] [**owner** *ownername*]	Adds an alarm entry.

2.7 Show Rmon Event

Use this command to display the event configuration.

show rmon event

Default N/A.

Command mode Privileged EXEC mode.

Usage guidelines N/A.

Examples

The example below displays the event configuration.

```
FS#show rmon event
rmon event table:
        index = 1
        description = ifInNUcastPkts is abnormal
        type = 4
        community = public
        lastTimeSent = 0d:0h:0m:0s
        owner =UserA
        status = 1

rmon log table:
        eventIndex = 1
        index = 1
        logTime = 6d:19h:21m:48s
        logDescription = ifInNUcastPkts is abnormal
```

Related commands

Command	Description
rmon event *number* [**log**] [**trap** *community*] [**description** *description-string*] [**owner** *ownername*]	Adds an event entry.

2.8 Show Rmon History

Use this command to display the history information.

show rmon history

Default N/A.

Command mode Privileged EXEC mode.

Usage guidelines N/A.

Examples

The example below displays the history information.

```
FS#show rmon history
rmon history control table:
        index = 1
        interface = GigabitEthernet 0/1
```

```
                    bucketsRequested = 5
                    bucketsGranted = 5
                    interval = 60
                    owner = UserA
                    stats = 1

rmon history table:
                    index = 1
                    sampleIndex = 2485
                    intervalStart = 7d:22h:56m:38s
                    dropEvents = 0
                    octets = 5840
                    pkts = 27
                    broadcastPkts = 0
                    multiPkts = 0
                    crcAlignErrors = 0
                    underSizePkts = 0
                    overSizePkts = 0
                    fragments = 0
                    jabbers = 0
                    collisions = 0
                    utilization = 0
```

Related commands

Command	Description
rmon collection history *index* [owner *ownername*] **[buckets** *bucket-number*] **[interval** *seconds*]	Adds a history control entry.

2.9 Show Rmon Statistics

Use this command to display the RMON statistics.

show rmon statistics

Default

N/A.

Command mode

Privileged EXEC mode.

Usage guidelines

N/A.

Examples

The example below displays the RMON statistics.

```
FS#show rmon statistics
ether statistic table:
                    index = 1
                    interface = GigabitEthernet 0/1
```

```
owner = admin
status = 0
dropEvents = 61
octets = 170647461
pkts = 580375
broadcastPkts = 2135
multiPkts = 3615
crcAlignErrors = 0
underSizePkts = 0
overSizePkts = 0
fragments = 0
jabbers = 0
collisions = 0
packets64Octets = 3254668
packets65To127Octets = 1833370
packets128To255Octets = 2098146
packets256To511Octets = 126716
packets512To1023Octets = 363621
packets1024To1518Octets = 1077865
```

Related commands

Command	Description
rmon collection stats *index* [**owner** *owner-string*]	Adds a statistical entry.

3. NTP Commands

3.1 No Ntp

Use this command to disable Network Time Protocol (NTP), and clear all NTP configuration.

no ntp

Parameter Description

Parameter	Description
N/A	N/A

Defaults

NTP is disabled by default.

Command mode

Global configuration mode.

Usage Guide

By default, NTP is disabled. However, once the NTP server or the NTP primary clock is configured, the NTP service will be enabled.

Configuration Examples

The following example disables NTP.

```
FS(config)#no ntp
```

Related Commands

Command	Description
ntp server	Specifies an NTP server.

Platform Description

N/A

3.2 Ntp Access-group

Use this command to configure an access group to control NTP access. Use the **no** form of this command to remove the peer access group.

ntp access-group { **peer** | **serve** | **serve-only** | **query-only** } *access-list-number* | *access-list-name*

no ntp access-group { **peer** | **serve** | **serve-only** | **query-only** } *access-list-number* | *access-list-name*

Parameter Description

Parameter	Description
peer	Allows the device to receive time requests and NTP control queries to synchronize itself to the servers specified in the access list.
serve	Allows the device to receive time requests and NTP control queries from the servers specified in the access list but not to synchronize itself to the specified servers.
serve-only	Allows the device to receive only time requests from the servers specified in the access list.
query-only	Allows the device to receive only NTP control queries from servers specified in

	the access list.
access-list-number	Access control list number, ranging from 1 to 99 and 1300 to 1999.
access-list-name	Access control list name.

Defaults No access rule to control NTP access is configured by default, namely, NTP access is granted to all devices.

Command mode Global configuration mode.

Usage Guide Use this command to configure an access group to control NTP access, providing a minimal security measures (more secure way is to use the NTP authentication mechanism).

The NTP service enables the access group options to be scanned in the following order, from least restrictive to most restrictive: **peer**, **serve**, **serve-only**, **query-only**.

If you do not configure any access groups, NTP access is granted to all devices. However, once you configure the access rule, NTP access is granted only to the devices specified in the access list.

NTP control query is not supported in the current system. Although it matches with the order in accordance with the above rules, the related requests about the control and query are not supported.

Configuration Examples The following example shows how to allow the device to only receive time requests from the device of 192.168.1.1.

```
FS(config)# access-list 1 permit 192.168.1.1
FS(config)# ntp access-group serve-only 1
```

Related Commands

Command	Description
ip access-list	Creates an IP access control list.

Platform Description N/A

3.3 Ntp Authenticate

Use this command to enable NTP authentication. Use the **no** form of this command to disable NTP authentication.

ntp authenticate

no ntp authenticate

Parameter Description

Parameter	Description
N/A	N/A

Defaults Disabled.

Command mode Global configuration mode.

Usage Guide If NTP authentication is disabled, the synchronization communication is not encrypted. To enable encrypted communication on the server, enable the NTP authentication and configure other keys globally.
NTP authentication is implemented through the trusted key specified by the **ntp authentication-key** and **ntp trusted-key** commands.

Configuration Examples After an authentication key is configured and specified as the global trusted key, enable NTP authentication.

```
FS(config)#ntp authentication-key 6 md5 wooooop
FS(config)#ntp trusted-key 6
FS(config)#ntp authenticate
```

Related Commands

Command	Description
ntp authentication-key	Sets the global authentication key.
ntp trusted-key	Configures the global trusted key.

Platform Description N/A

3.4 Ntp Authentication-key

Use this command to configure an NTP authentication key. Use the **no** form of this command to remove the NTP authentication key.
ntp authentication-key *key-id* **md5** *key-string* [*enc-type*]
no ntp authentication-key *key-id*

Parameter Description

Parameter	Description
key-id	Key ID, ranging from 1 to 4294967295.
key-string	Key string An encrypted key supports up to 64 bytes of length, while a non-encrypted key supports up to 31 bytes.
enc-type	(Optional) Whether this key is encrypted, where, 0 indicates the key is not encrypted, 7 indicates the key is encrypted simply. The key is not encrypted by default.

Defaults NTP authentication key is not configured by default.

Command mode Global configuration mode.

Usage Guide Use this command to configure an NTP authentication key and enables the **md5** algorithm for authentication. Each key presents a unique key ID, which can be configured as a trusted key using the **ntp trusted-key**

command..

You can configure up to 1024 NTP authentication keys. However, each server can support only one key.

Configuration Examples

The following example configures an NTP authentication key.

```
FS(config)ntp authentication-key 6 md5 wooooop
```

Related Commands

Command	Description
ntp authenticate	Enables NTP authentication.
ntp trusted-key	Configures an NTP trusted key.
ntp server	Specifies an NTP server.

Platform Description

N/A

3.5 Ntp Disable

Use this command to disable the device to receive NTP packets on the specified interface.

ntp disable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

All NTP packets can be received by default.

Command mode

Interface configuration mode.

Usage Guide

The NTP message received on any interface can be provided to the client to carry out the clock adjustment. The function can be set to shield the NTP message received from the corresponding interface.

By default, the device receives NTP packets on all interfaces, and adjust clock for the client. You can use this command to disable the device to receive NTP packets on the specified interface.

This command is configured only the interface that can receive and send IP packets.

Configuration Examples

The following example disables the device to receive the NTP packets.

```
FS(config-if)# no ntp disable
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.6 Ntp Master

Use this command to configure the device to act as an authoritative NTP server, synchronizing time to other devices. Use the **no** form of this command to remove the device as an authoritative NTP server.

ntp master [*stratum*]

no ntp master

Parameter Description

Parameter	Description
stratum	Stratum level. The range is from 1 to 15. The default is 8.

Defaults

N/A

Command mode

Global configuration mode.

Usage Guide

In general, the local device synchronizes time from the external time source directly or indirectly. However, if the time synchronization fails due to network connection trouble, you can use this command to configure the local device to act as an authoritative NTP server to synchronize time to t other devices. Once configured, the device will not perform time synchronization with the time source which is of a higher stratum.

Configuring the device to act as an authoritative NTP server (in particular, specify a lower stratum level), may be likely to overwrite the effective time. If multiple devices in the same network are configured with this command, the time synchronization may be instable due to the time difference between the devices.

Before configuring this command, you need to manually correct the system clock to avoid too much bias if the device has never performed time synchronization with the external clock source.

Configuration Examples

The following example configures the device to act as an authoritative NTP server, and sets the stratum level to 12:

```
FS(config)# ntp master 12
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.7 Ntp Server

Use this command to specify a NTP server for the NTP client. Use the **no** form of this command to delete the specified NTP server.

ntp server { *ip-addr* | *domain* | **ip** *domain* | **ipv6** *domain* } [**version** *version*] [**source** *if-name*] [**key** *keyid*] [**prefer**]

no ntp server *ip-addr*

Parameter Description

Parameter	Description
ip-addr	Sets the IP address of the NTP server. The address can be in IPv4 or IPv6 format.
domain	Sets the domain name of the NTP server, supporting IPv4 and IPv6.
version	(Optional) Specifies the NTP version (1-3). The default is NTPv3.
if-name	(Optional) Specifies the source interface from which the NTP message is sent (L3 interface).
keyid	(Optional) Specifies the encryption key adopted when communication with the corresponding server. The key ID range is from 1 to 4,294,967,295.
prefer	(Optional) Specifies the given NTP server as the preferred one.

Defaults

No NTP server is configured by default.

Command mode

Global configuration mode.

Usage Guide

At present, FSOS system only supports clients other than servers. Up to 20 servers can be synchronized.

To carry out the encrypted communication with the server, set the global encryption key and global trusted key firstly, and then specify the corresponding key as the trusted key of the server to launch the encrypted communication of the server. It requires the server presents identical global encryption key and global trust key to complete the encrypted communication with the server.

In the same condition (for instance, precision), the prefer clock is used for synchronization.

The source interface of NTP packets must be configured with the IP address and can be communicated with the peer.

Configuration Examples

The following example configures an NTP server.

For IPv4: FS(config)# ntp server 192.168.210.222

For IPv6: FS(config)# ntp server 10::2

Related Commands

Command	Description
no ntp	Disables NTP.

Platform Description

N/A

3.8 Ntp Trusted-key

Use this command to set a global trusted key. Use the **no** form of this command to remove the global trusted key.

ntp trusted-key *key-id*

no ntp trusted-key *key-id*

Parameter Description

Parameter	Description
key-id	Global trusted key ID, ranging from 1 to 4294967295.

Defaults N/A

Command mode Global configuration mode.

Usage Guide The NTP communication parties must use the same trusted key. The key is identified by ID and is not transmitted to improve security.

Configuration Examples The following example configures an authentication key and sets it as a trusted key.

```
FS(config)#ntp authentication-key 6 md5 wooooop
FS(config)#ntp trusted-key 6
FS(config)#ntp server 192.168.210.222 key 6
```

Related Commands

Command	Description
ntp authenticate	Enables NTP authentication.
ntp authentication-key	Configures an NTP authentication key.
ntp server	Configures an NTP server.

Platform Description N/A

3.9 Ntp Update-calendar

Use this command to enable the NTP client to periodically update the device clock with the time synchronized from the external source clock. Use the **no** form of this command to remove this function.

ntp update-calendar

no ntp update-calendar

Parameter Description

Parameter	Description
N/A	N/A

Defaults By default, update the calendar periodically is not configured.

Command mode Global configuration mode.

Usage Guide By default, the NTP update-calendar is not configured. After configuration, the NTP client updates the calendar at the same time when the time synchronization of external time source is successful. It is recommended to enable this function for keeping the accurate calendar.

Configuration Examples

The following example configures the NTP update calendar periodically.

```
FS(config)# ntp update-calendar
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.10 Show Ntp Server

Use this command to display the NTP server configuration.

show ntp server

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command mode

Privileged EXEC mode, global configuration mode, interface configuration mode, VLAN configuration mode

Usage Guide

N/A

Configuration Examples

The following example displays the NTP server.

```
FS# show ntp server
ntp-server                                    source     keyid          prefer   version
----------------------------------------   --------   -----------   ------   -------
10::2                                         None       None           FALSE    3
192.168.210.222                               None       None           FALSE    3
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

3.11 Show Ntp Status

Use this command to display the NTP configuration.

show ntp status

Parameter Description

Parameter	Description
N/A	N/A

Defaults

N/A

Command mode

Privileged EXEC mode, global configuration mode, interface configuration mode, VLAN configuration mode

Usage Guide

Use this command to display the NTP configuration. No configuration is displayed before the synchronization server is configured for the first time.

Configuration Examples

The following example displays the NTP configuration.

```
FS# show ntp status
Clock is synchronized, stratum 8, reference is 127.127.1.1
nominal freq is 250.0000 Hz, actual freq is 250.0000 Hz, precision is 2**24
reference time is D4BD819B.433892EE (01:27:55.000 UTC )
clock offset is 0.00000 sec, root delay is 0.00000 sec
root dispersion is 0.00002 msec, peer dispersion is 0.00002 msec
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

4. SNTP Commands

4.1 Show Sntp

Use this command to display the SNTP configuration.

show sntp

Parameter Description

Parameter	Description
N/A	N/A

Defaults

Command mode

Privileged EXEC mode, global configuration mode, interface configuration mode.

Usage Guide

N/A

Configuration Examples

The following example displays the SNTP configuration.

```
FS# show    sntp
SNTP state                  : Enable
SNTP server                 : 192.168.4.12
SNTP sync interval      : 60
Time zone                       : +8
```

Related Commands

Command	Description
sntp enable	Enables SNTP.

Platform Description

N/A

4.2 Sntp Enable

Use this command to enable the SNTP function. Use the **no** form of this command to restore the default value.

sntp enable

no sntp enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults

SNTP is disabled by default.

Command mode

Global configuration mode.

Usage Guide N/A

Configuration Examples The following example enables SNTP.

```
FS(config)# sntp enable
```

Related Commands

Command	Description
show sntp	Displays the SNTP configuration.

Platform Description N/A

4.3 Sntp Interval

Use this command to set the interval for the SNTP client to synchronize its clock with the NTP/SNTP server. Use the **no** form of this command to restore the default synchronization interval.

sntp interval *seconds*

no sntp interval

Parameter Description

Parameter	Description
seconds	Synchronization interval. The unit is second, and the range is from 60 to 65,535.

Defaults The default synchronization interval is 1,800 seconds.

Command mode Global configuration mode.

Usage Guide To make the synchronization interval configuration effective, run the **sntp enable** command.

Configuration Examples The following example configures the synchronization interval to 3,600 seconds.

```
FS(config)# sntp interval 3600
```

Related Commands

Command	Description
sntp enable	Enables SNTP.
show sntp	Displays the SNTP configuration.

Platform Description N/A

4.4 Sntp Server

Use this command to specify an SNTP server. Use the **no** form of this command to remove the SNTP server.

sntp server { *ip- address* | *domain* }

no sntp server

Parameter Description

Parameter	Description
ip-address	IP address of the SNTP server.
domain	Specifies the domain name of the SNTP server.

Defaults

No SNTP server is configured by default.

Command mode

Global configuration mode.

Usage Guide

As SNTP is fully compatible with NTP, the SNTP server can be used as an NTP server in Internet.

Configuration Examples

The following example specifies an SNTP server in Internet.

```
FS(config)# sntp server 192.168.4.12
```

Related Commands

Command	Description
show sntp	Displays the SNTP configuration.
sntp enable	Enables SNTP.

Platform Description

N/A

5. SPAN-RSPAN Commands

5.1 Mac-loopback

Use this command to enable MAC loopback. Use the **no** form of this command to disable MAC loopback.

mac-loopback

no mac-loopback

Parameter Description

Parameter	Description
N/A	N/A

Defaults

MAC loopback is disabled by default.

Command mode

Interface configuration mode.

Usage Guide

The MAC loopback feature must be enabled on the interfaces for purposes of local one-to-many mirroring. (Please enable the MAC loopback feature on the down interface, and do not add other configurations to the interface.)

Configuration Examples

The following example configures a remote VLAN.

```
FS(config)#vlan 100
FS(config-vlan)#remote-span
FS(config-vlan)#exit
```

The following example configures a session and specifies the mirrored port.

```
FS(config)#monitor session 1 remote-source
FS(config)#monitor session 1 source interface gigabitEthernet 4/1 both
```

The following example configures the mirroring port, and enables MAC loopback on the port.

```
FS(config)#monitor session 1 destination remote vlan 100 interface gigabitEthernet 4/2 switch
FS(config)#interface gigabitEthernet 4/2
FS(config-if-GigabitEthernet 4/2)#switchport access vlan 100
FS(config-if-GigabitEthernet 4/2)#mac-loopback
```

The following example adds interfaces GigabitEthernet 4/3-4 to the remote VLAN.

```
FS(config)#interface range gigabitEthernet 4/3-4
FS(config-if-range)#switchport access vlan 100
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.2 Monitor Session

Use this command to configure the SPAN session and specify the source port (monitored port).

monitor session *session-num* **source interface** *interface-id* [**both** | **rx** | **tx**]

Use this command to configure the SPAN session mirroring only the traffic permitted by the access list

monitor session *session-num* **source interface** *interface-id* **rx acl** *acl-name*

Use this command to configure the SPAN session and specify the destination port (monitoring port).

monitor session *session-num* **destination interface** *interface-id* [**switch**]

Use this command to configure the remote SPAN session ID on the source device..

monitor session *session-num* **remote-source**

Use this command to configure the remote SPAN session ID on the destination device.

monitor session *session-num* **remote-destination**

Use this command to configure the remote SPAN session and specify the remote SPAN destination VLAN.

monitor session *session-num* **destination remote vlan** *remote-vlan-id* **interface** *interface-id* [**switch**]

Use this command to configure the SPAN session and specify the source VLAN to monitor. Note that the source VLAN should not be a remote VLAN.

monitor session *session-num* **source vlan** *vlan-id* [**rx**]

Use this command to limit the SPAN source traffic to specific VLANs.

monitor session *session-num* **filter vlan** *vlan-id-list*

Use this command to remove the specified SPAN session, or remove the source port or destination port of the specified SPAN session.

no monitor session *session-num* [**source interface** *interface-id* | **destination interface** *interface-id*]

Use this command to remove the specified remote SPAN session, or remove the destination port of the remote SPAN session.

no monitor session *session-num* [**destination remote vlan** *remote-vlan-id* **interface** *interface-id*]

Use this command to remove the specified remote SPAN session, or remote the destination port of the remote SPAN session.

default monitor session *session-num* [**destination remote vlan** *remote-vlan-id* **interface** *interface-id*]

Use this command to remove the specified SPAN session, or remove the source port or destination port of the SPAN session.

default monitor session *session-num* { **source interface** *interface-id* | **destination interface** *interface-id* }

Parameter Description

Parameter	Description
session_number	SPAN session number
interface-id	Interface name
acl *acl-name*	Access list name
remote-vlan-id	Remote VLAN ID
vlan-id	VLAN ID (remote VLAN excluded)
vlan-id-list	VLAN list (remote VLAN excluded)
rx	Monitors the only received traffic.
tx	Monitors the only transmitted traffic.
both	Monitors both received and transmitted traffic. This is the default.
switch	Enables switching on the destination port. Switching function is disabled by default.

Defaults

Port monitoring is disabled by default.

Command mode

Global configuration mode.

Usage Guide

Use this command to configure SPAN or remote SPAN, and specify the source port or destination port.

If the **both**, **rx** or **tx** is not specified for the source port, the **both** parameter is the default.

Configuring an access list for the source port indicates that only the traffic permitted by the access list is monitored.

The **switch** feature is disabled on the destination port.

Configuration Examples

The following example configures the source port and destination port of the SPAN session.

```
FS(config)# monitor session 1 source interface gigabitEthernet 0/1
FS(config)# monitor session 1 destination interface gigabitEthernet 0/2
```

The following example configures the SPAN session mirroring only the traffic permitted by the access list.

```
FS(config)# monitor session 3 source interface gigabitEthernet 0/3 rx acl 90
```

The following example configures a remote SPAN session.

```
FS(config)# monitor session 10 remote-source
```

The following example configures the destination port of the remote SPAN session.

```
FS(config)# monitor session 4 destination remote vlan 10 interface gigabitEthernet 0/5
```

The following example configures the source VLAN of the SPAN session.

```
FS(config)# monitor session 1 source vlan 1
```

The following example removes the SPAN session.

```
FS(config)# no monitor session 1
```

The following example removes the source port and destination port of the SPAN session.

```
FS(config)# no monitor session    1 source interface gigabitEthernet 0/18
FS(config)# no monitor session    1 destination interface gigabitEthernet 0/18
```

Related Commands

Command	Description
N/A	N/A

Platform Description N/A

5.3 Remote-span

Use this command to configure a remote SPAN VLAN in VLAN configuration mode. Use the **no** form of this command to disable the remote SPAN VLAN.

remote-span

no remote-span

Parameter Description

Parameter	Description
N/A	N/A

Defaults Remote SPAN VLAN is disabled by default.

Command mode VLAN configuration mode.

Usage Guide N/A

Configuration Examples The following example configures a remote SPAN VLAN.

FS(config)# **vlan** *100*

FS(config-vlan)# **remote-span**

Related Commands

Command	Description
show vlan	Displays VLAN configuration.

Platform Description N/A

5.4 Show Monitor

Use this command to display the SPAN configurations.

show monitor [**session** *session_number*]

Parameter Description

Parameter	Description
session_number	Displays the specified SPAN session.

Defaults

N/A

Command mode

Privileged EXEC mode, global configuration mode and interface configuration mode

Usage Guide

N/A

Configuration Examples

This following example displays all SPAN sessions.

```
FS(config)# show monitor
sess-num: 2
span-type: LOCAL_SPAN
src-intf:
TenGigabitEthernet 0/5          frame-type Both
dest-intf:
TenGigabitEthernet 0/6
sess-num: 1
span-type: LOCAL_SPAN
src-intf:
TenGigabitEthernet 0/3          frame-type Both
dest-intf:
```

The following example displays SPAN session 1.

```
FS(config)# show monitor session 1
sess-num: 1
span-type: LOCAL_SPAN
src-intf:
TenGigabitEthernet 0/3          frame-type Both
dest-intf:
TenGigabitEthernet 0/4
```

Related Commands

Command	Description
N/A	N/A

Platform Description

N/A

6. ERSPAN Commands

6.1 Destination Ip Address

Use this command to configure the destination IP address for GRE encapsulation. Use the no form of this command to delete the destination IP address.

destination ip address *ip_address*

no destination ip address

Parameter Description

Parameter	Description
ip_address	The destination IP address of GRE encapsulation.

Defaults

N/A

Command mode

ERSPAN configuration mode

Usage Guide

To return to privileged EXEC mode, enter the **end** command or the **Ctrl-C** key combination.

To return to global configuration mode, enter the **exit** command.

Configuration Examples

The following example configures the destination IP address.

```
FS(config)# monitor session 2 erspan-source
FS(config-mon-erspan-src)# destination ip address 10.1.1.2
```

Related Commands

Command	Description
show monitor	Displays the mirror sessions.

Platform Description

N/A

6.2 Ip Dscp

Use this command to configure the DSCP value of the IP packets. Use the **no** form of this command to restore the default setting.

ip dscp *dscp-value*

no ip dscp

Parameter Description

Parameter	Description
dscp-value	The DSCP value of the IP packets.

Defaults

The default DSCP value is 0.

Command

ERSPAN configuration mode

mode

Usage Guide

To return to privileged EXEC mode, enter the **end** command or use the **Ctrl-C** key combination.

To return to global configuration mode, enter the **exit** command.

Configuration Examples

The following example configures the DSCP value of the IP packets.

```
FS(config)# monitor session 2 erspan-source
FS(config-mon-erspan-src)#ip dscp 56
```

Related Commands

Command	Description
show monitor	Displays the mirror sessions.

Platform Description

N/A

6.3 Ip Ttl

Use this command to configure the TTL value of the IP packets. Use the **no** form of this command to restore the default setting.

ip ttl *ttl-value*

no ip ttl

Parameter Description

Parameter	Description
ttl-value	The TTL value of the IP packets.

Defaults

The default TTL value is 64.

Command mode

ERSPAN configuration mode

Usage Guide

To return to privileged EXEC mode, enter the **end** command or use the **Ctrl-C** key combination.

To return to global configuration mode, enter the **exit** command.

Configuration Examples

The following example configures the TTL value of IP packets.

```
FS(config)# monitor session 2 erspan-source
FS(config-mon-erspan-src)#ip ttl 65
```

Related Commands

Command	Description
show monitor	Displays the mirror sessions.

Platform Description

N/A

6.4 Monitor Session

Use this command to create an ERSPAN session. Use the **no** form of this command to delete the session.

monitor session *session_num* { **erspan-source** }

no monitor session *session_num*

Parameter Description

Parameter	Description
session-num	Session ID

Defaults N/A

Command mode Global configuration mode

Usage Guide To return to privileged EXEC mode, enter the **end** command or the **Ctrl-C** key combination.

To return to global configuration mode, enter the **exit** command.

Configuration Examples The following example creates an ERSPAN session.

```
FS(config)# monitor session 2 erspan-source
```

Related Commands

Command	Description
show monitor	Displays the mirror session information.

Platform Description N/A

6.5 Origin Ip Address

Use this command to configure the source IP address for GRE encapsulation. Use the **no** form of this command to delete the source IP address.

origin ip address *ip_address*

no origin ip address

Parameter Description

Parameter	Description
ip_address	The source IP address of GRE encapsulation.

Defaults N/A

Command mode ERSPAN configuration mode

Usage Guide To return to privileged EXEC mode, enter the **end** command or use the **Ctrl-C** key combination.

To return to global configuration mode, enter the **exit** command.

Configuration Examples

The following example configures the source IP address.

```
FS(config)# monitor session 2 erspan-source
FS(config-mon-erspan-src)# origin ip address 11.1.1.2
```

Related Commands

Command	Description
show monitor	Displays the mirror sessions.

Platform Description

N/A

6.6 Shutdown

Use this command to shut down the session. Use the **no** form of this command to restore the default setting.

shutdown

no shutdown

Parameter Description

Parameter	Description
N/A	N/A

Defaults

The ERSPAN session is enabled by default.

Command mode

ERSPAN configuration mode

Usage Guide

To return to privileged EXEC mode, enter the **end** command or the **Ctrl-C** key combination.

To return to global configuration mode, enter the **exit** command.

Configuration Examples

The following example shuts down ERSPAN session 2.

```
FS(config)# monitor session 2 erspan-source
FS(config-mon-erspan-src)#shutdown
```

Related Commands

Command	Description
show monitor	Displays the mirror sessions.

Platform Description

N/A

6.7 Source Interface

Use this command to configure the ERSPAN source interface. Use the **no** form of this command to delete this source interface.

source interface *single-interface* [**rx | tx | both**]

no source interface *single-interface* [**rx | tx | both**]

Use this command to configure the flow-based ERSPAN source interface. Use the **no** form of this command to delete this source interface.

source interface *single-interface* **rx acl** *acl-name*

Parameter Description

Parameter	Description
single-interface	Source interface of the mirror.
rx	Receives only the traffic of Rx direction.
tx	Receives only the traffic of Tx direction.
both	(Default) Receives the traffic of Tx and Rx directions.
acl *acl-name*	ACL name.

Defaults

N/A

Command mode

ERSPAN configuration mode

Usage Guide

To return to privileged EXEC mode, enter the **end** command or use the **Ctrl-C** key combination.

To return to global configuration mode, enter the **exit** command.

Configuration Examples

The following example configures an ERSPAN source interface.

```
FS(config)# monitor session 2 erspan-source
FS(config-mon-erspan-src)#source interface gigabitethernet 0/1 both
```

The following example configures a flow-based ERSPAN source interface.

```
source interface gigabitEthernet 0/3 rx acl 90
```

Related Commands

Command	Description
show monitor	Displays the mirror sessions.

Platform Description

N/A

7. sFlow Commands

7.1 Sflow Agent

Use this command to configure the address of the sFlow Agent.

sflow agent { **address** { *ip-address* **| ipv6** *ipv6-address* }} | { **interface** { *interface-name* | **ipv6** *interface-name* }}

Use this command to delete the address of the sFlow Agent.

no sflow agent { address | interface }

Use this command to restore the default setting.

default sflow agent { address | interface }

Parameter Description

Parameter	Description
address	Configures the IP address of the sFlow Agent.
ip-address	sFlow Agent IPv4 address.
ipv6 *ipv6-address*	sFlow Agent IPv6 address.
interface	Configures the interface of the sFlow Agent.
interface-name	Interface of IPv4 address.
ipv6 *interface-name*	Interface of IPv6 address.

Defaults

Command Mode Global configuration mode

Default Level 14

Usage Guide This command is used to configure the Agent IP address field in the output sFlow datagram. The datagram not configured with this filed cannot be output. The sFlow Agent address shall be a host address. When a non-host address (for example, a multicast or broadcast address) is configured as the sFlow Agent address, a message indicating configuration failure is displayed. It is recommended that the IP address of the sFlow Agent device be configured as the sFlow Agent address.

Configuration Examples The following example configures 192.168.2.1 as the sFlow Agent address.

```
FS(config)# sflow agent address 192.168.2.1
```

Verification Use the show sflow command to display the sFlow configuration.

Prompt Messages Prompt an error message when the address is invalid.

```
invalid host address.
```

Common Errors N/A

Platforms N/A

7.2 Sflow Collector Collector-id Destination

Use this command to configure the address of the sFlow Collector.

sflow collector *collector-id* **destination** { *ip-address* | **ipv6** *ipv6_address* } *udp-port* **]**

Use this command to delete the address of the sFlow Collector.

no sflow collector *collector-id* **destination** { *ip-address* | **ipv6** *ipv6_address* } *udp-port* **]**

Use this command to delete the address of the sFlow Collector.

default sflow collector *collector-id* **destination** { *ip-address* | **ipv6** *ipv6_address* } *udp-port* **]**

Parameter Description

Parameter	Description
collector-id	sFlow Collector ID. The range is from 1 to 2.
ip-address	sFlow Collector IPv4 address
ipv6 *ipv6-address*	sFlow Collector IPv6 address
udp-port	sFlow Collector listening port number

Defaults

Command Mode Global configuration mode

Default Level 14

Usage Guide This command is used to configure the sFlow Collector address. The sFlow Collector address shall be a host address. When a non-host address (for example, a multicast or broadcast address) is configured as the sFlow Collector address, a message indicating configuration failure is displayed. The sFlow Collector monitors the sFlow datagram on the specified port.

Configuration Examples N/A

Verification Use the **show sflow** command to display the sFlow Collector.

Prompt Messages Prompt an error message when the address is invalid.

```
invalid host address.
```

No VPN exists.

```
vpn is not exist
```

Common Errors N/A

Platforms N/A

7.3 Sflow Collector Collector-id Max-datagram-size

Use this command to configure the maximum length of the output sFlow datagram.

sflow collector *collector-id* **max-datagram-size** *datagram-size*

Use this command to restore the default maximum length of the output sFlow datagram.

no sflow collector *collector-id* **max-datagram-size**

Use this command to restore the default maximum length of the output sFlow datagram.

default sflow collector *collector-id* **max-datagram-size**

Parameter Description

Parameter	Description
collector-id	sFlow Collector ID. The range is from 1 to 2.
max-datagram-size *datagram-size*	The maximum length of the output sFlow datagram. The range is from 200 to 9,000.

Defaults The default maximum length of the output sFlow datagram is 1,400.

Command Mode Global configuration mode

Default Level 14

Usage Guide N/A

Configuration Examples The following example configures 1,000 as the maximum length of the output sFlow datagram for sFlow Collector.

```
FS(config)# sflow collector 1 max-datagram-size 1000
```

Verification Use the **show sflow** command to display the maximum length of the output sFlow datagram.

Prompt Messages N/A

Common Errors N/A

Platforms N/A

7.4 Sflow Counter Collector

Use this command to enable the sFlow Agent to send counter samples to the sFlow Collector.

sflow counter collector *collector-id*

Use this command to disable the sFlow Agent to send counter samples to the sFlow Collector.

no sflow counter collector

Use this command to disable the sFlow Agent to send counter samples to the sFlow Collector.

default sflow counter collector

Parameter Description

Parameter	Description
collector-id	sFlow Collector ID. The range is from 1 to 2.

Defaults

Command Mode

Interface configuration mode

Default Level

14

Usage Guide

This command can be used for physical ports, SVI ports and sub routed ports and aggregate ports.

sFlow datagrams can be output only when an IP address is configured for the corresponding sFlow Collector.

Configuration Examples

The following example enables interface TenGigabitEthernet 0/5 to send counter samples to sFlow Collector 2.

```
FS(config-if-TenGigabitEthernet 0/5)# sflow counter collector 2
```

Verification

Use the **show sflow** command to display the sFlow counter sampling configuration.

Prompt Messages

N/A

Common Errors

N/A

Platforms

N/A

7.5 Sflow Counter Interval

Use this command to configure the sFlow counter sampling interval.

sflow counter interval *seconds*

Use this command to restore the default sFlow counter sampling interval.

no sflow counter interval

Use this command to restore the default sFlow counter sampling interval.

default sflow counter interval

Parameter Description

Parameter	Description
seconds	sFlow counter sampling interval. The range is form 3 to 2,147,483,647. The unit is second.

Defaults The default sFLow counter sampling interval is 30 seconds.

Command Mode Global configuration mode

Default Level 14

Usage Guide This command is used to configure the global sFlow counter sampling interval, and sFlow Counter sampling of all interfaces uses this sampling interval.

Configuration Examples The following example configures the sFlow counter sampling interval to 60 seconds.

```
FS(config)# sflow counter interval 60
```

Verification Use the **show sflow** command to display the sFlow counter sampling interval.

Prompt Messages N/A

Common Errors N/A

Platforms N/A

7.6 Sflow Enable

Use this command to enable flow sampling and counter sampling on the interface.

sflow enable

Use this command to disable flow sampling and counter sampling on the interface.

no sflow enable

Use this command to disable flow sampling and counter sampling on the interface.

default sflow enable

Parameter Description

Parameter	Description
N/A	N/A

Defaults The sFlow sampling function on an interface is disabled by default.

Command Mode Interface configuration mode

Default Level 14

Usage Guide This command can be used to enable counter sampling and flow sampling for physical ports, and aggregate ports.
sFlow datagram can be output only when an IP address is configured for the corresponding sFlow Collector.

Configuration Examples The following example enables the sFlow sampling on interface TenGigabitEthernet 0/5.

```
FS(config-if-TenGigabitEthernet 0/5)# sflow enable
```

Verification Use the **show sflow** command to display the status of the sFlow sampling function.

Prompt Messages N/A

Common Errors N/A

Platforms N/A

7.7 Sflow Flow Collector

Use this command to enable the sFlow Agent to send flow samples to the sFlow Collector.
sflow flow collector *collector-id*

Use this command to disable the sFlow Agent to send flow samples to the sFlow Collector.
no sflow flow collector

Use this command to disable the sFlow Agent to send flow samples to the sFlow Collector.
default sflow flow collector

Parameter Description

Parameter	Description
collector-id	sFlow Collector ID. The range is from 1 to 2.

Defaults

Command Mode Interface configuration mode

Default Level 14

Usage Guide This command can be used for physical ports, SVI ports, sub routed ports and aggregate ports.
sFlow datagrams can be output only when an IP address is configured for the corresponding sFlow Collector.

Configuration Examples

The following example enables interface TenGigabitEthernet 0/5 to send flow samples to sFlow Collector 2.

```
FS(config-if-TenGigabitEthernet 0/5)# sflow flow collector 2
```

Verification

Use the **show sflow** command to display the sFlow flow sampling configuration.

Prompt Messages

N/A

Common Errors

N/A

Platforms

N/A

7.8 Sflow Flow Max-header

Use this command to configure the maximum length of the packet header copied during flow sampling.

sflow flow max-header *length*

Use this command to restore the default maximum length of the packet header copied during flow sampling.

no sflow flow max-header

Use this command to restore the default maximum length of the packet header copied during flow sampling.

default sflow flow max-header

Parameter Description

Parameter	Description
length	Maximum length of the packet header to be copied. The range is from 18 to 256. The unit is byte.

Defaults

The default length is 64 bytes.

Command Mode

Global configuration mode

Default Level

14

Usage Guide

Configure the maximum number of bytes of the packet content copied from the header of the original packet. The copied content is recorded in the generated sample.

Configuration Examples

The following example sets the maximum length of the packet header copied during sFlow flow sampling to 128 bytes.

```
FS(config)# sflow flow max-header 128
```

Verification

Use the **show sflow** command to display the maximum length of the packet header copied during sFlow flow sampling.

Prompt Messages N/A

Common Errors N/A

Platforms N/A

7.9 Sflow Sampling-rate

Use this command to configure the sampling rate of sFlow flow sampling.

sflow sampling-rate *rate*

Use this command to restore the default the sampling rate of sFlow flow sampling.

no sflow sampling-rate

Use this command to restore the default sampling rate of sFlow flow sampling.

default sflow sampling-rate

Parameter Description

Parameter	Description
rate	Sampling rate of sFlow sampling. One packet is sampled from every *n* packets (*n* equals the value of rate). The range is from 4,096 to16,777,215.

Defaults The default sFlow flow sampling rate is 8,192.

Command Mode Global configuration mode

Default Level 14

Usage Guide This command is used to configure the global sampling rate of sFlow flow sampling, and sFlow flow sampling of all interfaces uses this sampling rate.

Configuration Examples The following example sets the sFlow flow sampling rate to 4,096.

```
FS(config)# sflow sampling-rate 4096
```

Verification Use the **show sflow** command to display the sFlow flow sampling rate.

Prompt Messages N/A

Common Errors N/A

Platforms N/A

7.10 Show Sflow

Use this command to display the sFlow configuration.

show sflow

Parameter Description

Parameter	Description
N/A	N/A

Command Mode Privileged EXEC mode/global configuration mode/interface configuration mode

Default Level 14

Usage Guide N/A

Configuration Examples The following example displays the sFlow configuration.

```
FS(config)#show sflow
sFlow datagram version 5
Global information:
Agent IP: 10.10.10.10
sflow counter interval:30
sflow flow max-header:64
sflow sampling-rate:8192
Collector information:
ID    IP                    Port Size VPN
1     192.168.2.100         6343 1400
2     NULL                  0    1400
Port information
Interface                   CID  FID  Enable
TenGigabitEthernet 0/1      0    1    Y
TenGigabitEthernet 0/2      0    1    N
```

Field Description:

Field	Description
sFlow datagram version	sFlow datagram version. Currently, FS supports V5 only.
Agent IP	IP address of the sFlow Agent. It can be configured by using the sflow Agent address {*ip-address* | ipv6 *ipv6-address* } command.
sflow counter interval	Counter sampling interval
sflow flow max-header	The maximum length of bytes of the packet header to be copied
sflow sampling-rate	Flow sampling rate
ID	sFlow Collector ID

IP	The IP address of the sFlow Colletor to receive sFlow datagram
Port	Port No. of the sFlow Collector to receive sFlow datagram
Size	The maximum length of the output sFlow datagram
VPN	VPN instance name of sFlow Collector
Interface	An interface configured with sFlow function
CID	The destination sFlow Collector ID to which the sFlow Agent sends the counter samples.
FID	The destination sFlow Collector ID to which the sFlow Agent sends the flow samples.
Enable	The status of the sFlow sampling function

Prompt Messages

N/A

Platforms

N/A

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