

S5900-24S4T2Q Switch Network Protocol CLI Reference Guide

Model: S5900-24S4T2Q

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1. IP Addressing Configuration Commands

1.1 IP Addressing Configuration Commands

IP addressing configuration commands include:

- arp
- arp scan
- arp timeout
- clear arp-cache
- ip address
- ip directed-broadcast
- ip forward-protocol udp
- ip helper-address
- ip host name
- ip proxy-arp
- ip unnumbered
- keepalive
- show arp
- show ip interface

1.1.1 Arp

To configure the static ARP which will permanently be stored in the ARP cache, run **arp [vrf vrf-name] ip-address hardware-address [alias]**. To delete the configured static ARP, run **no arp [vrf vrf-name] ip-address**.

arp [vrf vrf-name] ip-address hardware-address [alias]

no arp [vrf vrf-name] ip-address

Parameter

Parameter	Description
<i>Vrf-name</i>	VRF name (for the VRF version)
<i>ip-address</i>	IP address of the local link interface
<i>hardware-address</i>	Physical address of the local link interface
alias	(optional) the router will answer the ARP request from the IP address.

Default

No permanent static ARP mapping exists in the ARP cache.

Command Mode

Global configuration mode

Usage Description

A common host can support the dynamic ARP resolution; hence, you need not specially configure the static ARP mapping for the host. The vrf subcommand is used to specify which VRF the ARP item belongs to.

Example

The following command shows that the MAC address of the host with IP address 1.1.1.1 is set to 00:12:34:56:78:90.
arp 1.1.1.1 00:12:34:56:78:90

Related command

clear arp-cache

1.1.2 arp timeout

To configure the timeout value of the dynamic ARP item in the ARP cache, run **arp timeout seconds**. To resume the default value of the ARP item, run **no arp timeout** or **default arp timeout**.

arp timeout seconds

no arp timeout

default arp timeout

Parameter

Parameter	Description
seconds	Timeout value of the dynamic ARP item in the ARP cache, which means that the ARP cache obtained through dynamic resolution on the port will not be released at the timeout time

Default

180 seconds (3 minutes)

Command Mode

Interface configuration mode

Usage Description

If the timeout value of the dynamic ARP item is configured on the non-arp interface, the configuration is invalid. You can run show interface to display the timeout time of the ARP items on the port. See the following information :

ARP type: ARPA, ARP timeout 00:03:00

Example

The following example shows that the timeout time of the dynamic ARP mapping on interface vlan 1 is set to 900 seconds, which enables the ARP cache to be refreshed rapidly.

```
!  
interface vlan 1  
arp timeout 900  
!
```

Related command

show interface

1.1.3 clear arp-cache

To delete all dynamic ARP cache, run the following command:

clear arp-cache

Parameter

The command has no parameters or keywords.

Command Mode

EXEC

Example

The following command is used to delete all dynamic ARP cache.

clear arp-cache

Related command

arp

1.1.4 ip address

To configure the IP address of the interface and the network mask simultaneously, run **ip address**. Currently, the IP addresses can not be clearly classified into A type, B type and C type. However, the multicast address and the broadcast address can not be used. Except the Ethernet, multiple interfaces of other types of network can work on the same network segment. The network segment configured by the Ethernet interface cannot be same to that configured by other types of interfaces, unnumbered interfaces excluded. One main address

and multiple accessory addresses can be configured on an interface. The accessory address can be configured only after the main address is configured, while the main address can be deleted only after all accessory addresses are deleted. If the upper-layer application does not specify the source address of the system-generated IP packet, the router will adopt the IP address (configured on the transmitter interface and is in the same network segment as the gateway); if the IP address cannot be determined, the main address of the transmitter interface will be adopted. If the IP address of an interface is not configured and the interface is not an unnumbered interface, the IP packets will not be handled on the interface.

To delete an IP address or stop the IP packets from being handled on an interface, run **no ip address**.

ip address ip-address mask [secondary]

no ip address ip-address mask

no ip address

Parameter

Parameter	Description
<i>ip-address</i>	IP address
<i>mask</i>	Mask of the IP network
secondary	(optional) specifies an accessory IP address. If the IP address is not specified, it must be a main IP address.

Default

No IP addresses is configured on the interface.

Command Mode

Interface configuration mode

Usage Description

If you configure the accessory IP address on a physical network segment through the router, you must configure the accessory IP address of the same logical network segment for other systems on the same physical network segment; otherwise, the routing loop will be easily generated.

When the OSPF protocol is used, make sure that the accessory address and the main address of an interface must be in the same OSPF area.

Example

The following example shows that the main address on interface Ethernet1/0 is set to 202.0.0.1, network mask is set to 255.255.255.0 and two accessory IP addresses are set to 203.0.0.1 and 204.0.0.1 respectively.

```
interface ethernet1/0
ip address 202.0.0.1 255.255.255.0
ip address 203.0.0.1 255.255.255.0 secondary
ip address 204.0.0.1 255.255.255.0 secondary
```

1.1.5 ip directed-broadcast

To forward the directed IP broadcast and transmit the packets in the physical broadcast form, run **IP directed-broadcast [access-list-namer]**.

ip directed-broadcast [access-list-namer]

no ip directed-broadcast

Parameter

Parameter	Description
<i>access-list-name</i>	Name of the access list, which is an optional parameter If the access list is defined, only broadcast packets permitted by the access list can be forwarded.

Default

The directed IP broadcast will not be forwarded by default.

Command Mode

Interface configuration mode

Example

The following example shows how to configure the directed IP broadcast forwarding on interface Ethernet1/0.

```
!
interface vlan 1
ip directed-broadcast
!
```

1.1.6 ip forward-protocol udp

To specify which UDP packets to be forwarded after IP helper-address is configured on the interface, run **ip forward-protocol udp [port]**.

```
ip forward-protocol udp [port]
no ip forward-protocol udp [port]
default ip forward-protocol udp
Parameter
```

Parameter	Description
ISDN(BRI)	(optional) destination port which the to-be-forwarded UDP packets is transmitted.

Default

The NETBIOS Name Service packet is forwarded.

Command Mode

Global configuration mode

Usage Description

The NETBIOS Name Service packet is forwarded by default; to stop forwarding the NETBIOS Name Service packet, run either of the following two commands:

```
no ip forward-protocol udp netbios-ns
no ip forward-protocol udp 137
```

To stop forwarding all UDP packets, run the following command:

```
no ip forward-protocol udp
```

Example

```
Router_config#ip forward-protocol udp 137
```

Related command

ip helper-address

1.1.7 ip helper-address

To forward the directed IP packets to the designated IP helper address (unicast address or broadcast address), run **ip helper-address**. You can configure multiple helper addresses on each interface.

```
ip helper-address address
no ip helper-address [address]
Parameter
```

Parameter	Description
address	IP helper address

Default

The IP helper address is not configured.

Command Mode

Interface configuration mode

Usage Description

The command is invalid on the X.25 interface, because the router cannot identify physical broadcasts.

Example

The following example shows how to set the IP helper address on interface ethernet1/0 to 1.0.0.1.

```
!  
interface vlan 1  
ip helper-address 1.0.0.1  
!
```

Related command

ip forward-protocol udp

1.1.8 ip proxy-arp

To enable the agent ARP on the interface, run **ip proxy-arp**. To disable the agent ARP on the interface, run **no ip proxy-arp**.

ip proxy-arp
no ip proxy-arp

Parameter

The command has no parameters or keywords.

Default

The agent ARP is conducted.

Command Mode

Interface configuration mode

Usage Description

When the router receives the ARP request, if the router has the route to the requested IP address and the routing interface is different from the request-received interface, the router will send the ARP response out through its own MAC address; after then, the actual data packet will be forwarded after it is received. In this way, a host can communicate with the remote host even if the host does not completely learn the network topology or the correct router is not set for the host. The host is in the same physical subnet as a remote host is.

If a host requires the router to provide the service, the host and the router must be in the same IP network, or at least the router takes that the IP address of the host and the router are in the same IP subnet, that is, they use different masks. The router, otherwise, cannot provide the service.

Example

The following example shows how to enable the ARP agent on interface ethernet1/0.

```
!  
interface vlan 1  
ip proxy-arp  
!
```

1.1.9 ip unnumbered

To set an interface to an unnumbered interface to enable the IP process function without configuring the IP address, run **ip unnumbered type number**. To stop the IP process on the interface, run **no ip unnumbered**.

ip unnumbered type number
no ip unnumbered

Parameter

Parameter	Description
type number	Type and number of an interface whose IP address is configured The interface cannot be the unnumbered interface which has adopted the IP address of other interfaces.

Default

The function is disabled.

Command Mode

Interface configuration mode

Usage Description

You need not configure the unique IP address for the point-to-point link interface. You can run the command to directly handle the IP and specify the valid IP address of other interfaces as the source address of the packets transmitted from the interface. The IP address is thus saved. The point-to-point interface can be called as the unnumbered interface. IP packets generated on the unnumbered interface, such as route-refresh packets, will use the valid IP addresses configured on the command-designated interface. The address must be used to determine which routing processes are sending the refresh packets on the interface. However, it has the following limitations:

- (1) The command can set serial interfaces/channel interfaces that are encapsulated by HDLC, PPP, LAPB and SLIP to unnumbered interfaces. However, the command cannot be used on the X.25 interface and the SMDS interface.
- (2) You cannot check whether the interface works normally through the ping command. However, you can use SNMP to check the state of the interface remotely.

The command realizes its function based on the regulation in RFC 1195 that the valid IP address cannot be configured on the interface. Pay attention to the serial links (between different networks) that adopt the IP address of other interfaces; any routing protocol running on the serial link cannot broadcast any information about each subnet.

Example

The following example shows how to set interface vlan 1 to an unnumbered interface and adopt the valid IP address, 1.0.0.1, which configured on interface ethernet0/1, as the source address of the packet transmitted from the interface.

```
!
interface ethernet 0/1
ip address 1.0.0.1 255.255.255.0
!
interface serial 0/0
ip unnumbered vlan 1
!
```

1.1.10 keepalive

To test the reachability of the host and the connectivity of the network, run the following command:

keepalive [**group** group-id] [**source** source-address] [**interval** interval-time] [**number** number] **destination** destination-address

Parameter

Parameter	Description
group group-id	Multiple keepalive commands can be configured and can be identified by the group ID. The default value of the group ID is 0.
source source-address	Specifies the source IP address adopted by the packet. Default: the main IP address of the transmitted interface
interval interval-time	Number of the transmitted packets Its default value is 5.
destination destination-address	Destination host

Command Mode

EXEC or global configuration mode

Usage Description

The keepalive command supports the broadcast address and the multicast address. If the address is the limited broadcast address or the multicast address, the ICMP response packet will be transmitted on all interfaces supporting broadcasts and multicasts.

The command need not wait for the ICMP response packet, which only transmits the designated number of ICMP packets to the destination address regularly.

Example

The following shows that two keepalive commands are configured.

You can make a configuration that 10 ICMP request packets are transmitted from source address 192.168.20.230 to destination address 192.168.20.1 every 10 seconds. The packet-transmitting port is determined through destination address 192.168.20.1 and the routing protocol.

```
keepalive group 1 destination 192.168.20.1 source 192.168.20.230 interval 10 number 10
```

You can make a configuration that five ICMP request packets are transmitted from source address 172.16.20.232 to destination address 172.16.20.2 every second. The packet-transmitting port is determined through destination address 172.16.20.2 and the routing protocol.

```
keepalive group 2 destination 172.16.20.2 source 172.16.20.232
```

1.1.11 show arp

To display all ARP items, including the ARP mapping of the IP address for the interface, static ARP mapping and dynamic ARP mapping, run the following command:

```
show arp [vrf vrf-name]
```

Parameter

Parameter	Description
Vrf-name	ARP item which specifies which VRF to be displayed

Command Mode

EXEC

Usage Description

The displayed information shows in the following table:

Parameter	Description
Protocol	Protocol type, such as the IP protocol
Address	Address type, such as the IP address
Age	Lifetime, that is, the duration of ARP item from its generation (unit: minute) The fact that the router uses the ARP item does not affect the value.
Hardware Address	Physical address corresponding to the network address, which is null for the unresolved item
Type	Type of packet encapsulation used by the interface, including ARPA and SNAP
Interface	Interface relative with the network address

Example

The following command is used to display the ARP cache.

```
router#show arp
```

Protocol	IP Address	Age(min)	Hardware Address	Type	Interface
IP	192.168.20.77	11	00:30:80:d5:37:e0	ARPA	Ethernet1/0
IP	192.168.20.33	0	Incomplete		
IP	192.168.20.22	-	08:00:3e:33:33:8a	ARPA	Ethernet1/0
IP	192.168.20.124	0	00:a0:24:9e:53:36	ARPA	Ethernet1/0
IP	192.168.0.22	-	08:00:3e:33:33:8b	ARPA	Ethernet1/1

1.1.12 show ip interface

To display the IP configuration of the interface, run the following command:

show ip interface [type number]

Parameter

Parameter	Description
type	Type of the interface, which is optional
number	Number of the interface, which is optional

Command Mode

EXEC

Usage Description

If the link layer of an interface can effectively transmit and receive the data, the interface is available, whose state is **Protocol Up**. If an IP address is configured on the interface, the router will add a direct-through route to the routing table. If the link-layer protocol is disabled, that is, if the link-layer protocol is Protocol Down, the direct-through route will be deleted. If the interface type and the number of the interface is specified, only the information about the specified interface is displayed. Otherwise, the information about the IP configuration of all interfaces is displayed.

Example

The following example shows that the IP configuration of interface e0/1 is displayed.

```
Router#show ip interface e0/1
Ethernet1/0 is up, line protocol is up
IP address : 192.168.20.167/24
Broadcast address : 192.168.20.255
Helper address : not set
MTU : 1500(byte)
Forward Directed broadcast : OFF
Multicast reserved groups joined:
224.0.0.9 224.0.0.6 224.0.0.5 224.0.0.2
224.0.0.1
Outgoing ACL : not set
Incoming ACL : not set
IP fast switching : ON
IP fast switching on the same interface : OFF
ICMP unreachable : ON
ICMP mask replies : OFF
ICMP redirects : ON
```

The following table gives a detailed description to some parameters in the previous example.

Domain	Description
Ethernet1/0 is up	If the hardware of the interface is available, the interface will be identified as up. If the interface is available, its hardware and line protocols must be in the up state.
line protocol is up	If the interface can provide bidirectional communication, the line protocol will be identified as up. If the interface is available, its hardware and line protocols of the interface must be in the up state.
IP address	IP address of an interface and network mask
Broadcast address	Displays the broadcast address.
MTU	Displays the IP MTU configured on the interface.
Helper address	Displays the IP helper address.
Directed broadcast forwarding	Forwards the directed broadcast packets.
Multicast reserved groups joined	Multicast groups added to the interface

Domain	Description
Outgoing ACL	Outgoing access control list used by the interface
Incoming ACL	Incoming access control list used by the interface
IP fast switching	Enables fast switching on the interface by the router.
Proxy ARP	Enables the proxy ARP on the interface.
ICMP redirects	Forwards the ICMP redirect packet on the interface.
ICMP unreachable	Forwards the ICMP-unreachable packet on the interface.
ICMP mask replies	Forwards the ICMP-mask-replies packet on the interface.

2. DHCP Client Configuration Command

2.1 DHCP Client Configuration Command

DHCP client configuration commands include:

- `ip address dhcp`
- `ip dhcp client`
- `ip dhcp-server`
- `show dhcp lease`
- `show dhcp server`
- `debug dhcp`

2.1.1 `ip address dhcp`

To obtain an IP address for the Ethernet interface through DHCP, run **`ip address dhcp`**. To delete the obtained IP address, run **`no ip address dhcp`**.

`ip address dhcp`

`no ip address dhcp`

Parameter

None

Default

None

Command Mode

Interface configuration mode

Usage Description

The **`ip address dhcp`** command allows the interface to obtain the IP address through the DHCP protocol, which is useful for dynamically connecting the Internet service provider (ISP) through the Ethernet interface. Once the dynamic IP address is obtained, the Ethernet interface can adopt the PAT technology to realize the network address translation (NAT).

If the **`ip address dhcp`** command is configured on the router, the router will transmit the DHCPDISCOVER message to the DHCP server.

If the **`no ip address dhcp`** command is configured on the router, the router will transmit the DHCP RELEASE message.

Example

The following example shows that interface Ethernet1/1 obtains its IP address through the DHCP protocol.

```
!
interface Ethernet1/1
ip address dhcp
!
```

Related command

```
ip dhcp client
ip dhcp-server
show dhcp lease
show dhcp server
```

2.1.2 `ip dhcp client`

To configure the parameter about the DHCP client of the local router, run **`ip dhcp client`**.

`ip dhcp client { minlease seconds | retransmit count | retry_interval | select seconds }`

`no ip dhcp client { minlease | retransmit | retry_interval | select }`

Parameter

Parameter	Description
<i>minlease seconds</i>	(optional) the minimum lease time, ranging from 60 to 86400 seconds
<i>retransmit count</i>	(optional) retransmit times of the protocol packets, ranging between 1 and 10
<i>retry_interval</i>	(optional) Interval for retriggering the DHCP request, ranging between 1 and 1440 minutes
<i>select seconds</i>	(optional) interval for the select operation, ranging between 0 and 30

Default

The default value of the **minlease** parameter is 60 seconds.
The default value of the **retransmit** parameter is four times.
The default value of the **retry-interval** parameter is five seconds.
The default value of the **select** parameter is 0 seconds.

Command Mode

Global configuration mode

Usage Description

You can adjust these parameters according to the network structure and the DHCP server's requirements.
If the "no" forms of these commands are configured, the parameters are reset to the default values defined by the system.

Example

The following example shows that the receivable minimum lease time of the DHCP client on the router is set to 100 seconds.
ip dhcp client minlease 100
The following example shows how to set the retransmission times of the protocol packets on the DHCP client to three times.
ip dhcp client retransmit 3
The following example shows how to set the interval of retriggering the DHCP request on the DHCP client to 10 minutes.
ip dhcp client retry_interval 10
The following example shows how to set the interval of selecting on the DHCP client to 10 seconds.
ip dhcp client select 10

Related command

ip address dhcp
ip dhcp-server
show dhcp lease
show dhcp server

2.1.3 ip dhcp-server

To specify the IP address of the DHCP server, run **ip dhcp-server**.

ip dhcp-server ip-address
no ip dhcp-server ip-address

Parameter

Parameter	Description
ip-address	IP address of the DHCP server

Default

The default IP address of the DHCP server does not exist.

Command Mode

Global configuration mode

Usage Description

The command can be used to specify the IP address of the DHCP server, while the previously-designated IP address of the DHCP server will not be replaced.

You can use the "no" form of the command to delete the previously-configured IP address of the DHCP server.

Example

The following example shows how to set the server with IP 192.168.20.1 to the DHCP server.

```
ip dhcp-server 192.168.20.1
```

Related command

```
ip address dhcp
ip dhcp client
show dhcp lease
show dhcp server
```

2.1.4 show dhcp lease

To check the DHCP server distribution information used by the current router, run **show dhcp lease**.

Show dhcp lease

Parameter

None

Default

None

Command Mode

EXEC

Usage Description

The command can be used to check the DHCP server distribution information used by the current router.

Example

The following example shows the DHCP server distribution information used by the router.

```
router#show dhcp lease
Temp IP addr: 192.168.20.3   for peer on Interface: Ethernet1/1
Temp   sub net mask: 255.255.255.0
    DHCP Lease server: 192.168.1.3, state: 4 Rebinding
    DHCP transaction id: 2049
    Lease: 86400 secs,  Renewal: 43200 secs,  Rebind: 75600 secs
Temp default-gateway addr: 192.168.1.2
    Next timer fires after: 02:34:26
    Retry count: 1   Client-ID: router-0030.80bb.e4c0-Et1/1
```

Related command

```
ip address dhcp
ip dhcp client
ip dhcp-server
show dhcp server
debug dhcp
```

2.1.5 show dhcp server

To display the known DHCP server information, run **show dhcp server**.

show dhcp server

Parameter

None

Default

None

Command Mode

EXEC

Usage Description

The command is used to display the information about the known DHCP server.

Example

The following example shows the information about the known DHCP server.

```
router#show dhcp sever
DHCP Server 255.255.255.255
Leases: 0
Discovers: 62 Requests: 0 Declines: 0 Releases: 0
Offers: 0 Acks: 0 Naks: 0 Bad: 0
Subnet: 0.0.0.0, Domain name:
```

Related command

```
ip address dhcp
ip dhcp client
ip dhcp-server
show dhcp lease
```

2.1.6 debug dhcp

To check the treatment condition of the DHCP protocol, run **debug dhcp**.

```
debug dhcp <detail>
no debug dhcp <detail>
Parameter
```

Parameter	Description
detail	Displays the content of the DHCP packet.

Default

Relative information will not be displayed by default.

Command Mode

EXEC

Usage Description

The following example shows some important information about DHCP treatment:

```
router#debug dhcp
router#2000-4-22 10:50:40 DHCP: Move to INIT state, xid: 0x7
2000-4-22 10:50:40 DHCP: SDISCOVER attempt # 1, sending 277 byte DHCP packet
2000-4-22 10:50:40 DHCP: B'cast on Ethernet1/1 interface from 0.0.0.0
2000-4-22 10:50:40 DHCP: Move to SELECTING state, xid: 0x7
```



```
2000-4-22 10:50:46 DHCP: SDISCOVER attempt # 2, sending 277 byte DHCPpacket
2000-4-22 10:50:46 DHCP:           B'cast on Ethernet1/1 interface from 0.0.0.0
2000-4-22 10:50:54 DHCP: SDISCOVER attempt # 3, sending 277 byte DHCPpacket
```

Related command

```
show dhcp lease
```

3. DHCP Server Configuration Commands

3.1 DHCP Server Configuration Commands

DHCP server configuration commands include:

- ip dhcpd ping packet
- ip dhcpd ping timeout
- ip dhcpd write-time
- ip dhcpd database-agent
- ip dhcpd pool
- ip dhcpd enable
- ip dhcpd disable

3.1.1 ip dhcpd ping packet

ip dhcpd ping packet pkgs

Parameter

Parameter	Description
pkgs	A parameter used by the DHCP server to check whether the address has distributed the number of the transmitted ICMP packets.

Default

2

Command Mode

Global configuration mode

Usage Description

You can run the following command to configure whether the DHCP server has transmitted n ICMP packets when it check whether the address is distributed.

ip dhcpd ping packets n

Example

You can run the following command to configure whether the DHCP server has transmitted n ICMP packets when it check whether the address is distributed.

ip dhcpd ping packets 1

3.1.2 ip dhcpd ping timeout

Parameter

Parameter	Description
timeout	Timeout time for waiting the ICMP echo message when the DHCP server is used to check whether the address is distributed

Default

5

Command Mode

Global configuration mode

Usage Description

You can run the following command to set the timeout time for waiting the ICMP echo packet to **n*100ms** when it check whether the address is distributed.

```
ip dhcpd ping timeout n
```

Example

You can run the following command to set the timeout time for waiting the ICMP echo packet to **300ms** when it check whether the address is distributed.

```
ip dhcpd ping timeout 3
```

3.1.3 ip dhcpd write-time

Parameter

Parameter	Description
time	Interval for the DHCP server to save the address distribution information to the database (unit: minute)

Default

0

Command Mode

Global configuration mode

Usage Description

The following command can be used to set the DHCP server to write the address distribution information to the database every n minutes.

```
ip dhcpd write-time n
```

Example

The following example shows that the DHCP server is set to write the address distribution information to the database every two days.

```
ip dhcpd write-time 1440
```

3.1.4 ip dhcpd database-agent

Parameter

Parameter	Description
Ip address	IP address of the address distribution information after the DHCP server is saved on PC

Default

None

Command Mode

Global configuration mode

Usage Description

You can run the following command to configure the address of PC where the address distribution information of the DHCP server is stored:

```
ip dhcpd database-agent X X X X
```

If the address is not configured, the address distribution information will be stored in the flash.

NOTE: To store the address distribution information, you need start the TFTP server on PC and at the same time the PC and the DHCP server must correctly connect.

Example

```
ip dhcpd database-agent 192.168.1.1
```

3.1.5 ip dhcp snooping arp

Parameter

None

Default

None

Command Mode

Global configuration mode

Usage Description

To enable the ARP mapping protection mechanism, run **ip dhcp snooping arp**. After the command is configured, the DHCP server will create an ARP mapping between the MAC address of the DHCP server and the distributed IP address and protect the ARP mapping.

Example

```
ip dhcp snooping arp
```

3.1.6 ip dhcpd pool

Parameter

Parameter	Description
name	Name of the DHCP address pool

Default

None

Command Mode

Global configuration mode

Usage Description

You can run the following command to add the **name** DHCP address pool and enter the DHCP address pool configuration mode.

```
ip dhcpd pool name
```

Example

The following command in the example is used to add a **test** DHCP address pool and enter the DHCP address pool configuration mode.

```
ip dhcpd pool test
```

3.1.7 ip dhcpd enable

Parameter

None

Default

The DHCP service is disabled by default.

Command Mode

Global configuration mode

Usage Description

You can run the following command to enable the DHCP service. After the DHCP service is enabled, the DHCP server supports the relay operation; for those address requests that cannot be distributed by themselves, the DHCP requests will be forwarded on the port where the ip-helper-address is configured.

```
ip dhcpd pool name
```

Example

The following command is used to open the DHCP service.

```
ip dhcpd enable
```

3.2 DHCP Address Pool Configuration Commands

DHCP address pool configuration commands include the following:

- network
- range
- default-router
- dns-server
- domain-name
- lease
- netbios-name-server
- ip-bind

3.2.1 network

network ip-addr netmask

Parameter

Parameter	Description
ip-addr	Network address of the address pool for automatic distribution
netmask	Subnet mask

Default

None

Command Mode

DHCP address pool configuration mode

Usage Description

You can use the command to configure the network address of the address pool for automatic distribution.

Before the command is configured, make sure that the network number of the IP address for a port on the interface receiving the DHCP packet must be same to the network.

Example

The following example shows how to set the network address of the DHCP address pool to 192.168.20.0 and the subnet mask to 255.255.255.0.

```
network 192.168.20.0 255.255.255.0
```

3.2.2 range

range low-addr high-addr

Parameter

Parameter	Description
low-addr	Start address of the automatic address distribution range
hoh-addr	End address of the automatic address distribution range

Default

None

Command Mode

DHCP address pool configuration mode

Usage Description

You can use the command to configure the automatic address distribution range. You can configure up to eight ranges for each address pool, while each range must be in the network. The command is used only for the automatic distribution mode.

Example

The following example shows how to configure the address distribution range of the DHCP address pool to 192.168.20.210~192.168.20.219.
range 192.168.20.210 192.168.20.219

3.2.3 default-router

default-router ip-addr

Parameter

Parameter	Description
ip-addr	Default route which is distributed to the client

Default

None

Command Mode

DHCP address pool configuration mode

Usage Description

You can run the command to configure the default route which is distributed to the client; up to four default routes can be configured which are separated through space.

Example

The following example shows how to configure the default route of the DHCP client to 192.168.20.1.
default-router 192.168.20.1

3.2.4 dns-server

dns-server ip-addr ...

Parameter

Parameter	Description
ip-addr	DNS server address distributed to the client

Default

None

Command Mode

DHCP address pool configuration mode

Usage Description

You can run the command to configure the address of the DNS server which is distributed to the client; up to four DNS servers can be configured which are separated through space.

Example

The following example shows how to configure the address of the DNS server distributed to the client to 192.168.1.3.
dns-server 192.168.1.3

3.2.5 domain-name

domain-name name

Parameter

Parameter	Description
name	Domain name distributed to the client

Default

None

Command Mode

DHCP address pool configuration mode

Usage Description

You can run the command to configure the domain name which is distributed to the client.

Example

The following example shows how to configure the domain name to **test.domain**.
domain-name test.domain

3.2.6 lease

lease {days [hours][minutes] | infinite}

Parameter

Parameter	Description
days	Days distributed by the address
hours	Hours distributed by the address
minutes	Minutes distributed by the address
infinite	Means that the addresses will be distributed permanently.

Default

one day

Command Mode

DHCP address pool configuration mode

Usage Description

You can run the command to configure the time limitation of the address which is distributed to the client.

Example

The following example shows how to configure the time limitation of the address which is distributed to the client to 12 hours and two days.

Lease 2 12

3.2.7 netbios-name-server

netbios-name-server ip-addr

Parameter

Parameter	Description
ip-addr	Address of the netbios name server distributed to the client

Default

None

Command Mode

DHCP address pool configuration mode

Usage Description

You can run the command to configure the address of the netbios name server which is distributed to the client; up to four netbios name servers can be configured which are separated through space.

Example

The following example shows how to configure the address of the DNS server distributed to the client to 192.168.1.10.
netbios-name-server 192.168.1.10

3.2.8 ip-bind

ip-bind ip-addr [**hardware-address**] [**identifier**] [**host-name**]

Parameter

Parameter	Description
<i>ip-addr</i>	Host address used for manual distribution
hardware-address	Binds the IP address to the hardware address. The hardware address is in the hex format: 00-12-3F-28-AE-35.
identifier	Binds the IP address to the identifier of the host which is in the hex format or in the format of the inverted command and character string.
host-name	Binds the IP address to the host name which is in the character string format.

Default

None

Command Mode

DHCP address pool configuration mode

Usage Description

You can use the command to configure the host's address of the address pool for automatic distribution.

Example

The following command is used to bind the manually-distributed address 192.168.20.200 to the hardware address 00-12-3F-28-AE-35.

```
Ip-bind 192.168.20.200 hardware-address 00-12-3F-28-AE-35
```

The following command is used to bind the manually-distributed address 192.168.20.200 to the host's name bdc0m-315.

```
Ip-bind 192.168.20.200 host-name bdc0m-315
```

```
ip-bind ip-addr hardware-address
```

```
ip-bind ip-addr hardware-address hardware-address{ type}
```

Parameter

Parameter	Description
<i>hardware-address</i>	Matches the hardware address of the client.
<i>type</i>	Means the type of the hardware address.

Default value

The default value of the "type" parameter is 1, standing for Ethernet.

Command mode

DHCP address pool configuration mode

Instruction

This command can be used to configure the hardware address, which is used to match the hardware address. The format of the hardware address is like ab:cd:ef:gh. This command is used only in manual distribution mode.

Example

The following example shows how to set the hardware address of the manual-DHCP-distribution address pool to **10:a0:0c:13:64:7d**.

```
ip-bind ip-addr hardware-address 10:a0:0c:13:64:7d
```

3.2.9 ip-bind ip-addr client-identifier

ip-bind ip-addr client-identifier unique-identifier

Parameter

Parameter	Description
unique-identifier	Matches the ID of the client.

Default value

None

Command mode

DHCP address pool configuration mode

Instruction

This command is used to configure the client ID which is used to match the client. The format of the client ID is like **ab.cd.ef.gh**. This command is used only in manual distribution mode.

Example

The following example shows how to set the client ID of the manual-DHCP-distribution address pool to **10:a0:0c:13:64:7d**.

```
ip-bind ip-addr client-identifier 01.10.a0.0c.13.64.7d
```

3.2.10 ip-bind ip-addr client-name

ip-bind ip-addr client-name name

Parameter

Parameter	Description
name	Means the name of the client.

Default value

None

Command mode

DHCP address pool configuration mode

Instruction

This command is used to configure the host name which is distributed to the client. This command is used only in manual distribution mode.

Example

The following example shows how to set the name of the client to **test**.

ip-bind ip-addr client-name test

3.3 DHCP Debugging Commands

DHCP debugging commands include:

- debug ip dhcpd packet
- debug ip dhcpd event

3.3.1 debug ip dhcpd packet

debug ip dhcpd packet

Parameter

None

Default

None

Command Mode

EXEC

Usage Description

You can run the command to open the debugging switch of the DHCPD packet.

Example

The following command is used to enable the debugging switch of the DHCPD packet.

debug ip dhcpd packet

3.3.2 debug ip dhcpd event

debug ip dhcpd event

Parameter

None

Default

None

Command Mode

EXEC

Usage Description

You can run the command to open the debugging switch of the DHCPD event.

Example

The following command is used to enable the debugging switch of the DHCPD event.

debug ip dhcpd event

DHCPD management commands DHCP management commands include:

- show ip dhcpd statistic
- show ip dhcpd binding
- clear ip dhcpd statistic
- clear ip dhcpd binding

3.3.3 show ip dhcpd statistic

Parameter

None

Default

None

Command Mode

All modes except the user mode

Usage Description

You can run the command to display the DHCPD statistics information, including the number of all types of packets and the number of automatically- or manually-distributed addresses.

Example

The following command is used to display the DHCPD statistics information. Show ip dhcpd statistic

3.3.4 show ip dhcpd binding

show ip dhcpd binding {ip-addr}

Parameter

Parameter	Description
ip-addr	Address whose binding information requires to be displayed

Default

The binding information of all addresses is displayed.

Command Mode

All modes except the user mode

Usage Description

You can run the following command to display the binding information, IP address, hardware address, binding type and timeout time about the DHCPD.

Example

The following command is used to display the DHCPD binding information. Show ip dhcpd binding

3.3.5 show ip dhcpd pool

Parameter

None

Default

None

Command Mode

All modes except the user mode

Usage Description

You can run the command to display the information about the DHCPD address pool, including the network number of the address pool, address range, number of the distributed addresses, number of the temporarily-deserted addresses, number of the addresses that can be distributed, manually-distributed IP address and hardware address.

Example

The following command is used to display the statistics information about the DHCPD address pool.
show ip dhcpd pool

3.3.6 clear ip dhcpd statistic

Parameter

None

Default

None

Command Mode

EXEC

Usage Description

You can run the command to delete the statistics information about the number of the packets.

Example

The following command is used to delete the statistics information about the number of the packets.

Clear ip dhcpd statistic

3.3.7 clear ip dhcpd binding

clear ip dhcpd binding {ip-addr|*}

Parameter

Parameter	Description
ip-addr	Address whose binding information requires to be deleted
*	Deletes all binding information.

Default

The designated address binding information is deleted.

Command Mode

EXEC

Usage Description

You can run the command to delete the binding information about the designated address.

Example

The following command is used to delete the binding information about address 192.168.20.210.

```
clear ip dhcpd binding 192.168.20.210
```

The following command is used to delete the binding information about address 192.168.20.210 and address 192.168.20.211.

```
clear ip dhcpd binding 192.168.20.210 192.168.20.211
```

The following command is used to delete all binding information.

```
clear ip dhcpd binding *
```

3.3.8 clear ip dhcpd abandoned

Parameter

None

Default

None

Command Mode

EXEC

Usage Description

You can run the command to delete the **abandon** identifier.

Example

The following example shows how to delete the **abandon** identifier. Clear ip dhcpd abandoned

4. IP Configuration Commands

4.1 IP Server Configuration Commands

IP server configuration commands include:

- clear tcp
- clear tcp statistics
- debug arp
- debug ip icmp
- debug ip packet
- debug ip raw
- debug ip rtp
- debug ip tcp packet
- debug ip tcp transactions
- debug ip udp
- ip mask-reply
- ip mtu
- ip redirects
- ip route-cache
- ip source-route
- ip tcp synwait-time
- ip tcp window-size
- ip unreachable
- show ip cache
- show ip irdp
- show ip sockets
- show ip traffic
- show tcp
- show tcp brief
- show tcp statistics
- show tcp tcb

4.1.1 clear tcp

To delete a TCP connection, run the following command:

clear tcp {local host-name port **remote** host-name port | **tcb address**}

Parameter

Parameter	Description
local host-name port	IP address and TCP port of the local host
remote host-name port	IP address and TCP port of the remote host
tcb address	Address of the transmission control block (TCB) for the to-be-deleted TCP connection. TCB is an internal identifier of the TCP connection, which can be obtained through the show tcp brief command.

Command Mode

EXEC

Usage Description

The **clear tcp** command is mainly used to delete the terminated TCP connection. Sometimes, because of communication line faults, TCP connection or the peer host is restarted and the TCP connection is actually closed. The TCP connection has no communication, so the system does not know that the TCP connection is already closed. In this case, the **clear tcp** command is used to close the invalid TCP connection. The **clear tcp local host-name port remote host-name port** command is used to close the TCP connection between the IP address or port of the local host and the IP address or port of the remote host. The **clear tcp tcb address** command is used to close the TCP connection identified by the designated TCB address.

Example

The following example shows that the TCP connection between 192.168.20.22:23 (local) and 192.168.20.120:4420 (remote). The **show tcp brief** command is used to display the information of the local and remote hosts of the current TCP connection.

```
Router#show tcp brief
```

TCB	Local Address	Foreign Address	State
0xE85AC8	192.168.20.22:23	192.168.20.120:4420	ESTABLISHED
0xEA38C8	192.168.20.22:23	192.168.20.125:1583	ESTABLISHED

```
Router#clear tcp local 192.168.20.22 23 remote 192.168.20.120 4420
```

```
Router#show tcp brief
```

TCB	Local Address	Foreign Address	State
0xEA38C8	192.168.20.22:23	192.168.20.125:1583	ESTABLISHED

The following example shows how to clear the TCP connection whose TCB address is 0xea38c8. The **show tcp brief** command displays the TCB address of the TCP connection.

```
Router#show tcp brief
```

TCB	Local Address	Foreign Address	State
0xEA38C8	192.168.20.22:23	192.168.20.125:1583	ESTABLISHED

```
Router#clear tcp tcb 0xea38c8
```

```
Router#show tcp brief
```

TCB	Local Address	Foreign Address	State
-----	---------------	-----------------	-------

Related command

show tcp

show tcp brief

show tcp tcb

4.1.2 clear tcp statistics

To clear the statistics data about TCP, run the following command:

clear tcp statistics

Parameter

The command has no parameters or keywords.

Command Mode

EXEC

Example

The following example shows how to delete the TCP statistics information:

Router#clear tcp statistics

Related command

show tcp statistics

4.1.3 debug arp

To display the ARP interaction information, such as ARP request transmitting, ARP response receiving, ARP request receiving and ARP response transmitting, run **debug arp**. When the router and host cannot communicate with each other, you can run the command to analyze the ARP interaction information. You can run **no debug arp** to stop displaying the ARP interaction information.

debug arp

no debug arp

Parameter

The command has no parameters or keywords.

Command Mode

EXEC

Example

Router#debug arp

Router#IP ARP: rcvd req src 192.168.20.116 00:90:27:a7:a9:c2, dst 192.168.20.111, Ethernet1/0

IP ARP: req filtered src 192.168.20.139 00:90:27:d5:a9:1f, dst 192.168.20.82 00:

00:00:00:00:00, wrong cable, Ethernet1/1

IP ARP: created an incomplete entry for IP address 192.168.20.77, Ethernet1/0

IP ARP: sent req src 192.168.20.22 08:00:3e:33:33:8a, dst 192.168.20.77, Ethernet1/0

IP ARP: rcvd reply src 192.168.20.77 00:30:80:d5:37:e0, dst 192.168.20.22, Ethernet1/0

The first information line shows that the router receives an ARP request from vlan 1. The ARP is sent from a host whose IP address is 192.168.20.116 and MAC address is 00:90:27:a7:a9:c2 and received by a host whose IP address is 192.168.20.111. The ARP request requires the MAC address of the destination host.

IP ARP: rcvd req src 192.168.20.116 00:90:27:a7:a9:c2, dst 192.168.20.111, Ethernet1/0

The second information line shows that the router receives an ARP address request with IP 192.168.20.139 from interface Ethernet 1/1. However, according to the interface configuration of the router, the interface is not in the network claimed by the host. The reason may lie

in the incorrect host configuration. If the router creates an ARP cache according to the information, it cannot communicate with a host having the same address though the host connects an interface normally.

```
IP ARP: req filtered src 192.168.20.139 00:90:27:d5:a9:1f, dst 192.168.20.82 00:00:00:00:00:00, wrong cable, Ethernet1/1
```

The third line shows that, before the router resolves the MAC address of host 192.168.20.77, an incomplete ARP item must be created in the ARP cache for the host; after the ARP response is received, the MAC address is entered. According to the configuration of the router, the host connects interface Ethernet1/0.

```
IP ARP: created an incomplete entry for IP address 192.168.20.77, Ethernet1/0
```

The fourth information shows that the router transmits the ARP request from interface vlan 1, the IP address of the router is 192.168.20.22, the MAC address of the interface is 08:00:3e:33:33:8a and the IP address of the requested host is 192.168.20.77. The four information line has connection with the third information line.

```
IP ARP: sent req src 192.168.20.22 08:00:3e:33:33:8a, dst 192.168.20.77, Ethernet1/0
```

The fifth information line shows the router receives the ARP response which is transferred from host 192.168.20.77 to the router's interface 192.168.20.22 on interface vlan 1, telling that the MAC address is 00:30:80:d5:37:e0. The fifth information line has connection with the third and fourth information lines.

```
IP ARP: rcvd reply src 192.168.20.77 00:30:80:d5:37:e0, dst 192.168.20.22, Ethernet1/0
```

4.1.4 debug ip icmp

To display the interaction information of ICMP, run **debug ip icmp**. To close the debugging output, run **no debug ip icmp**.

debug ip icmp

no debug ip icmp

Parameter

The command has no parameters or keywords.

Command Mode

EXEC

Usage Description

The command is used to display the received and transmitted ICMP packets, helping to resolve the end-to-end connection problem. To understand the detailed meaning of the **debug ip icmp** command, see RFC 792, "Internal Control Message Protocol".

Example

```
Router#debug ip icmp
```

```
Router#ICMP: sent pointer indicating to 192.168.20.124 (dst was 192.168.20.22), len 48
```

```
ICMP: rcvd echo from 192.168.20.125, len 40
```

```
ICMP: sent echo reply, src 192.168.20.22, dst 192.168.20.125, len 40
```

```
ICMP: sent dst (202.96.209.133) host unreachable to 192.168.20.124, len 36
```

```
ICMP: sent dst (192.168.20.22) protocol unreachable to 192.168.20.124, len 36
```

```
ICMP: rcvd host redirect from 192.168.20.77, for dst 22.0.0.3 use gw 192.168.20.26, len 36
```

```
ICMP: rcvd dst (22.0.0.3) host unreachable from 192.168.20.26, len 36
```

```
ICMP: sent host redirect to 192.168.20.124, for dst 22.0.0.5 use gw 192.168.20.77, len 36
```

```
ICMP: rcvd dst (2.2.2.2) host unreachable from 192.168.20.26, len 36
```

The first information line is explained as follows:

ICMP: sent pointer indicating to 192.168.20.124 (dst was 192.168.20.22), len 48

Domain	Description
ICMP	Displays the information about ICMP.
Sent	Transmits the ICMP packets.
pointer indicating	<p>Type of the ICMP packet, which shows the original IP packet is incorrect and specifies the incorrect domain. Other types of ICMP packet include:</p> <ul style="list-style-type: none"> echo reply dst unreachable, including: <ul style="list-style-type: none"> ---net unreachable ---host unreachable ---protocol unreachable ---port unreachable ---fragmentation needed and DF set ---source route failed ---net unknown ---destination host unknown ---source host isolated ---net prohibited ---host prohibited ---net tos unreachable ---host tos unreachable source quench redirect, including: <ul style="list-style-type: none"> ---net redirect ---host redirect ---net tos redirect ---host tos redirect echo router advertisement router solicitation time exceeded, including: <ul style="list-style-type: none"> ---ttl exceeded ---reassembly timeout parameter problem, including: <ul style="list-style-type: none"> ---pointer indicating ---option missed ---bad length timestamp timestamp reply information request information reply mask request mask reply <p>If it is the unknown ICMP type, the system will display the ICMP type and its code.</p>
to 192.168.20.124	The destination address of the ICMP packet is 192.168.20.124, which is also the source address of the original packet triggering the ICMP packet.
(dst was 192.168.20.22)	The destination address of the original packet leading to the ICMP packet is 192.168.20.22.
len 48	The length of the ICMP packet is 48 bytes, the length of IP header excluded.

The second information line is explained as follows:

ICMP: rcvd echo from 192.168.20.125, len 40

Domain	Description
rcvd	Receives the ICMP packet.

Domain	Description
echo	Request response packet
from 192.168.20.125	The source address of the ICMP packet is 192.168.20.125.

The third information line is explained as follows:

ICMP: sent echo reply, src 192.168.20.22, dst 192.168.20.125, len 40

Domain	Description
src 192.168.20.22	Means the source address of the ICMP packet is 192.168.20.22.
dst 192.168.20.125	Means the destination address of the ICMP packet is 192.168.20.125.

Different types of ICMP packets have different formats when the ICMP packet is generated.

For example, the ICMP redirect packet adopts the following format:

ICMP: rcvd host redirect from 192.168.20.77, for dst 22.0.0.3 use gw 192.168.20.26, len 36

ICMP: sent host redirect to 192.168.20.124, for dst 22.0.0.5 use gw 192.168.20.77, len 36

The first information line shows that the redirect ICMP packet from host 192.168.20.77 is received and gateway 192.168.20.26 is recommended to forward the packet to destination host 22.0.0.3; the length of the ICMP packet is 36 bytes.

The second information line shows the redirect ICMP packet is sent to host 192.168.20.124. The redirect ICMP packet notifies the host of using gateway 192.168.20.77 to send packets to host 22.0.0.5. The length of the ICMP packet is 36 bytes.

For the DST unreachable ICMP packet, the following format is adopted for printing:

ICMP: sent dst (202.96.209.133) host unreachable to 192.168.20.124, len 36

ICMP: rcvd dst (2.2.2.2) host unreachable from 192.168.20.26, len 36

The first information line shows that, because the router cannot route a certain IP packet, the destination-unreachable ICMP packet will be sent to source host 192.168.20.124. The length of the ICMP packet is 36 bytes.

The second information line shows that the router receives an ICMP packet from host 192.168.20.26, notifying that the destination host 2.2.2.2 cannot be reached. The length of the ICMP packet is 36 bytes.

4.1.5 debug ip packet

To display the IP interaction information, run `debug ip packet`. You can run `no debug ip packet` to stop displaying the IP interaction information.

`debug ip packet [detail] [ip-access-list-name]`

`no debug ip packet`

Parameter

Parameter	Description
detail	(optional) exports the protocol information encapsulated in the IP packet, including protocol number, UDP, number of the TCP port and type of the ICMP packet.
<i>ip-access-list-name</i>	(optional) name of the IP access list for filtering and exporting information Only the information about the IP packet which meets the requirement of the designated IP access list can be exported.
<i>access-group</i>	(optional) name of the IP access list for filtering and exporting information Only the information about the IP packet which meets the requirement of the designated IP access list can be exported.

Parameter	Description
<i>interface</i>	(optional) name of the port for filtering and exporting information Only the information about the IP packet which meets the requirement of the designated port can be exported.

Command Mode

EXEC

Usage Description

The command helps you to know the final direction of each received or locally-generated IP packet flow and detect the reason of communication problems.

The following are potential reasons:

- Forwarded
- Forwarded as the broadcast or multicast packet
- Failed addressing when the IP packet is forwarded
- Forwarding the redirect packet
- Rejected because of having the source route option
- Rejected because of illegal IP options
- Source route
- Locally-transmitted packets need fragmentation, while the DF bit is reset.
- Receiving the packets
- Receiving IP fragments
- Transmitting packets
- Transmitting the broadcast/multicast
- Failed addressing of locally-generated packets
- Locally-generated packets being fragmented
- Received packets being filtered
- Transmitted packets being filtered
- Encapsulation of the link layer failed (only for Ethernet)
- Unknown protocol

If you use the command, lots of output information will appear; you had better run the router at a relatively free time, or the system's performance may be badly affected. Additionally, you had better filter the information output through the access list, enabling the system to display the information that interests users.

Command Mode

EXEC

Example

```
router#debug ip packet
```

```
router#IP: s=192.168.20.120 (Ethernet1/0), d=19.0.0.9 (Ethernet1/0), g=192.168.20.1, len=60, redirected
```

```
IP: s=192.168.20.22 (local), d=192.168.20.120 (Ethernet1/0), g=192.168.20.120, len=56, sending
```

```
IP: s=192.168.20.120 (Ethernet1/0), d=19.0.0.9 (Ethernet1/0), g=192.168.20.1, len=60, forward
```

```
IP: s=192.168.20.81 (Ethernet1/0), d=192.168.20.22 (Ethernet1/0), len=56, rcvd
```

Domain	Description
IP	Means that the information is about the IP packet.
s=192.168.20.120 (Ethernet1/0)	Source address of the IP packet and the name of the interface receiving the packet
d=19.0.0.9 (Ethernet1/0)	Destination address of the IP packet and the name of the interface transmitting the packet (if the routing succeeds)
g=192.168.20.1	Destination address of the next hop of the IP packet, which may be the gateway address or the destination address
len	Length of the IP packet
redirected	<p>Means the router will send the ICMP redirected packet to the source host of the ICMP packet. The following are other cases:</p> <p>Forward—the packet is forwarded.</p> <p>forward directed broadcast---Packets are forwarded as the directed broadcast and packets will be transformed as the physical broadcast on the transmission interface</p> <p>unroutable---The addressing of the packet fails and the packet will be dropped.</p> <p>source route---Source route</p> <p>rejected source route---Because the system does not support the source route, the packets with the IP source route are rejected.</p> <p>Bad options—the IP option is incorrect and the packet will be dropped.</p> <p>need frag but DF set---The local packet need be fragmented; however, the DF is reset.</p> <p>rcvd---the packet is received by the local host.</p> <p>rcvd fragment---The fragment of the packet is received.</p> <p>sending---The locally-generated packet is being sent.</p> <p>sending broad/multicast---The locally-generated broadcast/multicast packet is being sent.</p> <p>sending fragment---The locally-fragmented IP packet is being sent.</p> <p>denied by in acl---The packet is denied by the ACL of the receiver interface.</p> <p>denied by out acl---The packet is denied by the transmitter interface.</p> <p>unknown protocol---unknown protocol</p> <p>encapsulation failed---the protocol encapsulation fails in the Ethernet. When the to-be-transmitted packet is dropped on the Ethernet interface because of ARP resolution failure, the information appears.</p>

The first information line shows that the router has received an IP packet; its source address is 192.168.20.120 and destination address is 19.0.0.9; it is from the network segment connected by interface vlan 1; the transmitter interface determined by the routing table is interface Ethernet1/0; the gateway's address is 192.168.20.1 and the length of the packet is 60 bytes. The gateway and the source host which transmits the IP packet are connected on the same network, that is, the network connected by interface vlan 1 of the router. Hence, the router transmits the ICMP redirect packet.

IP: s=192.168.20.120 (Ethernet1/0), d=19.0.0.9 (Ethernet1/0), g=192.168.20.1, len=60, redirected

The second information line describes the transmission of the ICMP redirect packet. The source address is the local address 192.168.20.22 and the destination address is the source address of the previous packet, that is, 192.168.20.120. The ICMP redirect packet is transmitted from interface Ethernet1/0 to the destination directly, so the address of the gateway is the destination address 192.168.20.120. The length of the ICMP redirect packet is 56 bytes.

IP: s=192.168.20.22 (local), d=192.168.20.120 (Ethernet1/0), g=192.168.20.120, len=56, sending

The third information line shows that the IP layer receives an IP packet. The source address of the packet is 192.168.20.120; the transmitter interface is interface Ethernet1/0; the destination address of the packet is 19.0.0.9. Through the routing table, the packet is found to forward to interface Ethernet1/0; the address of the gateway is 192.168.20.77 and the length of the packet is 60 bytes.

IP: s=192.168.20.120 (Ethernet1/0), d=19.0.0.9 (Ethernet1/0), g=192.168.20.77, len=60, forward

The fourth information line shows that the IP layer receives an IP packet. The source address is 192.168.20.81 and the receiver interface is Ethernet1/0; the destination address is 192.168.20.22, which is an IP address configured on interface Ethernet1/0 of the router; the length of the packet is 56 bytes.

IP: s=192.168.20.81 (Ethernet1/0), d=192.168.20.22 (Ethernet1/0), len=56, rcvd

The output of the **debug ip packet detail** command is described in the following. Only newly-added parts are described.

router#debug ip packet detail

router#IP: s=192.168.12.8 (Ethernet1/0), d=255.255.255.255 (Ethernet1/0), len=328, rcvd, UDP: src=68, dst=67

IP: s=192.168.20.26 (Ethernet1/0), d=224.0.0.5 (Ethernet1/0), len=68, rcvd, proto=89

IP: s=192.168.20.125 (Ethernet1/0), d=192.168.20.22 (Ethernet1/0), len=84, rcvd, ICMP: type=0, code=0

IP: s=192.168.20.22 (local), d=192.168.20.124 (Ethernet1/0), g=192.168.20.124, len=40, sending, TCP: src=1024, dst=23, seq=75098622, ack=161000466, win=17520, ACK

Domain	Description
UDP	Protocol name, such as UDP, ICMP or TCP
type, code	Type and code of the ICMP packet
src, dst	Request response packet
seq	The source address of the ICMP packet is 192.168.20.125.
ack	Sequence number of the TCP packet
win	Acknowledge number of the TCP packet
ACK	Windows value of the TCP packet
	ACK in the control bit of the TCP packet is reset, indicating that the acknowledge number is valid. Other control bits include SYN, URG, FIN, PSH and RST.

The first information line shows that the UDP packet is received. The source port is 68 and the destination port is 67.

IP: s=192.168.12.8 (Ethernet1/0), d=255.255.255.255 (Ethernet1/0), len=328, rcvd, UDP: src=68, dst=67

The second information line shows that the protocol number of the received packet is 89.

IP: s=192.168.20.26 (Ethernet1/0), d=224.0.0.5 (Ethernet1/0), len=68, rcvd, proto=89

The third information line shows that the ICMP packet is received. Both the packet type and the code are 0.

IP: s=192.168.20.125 (Ethernet1/0), d=192.168.20.22 (Ethernet1/0), len=84, rcvd, ICMP: type=0, code=0

The fourth information line shows that the TCP packet is transmitted. The source port is 1024, the destination port is 23, the sequence number is 75098622, the acknowledge number is 161000466, the size of the receiver window is 17520 and the ACK bit is reset. For the meanings of these domains, see— *TRANSMISSION CONTROL PROTOCOL*.

IP: s=192.168.20.22 (local), d=192.168.20.124 (Ethernet1/0), g=192.168.20.124, len=40, sending, TCP: src=1024, dst=23, seq=75098622, ack=161000466, win=17520, ACK

The following describes how to use the ACL. For example, to display the information about the packet whose source address is 192.168.20.125, you need to define the abc ACL and then allow the IP packets whose source address is 192.168.20.125. At last, you can use the ACL through the **debug ip packet** command.

```
Router#config
```

```
Router_config#ip access-list standard abc
```

```
Router_config_std_nacl#permit 192.168.20.125
```

```
Router_config_std_nacl#exit
```

```
Router_config#exit
```

```
Router#debug ip packet abc
```

```
Router#IP: s=192.168.20.125 (Ethernet0/1), d=192.168.20.22 (Ethernet0/1), len=48, rcvd
```

In the previous commands, the standard ACL is used. However, the expanded ACL can also be used.

Related command

debug ip tcp packet

4.1.6 debug ip raw

To display the information about IP interaction, run **debug ip raw [detail] [access-list-group] [interface]**. To stop displaying information about IP interaction, run **no debug ip raw**.

debug ip raw [detail] [access-list-group] [interface]

no debug ip raw

Parameter

Parameter	Description
detail	(optional) exports the protocol information encapsulated by the IP packet, such as the protocol number, number of the UDP port and the TCP port, and type of the TCP packet.
access-group	(optional) name of the IP ACL which is used to filter the output information Only the information about the IP packets that comply with the designated IP ACL can be exported.
interface	(optional) interface name which is used to filter the output information Only the information about the IP packets that comply with the designated port can be exported.

Command Mode

EXEC

Usage Description

The command helps you to know the final destination of each received or locally-generated IP flows and to find the reason of the communication problem.

The following are potential cases:

- Forwarded
- Forwarded as the broadcast/multicast packet
- Addressing failed when the IP packet is forwarded
- Forwarding the redirect packet
- Rejected because of having the source route option
- Rejected because of illegal IP options
- Source route
- Locally-transmitted packets need fragmentation, while the DF bit is reset.
- Receiving the packets.
- Receiving IP fragments
- Transmitting the packet
- Transmitting the broadcast/multicast
- Failed addressing of locally-generated packets
- Locally-generated packets being fragmented
- Received packets being filtered
- Transmitted packets being filtered
- Encapsulation of the link layer failed (only for Ethernet)
- Unknown protocol

If you use the command, lots of output information will appear; you had better run the router at a relatively free time, or the system's performance may be badly affected. Additionally, you had better filter the information output through the access list, enabling the system to display the information that interests users.

Example

The example is the same to that of the `debug ip packet` command.

Related command

`debug ip tcp packet`

4.1.7 debug ip rtp

To display the information about the header compression, run **`debug ip rtp {header-compression|packets |rtcp}`**. You can run **`no debug ip rtp {header-compression|packets |rtcp}`** to stop displaying the information about the header compression.

`debug ip rtp {header-compression|packets |rtcp}`

`no debug ip rtp {header-compression|packets |rtcp}`

Parameter

Parameter	Description
header-compress	RTP/UDP/IP header compression
packets	Packets about data interaction of the RTP/UDP/IP header compression
rtcp	Packets about data interaction of the TCP/IP header compression

Command Mode

EXEC

Usage Description

The command helps you to understand the whole process of header compression and interaction.

If you use the command, lots of output information will appear; you had better run the router at a relatively free time, or the system's performance may be badly affected.

Example

```
router # debug ip rtp header-compress
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: new connection, conn 0,
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: output uncompressed, conn 0, cksum 0x0000, seq 7078, Gen = 0
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7079, Gen = 0
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7080, Gen = 0
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7081, Gen = 0
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7082, Gen = 0
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7083, Gen = 0
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7084, Gen = 0
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7085, Gen = 0
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7086, Gen = 0
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: recv uncompress, conn 0, cksum 0x0000, seq 4024, Gen = 0
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7087, Gen = 0
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: recv COMPRESSED_RTP, conn 0, cksum 0x0000, seq 4025, Gen = 0
```

```
2002-1-9 21:36:42
```

```
21:32:05: RHC Serial1/0: recv COMPRESSED_RTP, conn 0, cksum 0x0000, seq 4026, Gen = 0
```

```
2002-1-9 21:36:42
```

21:32:05: RHC Serial1/0: output uncompressed, conn 0, cksum 0x0000, seq 7088, Gen = 0
2002-1-9 21:36:42

21:32:05: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7089, Gen = 0
2002-1-9 21:36:42

21:32:05: RHC Serial1/0: recv COMPRESSED_RTP, conn 0, cksum 0x0000, seq 4027, Gen = 0
2002-1-9 21:36:42

21:32:05: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7090, Gen = 0
2002-1-9 21:36:42

21:32:05: RHC Serial1/0: recv uncompress, conn 0, cksum 0x0000, seq 4028, Gen = 0
2002-1-9 21:36:42

21:32:05: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7091, Gen = 0
2002-1-9 21:36:42

21:32:05: RHC Serial1/0: recv COMPRESSED_RTP, conn 0, cksum 0x0000, seq 4029, Gen = 0
2002-1-9 21:36:42

21:32:05: RHC Serial1/0: output uncompressed, conn 0, cksum 0x0000, seq 7092, Gen = 0
2002-1-9 21:36:42

21:32:05: RHC Serial1/0: recv COMPRESSED_RTP, conn 0, cksum 0x0000, seq 4030, Gen = 0
2002-1-9 21:36:43

21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7093, Gen = 0
2002-1-9 21:36:43

21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7094, Gen = 0
2002-1-9 21:36:43

21:32:06: RHC Serial1/0: recv uncompress, conn 0, cksum 0x0000, seq 4032, Gen = 0
2002-1-9 21:36:43

21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7095, Gen = 0
2002-1-9 21:36:43

21:32:06: RHC Serial1/0: recv COMPRESSED_RTP, conn 0, cksum 0x0000, seq 4033, Gen = 0
2002-1-9 21:36:43

21:32:06: RHC Serial1/0: output uncompressed, conn 0, cksum 0x0000, seq 7096, Gen = 0
2002-1-9 21:36:43

21:32:06: RHC Serial1/0: recv COMPRESSED_RTP, conn 0, cksum 0x0000, seq 4034, Gen = 0
2002-1-9 21:36:43

21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7097, Gen = 0
2002-1-9 21:36:43

21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7098, Gen = 0
2002-1-9 21:36:43

21:32:06: RHC Serial1/0: recv uncompress, conn 0, cksum 0x0000, seq 4036, Gen = 0
2002-1-9 21:36:43

21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7099, Gen = 0

2002-1-9 21:36:43
21:32:06: RHC Serial1/0: recv COMPRESSED_RTP, conn 0, cksum 0x0000, seq 4037, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: output uncompressed, conn 0, cksum 0x0000, seq 7100, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: recv COMPRESSED_RTP, conn 0, cksum 0x0000, seq 4038, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7101, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: tossing error packet
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7102, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: recv uncompress, conn 0, cksum 0x0000, seq 4040, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7103, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: recv COMPRESSED_RTP, conn 0, cksum 0x0000, seq 4041, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: output uncompressed, conn 0, cksum 0x0000, seq 7104, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: recv COMPRESSED_RTP, conn 0, cksum 0x0000, seq 4042, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7105, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7106, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: recv uncompress, conn 0, cksum 0x0000, seq 4044, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7107, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: recv COMPRESSED_RTP, conn 0, cksum 0x0000, seq 4045, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: output uncompressed, conn 0, cksum 0x0000, seq 7108, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: recv COMPRESSED_RTP, conn 0, cksum 0x0000, seq 4046, Gen = 0
2002-1-9 21:36:43
21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7109, Gen = 0
2002-1-9 21:36:43

21:32:06: RHC Serial1/0: output COMPRESSED_RTP, conn 0, cksum 0x0000, seq 7110, Gen = 0

2002-1-9 21:36:43

21:32:06: RHC Serial1/0: recv uncompress, conn 0, cksum 0x0000, seq 4048, Gen = 0

no deb all

4.1.8 debug ip tcp packet

To display the information about receiving and transmitting the TCP packet, run **debug ip tcp packet**. To stop displaying relative information, run **no debug ip tcp packet**.

debug ip tcp packet

no debug ip tcp packet

Parameter

The command has no parameters or keywords.

Command Mode

EXEC

Example

Router#debug ip tcp packet

Router#tcp: O ESTABLISHED 192.168.20.22:23 192.168.20.125:3828 seq 50659460

DATA 1 ACK 3130379810 PSH WIN 4380

tcp: I ESTABLISHED 192.168.20.22:23 192.168.20.125:3828 seq 3130379810

DATA 2 ACK 50659460 PSH WIN 16372

tcp: O ESTABLISHED 192.168.20.22:23 192.168.20.125:3828 seq 50659461

DATA 50 ACK 3130379812 PSH WIN 4380

tcp: O FIN_WAIT_1 192.168.20.22:23 192.168.20.125:3828 seq 50659511

ACK 3130379812 FIN WIN 4380

tcp: I FIN_WAIT_1 192.168.20.22:23 192.168.20.125:3828 seq 3130379812

ACK 50659511 WIN 16321

tcp: I FIN_WAIT_1 192.168.20.22:23 192.168.20.125:3828 seq 3130379812

ACK 50659512 WIN 16321

tcp: I FIN_WAIT_2 192.168.20.22:23 192.168.20.125:3828 seq 3130379812

ACK 50659512 FIN WIN 16321

tcp: O TIME_WAIT 192.168.20.22:23 192.168.20.125:3828 seq 50659512

ACK 3130379813 WIN 4380

tcp: I LISTEN 0.0.0.0:23 0.0.0.0:0 seq 3813109318

DATA 2 ACK 8057944 PSH WIN 17440

tcp: O LISTEN 0.0.0.0:23 0.0.0.0:0 seq 8057944

RST

Domain	Description
tcp:	Information about the TCP packets
O	Transmits the TCP packets.
ESTABLISHED	Current state of the TCP connection For the description of the TCP connection's state, see the description of the debug ip tcp transactions command.
192.168.20.22:23	The source address of the packet is 192.168.20.22 and the source port is 23.
192.168.20.125:3828	The destination address of the packet is 192.168.20.125 and the destination port is 3828.
seq 50659460	The sequence number of the packet is 50659460.
DATA 1	Means that the packet contains only one effective byte.
ACK 3130379810	The acknowledgement number of the packet is 3130379810.
PSH	PSH is reset in the control bit of the packet. Other control bits include ACK, FIN, SYN, URG and RST.
WIN 4380	Window domain of the packet used to notify the peer end to receive the cache size, which is 4380 bytes currently
WIN 4380	Window domain of the packet used to notify the peer end to receive the cache size, which is 4380 bytes currently

If a domain of the previous domains does not appear, the domain has no effective value in the TCP packet.

Related command

debug ip tcp transactions

4.1.9 debug ip tcp transactions

To display the important interaction information about TCP, such as the state change of the TCP connection, run **debug ip tcp transactions**.

To stop displaying relative information, run **no debug ip tcp transactions**.

debug ip tcp transactions

no debug ip tcp transactions

Parameter

The command has no parameters or keywords.

Command Mode

EXEC

Example

```
Router#debug ip tcp transactions
```

```
Router#TCP: rcvd connection attempt to port 23
```

```
TCP: TCB 0xE88AC8 created
```

```
TCP: state was LISTEN -> SYN_RCVD [23 -> 192.168.20.125:3828]
```

TCP: sending SYN, seq 50658312, ack 3130379657 [23 -> 192.168.20.125:3828]

TCP: state was SYN_RCVD -> ESTABLISHED [23 -> 192.168.20.125:3828]

TCP: connection closed by user, state was LISTEN [23 -> 0.0.0.0]

TCP: state was TIME_WAIT -> CLOSED [23 -> 192.168.20.125:3827]

TCP: TCB 0xE923C8 deleted

TCP: TCB 0xE7DBC8 created

TCP: connection to 192.168.20.124:513 from 192.168.20.22:1022, state was CLOSED to SYN_SENT

TCP: sending SYN, seq 52188680, ack 0 [1022 -> 192.168.20.124:513]

TCP: state was SYN_SENT -> ESTABLISHED [1022 -> 192.168.20.124:513]

TCP: rcvd FIN, state was ESTABLISHED -> CLOSE_WAIT [1022 -> 192.168.20.124:513]

TCP: connection closed by user, state was CLOSE_WAIT [1022 -> 192.168.20.124:513]

TCP: sending FIN [1022 -> 192.168.20.124:513]

TCP: connection closed by user, state was LAST_ACK [1022 -> 192.168.20.124:513]

TCP: state was LAST_ACK -> CLOSED [1022 -> 192.168.20.124:513]

TCP: TCB 0xE7DBC8 deleted

Domain	Description
TCP:	Displays the TCP interaction information.
rcvd connection attempt to port 23	Receives the connection request from the peer port 23, that is, the TELNET port.
TCB 0xE88AC8 created	Generates a new control block for the TCP connection, which is identified as 0xE88AC8.

Domain	Description
state was LISTEN -> SYN_RCVD	<p>Means that the TCP state machine changes from LISTEN to SYN_RCVD.</p> <p>The states of the TCP include:</p> <p>LISTEN—waiting for the TCP connection request from any remote host</p> <p>SYN_SENT—Sending out the connection request to trigger the TCP connection negotiation and then waiting for the peer's response</p> <p>SYN_RCVD—receiving the connection request from the peer, sending out the acknowledgement response and also sending out its connection request, and waiting for the connection request acknowledgement from the peer</p> <p>ESTABLISHED—means that the connection is created; the connection is in the data transmission phase; the data of the upper-layer application can be received and transmitted.</p> <p>FIN_WAIT_1—Means that the connection termination request has been transmitted and the response and connection termination request from the peer are being waited.</p> <p>FIN_WAIT_1—Means that the connection termination request has been transmitted and the response from the peer has been received, while the connection termination request from the peer is being waited.</p> <p>CLOSE_WAIT—Means the connection termination request of the peer is received and the local response has been sent out, and now the local user is being waited to close the connection. Once the user requires closing the connection, the system will send the connection termination request.</p> <p>CLOSING—Means the connection termination request has been sent to the peer and the peer's connection termination request is also received and the corresponding response is also sent out, and now is waiting for the peer to acknowledge the local connection termination request.</p> <p>LAST_ACK—Means that the connection termination request from the peer is received and acknowledged, and now the connection termination request is transmitted and the response is waited.</p> <p>TIME_WAIT—Means that a sufficient time is needed to ensure that the peer has already received the local acknowledgement of the peer's connection termination request and the connection packet still being transmitted in the network is waited to be sent to the destination or be dropped.</p> <p>CLOSED—Means that there is no connection or the connection has been completed shut down.</p> <p>For more detailed information, see RFC 793, TRANSMISSION CONTROL PROTOCOL.</p>
[23 -> 192.168.20.125:3828]	<p>The content in the bracket is explained as follows:</p> <p>The first domain (23) stands for the local TCP port.</p> <p>The second domain (192.168.20.125) stands for the remote IP address.</p> <p>The third domain (3828) stands for the remote TCP port.</p>
sending SYN	<p>Transmits a connection request out (the SYN of the control bit in the TCP header is reset). Other TCP control bits include SYN, ACK, FIN, PSH, RST and URG..</p>

Domain	Description
seq 50658312	The sequence number of the transmitted packet is 50658312.
ack 3130379657	The acknowledgement number of the transmitted packet is 3130379657.
rcvd FIN	Means that the connection termination request is received (FIN in the control bit of the TCP header is reset).
connection closed by user	Means that the upper-layer application requires closing the TCP connection.
connection timed out	Means that the connection is closed because it times out.

Related command

debug ip tcp packet

4.1.10 debug ip udp

To display the information about UDP interaction, run **debug ip udp**. To stop displaying the information about UDP interaction, run **no debug ip udp**.

debug ip udp

no debug ip udp

Parameter

The command has no parameters or keywords.

Command Mode

EXEC

Example

Router#debug ip udp

Router#UDP: rcvd src 192.168.20.99(520), dst 192.168.20.255(520), len = 32

UDP: sent src 192.168.20.22(20001), dst 192.168.20.43(1001), len = 1008

Domain	Description
UDP:	Means that the information is about the UDP packet.
rcvd	Means that the packet is received.
sent	Means that the packet is transmitted.
src	Stands for the source IP address and UDP port of the UDP packet.
dst	Stands for the destination IP address and UDP port of the UDP packet.
len	Stands for the length of the message.

The first information shows that the UDP packet is received. Its source address is 192.168.20.99 and its source port is port 520; its destination address is 192.168.20.255 and its destination port is port 520; the length of the packet is 32 bytes.

The second information shows that the UDP packet is transmitted. Its source address is 192.168.20.22 and its source port is port 20001; its destination address is 192.168.20.43 and its destination port is port 1001; the length of the packet is 1008 bytes.

4.1.11 ip mask-reply

To enable the router to answer the request of the IP mask on the designated interface, run **ip mask-reply**. To disable this function, run **no ip mask-reply**.

ip mask-reply

no ip mask-reply

default ip mask-reply

Parameter

The command has no parameters or keywords.

Default

The IP mask request is not answered.

Command Mode

Interface configuration mode

Example

```
!  
interface vlan 1  
ip mask-reply  
!
```

4.1.12 ip mtu

To set the MTU of the IP packet transmitted from an interface, run **ip mtu bytes**. To reuse the default value of MTU, run **no ip mtu**.

ip mtu bytes

no ip mtu

Parameter

Parameter	Description
<i>bytes</i>	Maximum IP transmission length which is counted with bytes

Default

The physical media of the interfaces are different, while the MTU on the interfaces are same. Sixty-eight bytes is the minimum MTU.

Command Mode

Interface configuration mode

Usage Description

If the length of the IP packet exceeds the IP MTU configured on the interface, the router will fragment the packet. Devices on the same physical media can communicate with each other only when they are configured with the same MTU. The MTU value will affect the value of the IP MTU. If the value of IP MTU and that of MTU are same, the value of IP MTU will automatically change to the new value of MTU when the MTU value changes. However, the value of MTU will not change if the value of IP MTU changes.

The minimum value of the IP MTU is 68 bytes, and its maximum value cannot exceed the MTU value configured on the interface.

Example

The following example shows how to set the IP MTU of the interface to 200:

```
!  
interface vlan 1  
ip mtu 200  
!
```

Related command

mtu

4.1.13 ip redirects

To transmit the IP ICMP redirect packet, run **ip redirects**. To stop transmitting the IP ICMP redirect packet, run **no ip redirects**.

ip redirects

no ip redirects

Parameter

The command has no parameters or keywords.

Default

In general, the IP redirect packet is transmitted by default. However, the function that the IP redirect packet can be transmitted will be automatically disabled if the hot-standby router protocol is configured on the interface. If the configuration of the hot-standby router protocol is cancelled later, the function cannot be automatically enabled.

Command Mode

Interface configuration mode

Usage Description

When the router detects that the forwarding interface of the gateway is the same as that of the received packet during the transmission of packets and if the packet-transmitting host directly connects the logic network of the interface, the router can transmit an ICMP redirect packet according to the protocol, notifying the source host of directly taking that router as the gateway for the destination address of the packet without packet forwarding through this router.

If the hot-standby router protocol is configured on an interface, the transmission of IP redirect packet may cause the loss of the packet.

Example

The following example shows how to enable the function of transmitting the ICMP redirect passage on interface ethernet1/0:

```
!
interface vlan 1
ip redirects
!
```

4.1.14 ip route-cache

To enable the route cache on an interface to forward the IP packet, run **ip route-cache**. To forbid the route cache on an interface, run **no ip route-cache**.

ip route-cache

no ip route-cache

ip route-cache same-interface

no ip route-cache same-interface

Parameter

Parameter	Description
same-interface	Allows the IP packet to be rapidly forwarded from the received interface.

Default

Fast switching is allowed on an interface, while fast switching is forbidden on the same interface.

Command Mode

Interface configuration mode

Usage Description

The route cache can conduct the load balance to the forwarded packets based on the source/destination address.

If the route cache is enabled, the packet forwarding rate of the router will be improved. However, the route cache should be forbidden on the low-speed line (64k or even less than 64k).

You can run **ip route-cache same-interface** to allow rapid IP switching on the same interface, that is, the receiver interface is same to the transmitter interface. In general, the function is not recommended to be enabled because the function conflicts with the redirect function of the router. If you has a incompletely-connected network, such as a frame-relay network, you can enable the function on the frame-relay interface. For example, in a frame-relay network consisting of routers A, B and C, there are only links from A to B and from B to C, the communication between router A and router C must be forwarded through router B. In this case, router B receives a packet from router A through a DLCI of an interface, and then transmits the packet to router C through another DLCI of the same interface.

Example

The following command is used to allow fast switching on the same interface.

```
ip route-cache same-interface
```

The following command is used to forbid fast switching even on the same interface.

no ip route-cache

The following command is used to forbid fast switching only on the same interface.

no ip route-cache same-interface

The following command is used to enable the default setting (allowing fast switching, the same interface excluded).

ip route-cache

Related command

show ip cache

4.1.15 ip source-route

To enable the router to handle the IP packet with the source IP route option, run **ip source-route**. To enable the router to drop the IP packet with the source IP route option, run **no ip source-route**.

ip source-route

no ip source-route

Parameter

The command has no parameters or keywords.

Default

The IP packet with the source IP route option is handled.

Command Mode

Global configuration mode

Example

The following example shows how to enable the router to handle the IP packet with the source IP route option.

ip source-route

Related command

ping

4.1.16 ip tcp synwait-time

To set the timeout time for the router to wait for the successful TCP connection, run **ip tcp synwait-time seconds**. To resume the default timeout time, run **no ip tcp synwait-time**.

ip tcp synwait-time seconds

no ip tcp synwait-time

Parameter

Parameter	Description
seconds	Time for the TCP connection, whose unit is second The valid vale ranges between 5 and 300 seconds. The default value is 75.

Default

75 seconds

Command Mode

Global configuration mode

Usage Description

When the router triggers the TCP connection and if the TCP connection is not established in the designated wait time, the router views that the connection fails and then sends the result to the upper-layer program. You can set the wait time for creation of the TCP connection. The default value of the wait time is 75 seconds. The option has no relation with the TCP connection packet which is forwarded through the router, but has relation with the TCP connection of the router itself.

To know the current value, you can run **ip tcp synwait-time?**. The value in the square bracket is the current value.

Example

The following example shows how to set the wait time of creating TCP connection to 30 seconds:

```
Router_config#ip tcp synwait-time 30
```

```
Router_config#ip tcp synwait-time ?
```

```
<5-300>[30] seconds    -- wait time
```

4.1.17 ip tcp window-size

To set the size of the TCP window, run **ip tcp window-size bytes**. To resume the default size of the TCP window, run **no ip tcp window-size**.

ip tcp window-size bytes

no ip tcp window-size

Parameter

Parameter	Description
bytes	Size of the window The maximum window size is 65535 bytes. The default window size is 2000 bytes.

Default

2000 bytes

Command Mode

Global configuration mode

Usage Description

Do not change the window size at will unless you have a definite purpose. To know the current value, you can run **ip tcp synwait-time ?**. The value in the square bracket is the current value.

Example

The following example shows how to set the size of the TCP window to 6000 bytes.

```
Router_config#ip tcp window-size 6000
```

```
Router_config#ip tcp window-size ?
```

```
<1-65535>[6000] bytes      -- Window size
```

4.1.18 ip unreachable

To enable the router to transmit the ICMP unreachable packet, run **ip unreachable**. To enable the router to stop transmitting this packet, run **no ip unreachable**.

ip unreachable

no ip unreachable

Parameter

The command has no parameters or keywords.

Default

The ICMP unreachable packet is transmitted.

Command Mode

Interface configuration mode

Usage Description

When the router forwards the IP packet, the packet may be dropped because there is no relative route in the routing table. In this case, the router can send the ICMP unreachable packet to the source host, notifying the source host and enabling it to detect the host timely and correct the fault rapidly.

Example

The following example shows how to enable the ICMP unreachable packet to be transmitted on interface vlan 1:

```
!  
interface vlan 1  
ip unreachable  
!
```

4.1.19 show ip cache

To display the route cache which is used for fast IP switching, run **show ip cache [prefix mask] [type number]**.

show ip cache [prefix mask] [type number]

Parameter

Parameter	Description
prefix mask	Displays the items whose destination addresses match up the designated prefixes/masks users enter. It is optional.
type number	Displays the items whose transmitter interfaces match up the designated interface types/numbers users enter. It is optional.
rsvp	Displays RSVP-relative items. It is optional.

Command Mode

EXEC

Example

The following example shows that the route cache is displayed:

Router#show ip cache

Source	Destination	Interface	Next Hop
192.168.20.125	2.0.0.124	Serial1/0	2.0.0.124
192.168.20.124	192.168.30.124	Serial1/0	2.0.0.124
2.0.0.124	192.168.20.125	Ethernet1/1	192.168.20.125

Domain	Description
Source	Source address
Destination	Destination address
Interface	Type and number of the transmitted interface
Next Hop	Gateway's address

The following example shows the route cache whose destination address matches up the designated prefix/mask.

Router#show ip cache 192.168.20.0 255.255.255.0

Source	Destination	Interface	Next Hop
2.0.0.124	192.168.20.125	Ethernet0/1	192.168.20.125

The following example shows the route cache whose transmitter interface matches up the designated interface type/mask.

Router#show ip cache s1/0

Source	Destination	Interface	Next Hop
192.168.20.125	2.0.0.124	Serial1/0	2.0.0.124
192.168.20.124	192.168.30.124	Serial1/0	2.0.0.124

4.1.20 show ip irdp

To display the **irdp protocol** information, run **show ip irdp**.

Parameter

The command has no parameters or keywords.

Command Mode

EXEC

Example

```
xuhao_config_e1/0# show ip irdp
```

Async0/0 ICMP router discovery protocol(IRDP) : OFF

Ethernet1/0 ICMP router discovery protocol(IRDP) : ON

Advertisements occur between every 450 and 600 seconds

Advertisements are sent as broadcasts

Advertisements valid in 1800 seconds

Default preference : 0

Ethernet1/1 ICMP router discovery protocol(IRDP) : OFF

Null0 ICMP router discovery protocol(IRDP) : OFF

Loopback7 ICMP router discovery protocol(IRDP) : OFF

Loopback10 ICMP router discovery protocol(IRDP) : OFF

4.1.21 show ip sockets

To display the socket information, run ***show ip sockets***.

show ip sockets

Parameter

The command has no parameters or keywords.

Command Mode

EXEC

Example

```
Router#show ip sockets
```

Proto	Local	Port	Remote	Port	In	Out
17	0.0.0.0	0	0.0.0.0	0	161	0
6	0.0.0.0	0	0.0.0.0	0	513	0
17	0.0.0.0	0	0.0.0.0	0	1698	0
17	0.0.0.0	0	0.0.0.0	0	69	0
6	0.0.0.0	0	0.0.0.0	0	23	0
17	0.0.0.0	0	0.0.0.0	0	137	122590

Domain	Description
Proto	Number of the IP protocol If the value is 17, it means the UDP protocol; if the value is 6, it means the TCP protocol.
Remote	Remote address
Port	Remote port
Local	Local address
Port	Local port
In	Total number of the received bytes
Out	Total number of the transmitted bytes

4.1.22 show ip traffic

To display the flow statistics information, run the following command:

show ip traffic

Parameter

The command has no parameters or keywords.

Command Mode

EXEC

Example

Router#show ip traffic

IP statistics:

Rcvd: 0 total, 0 local destination, 0 delivered

0 format errors, 0 checksum errors, 0 bad ttl count

0 bad destination address, 0 unknown protocol, 0 discarded

0 filtered , 0 bad options, 0 with options

Opts: 0 loose source route, 0 record route, 0 strict source route

0 timestamp, 0 router alert, 0 others

Frag: 0 fragments, 0 reassembled, 0 dropped

0 fragmented, 0 fragments, 0 couldn't fragment

Bcast: 0 received, 0 sent

Mcast: 0 received, 0 sent

Sent: 230 generated, 0 forwarded

0 filtered, 0 no route, 0 discarded

ICMP statistics:

Rcvd: 0 total, 0 format errors, 0 checksum errors

0 redirect, 0 unreachable, 0 source quench

0 echos, 0 echo replies, 0 mask requests, 0 mask replies

0 parameter problem, 0 timestamps, 0 timestamp replies

0 time exceeded, 0 router solicitations, 0 router advertisements

Sent: 0 total, 0 errors

0 redirects, 0 unreachable, 0 source quench

0 echos, 0 echo replies, 0 mask requests, 0 mask replies

0 parameter problem, 0 timestamps, 0 timestamp replies

0 time exceeded, 0 router solicitations, 0 router advertisements

UDP statistics:

Rcvd: 28 total, 0 checksum errors, 22 no port, 0 full sock

Sent: 0 total

TCP statistics:

Rcvd: 0 total, 0 checksum errors, 0 no port

Sent: 3 total

IGMP statistics:

Rcvd: 0 total, 0 format errors, 0 checksum errors

0 host queries, 0 host reports

Sent: 0 host reports

ARP statistics:

Rcvd: 8 total, 7 requests, 1 replies, 0 reverse, 0 other

Sent: 5 total, 5 requests, 0 replies (0 proxy), 0 reverse

Domain	Description
format errors	Error of the packet's format, such as incorrect IP header length
bad hop count	If the router finds that the TTL value of the packet decreases to zero when it forwards the packet, the packet will be dropped.
no route	Means that the router has no corresponding route.

4.1.23 show tcp

To display the states of all TCP connections, run the following command:

show tcp

Parameter

The command has no parameters or keywords.

Command Mode

EXEC

Example

Router#show tcp

TCB 0xE9ADC8

Connection state is ESTABLISHED, unread input bytes: 934

Local host: 192.168.20.22, Local port: 1023

Foreign host: 192.168.20.124, Foreign port: 513

Enqueued bytes for transmit: 0, input: 934 mis-ordered: 0 (0 packets)

Timer	Starts	Wakeups	Next(ms)
Retrans	33	1	0
TimeWait	0	0	0
SendWnd	0	0	0
KeepAlive	102	0	7199500

iss: 29139463 snduna: 29139525 sndnxt: 29139525 sndwnd: 17520

irs: 709124039 rcvnxt: 709205436 rcvwnd: 4380

SRTT: 15 ms, RXT: 2500 ms, RTV: 687 ms

minRXT: 1000 ms, maxRXT: 64000 ms, ACK hold: 200 ms

Datagrams (max data segment is 1460 bytes):

Rcvd: 102 (out of order: 0), with data: 92, total data bytes: 81396

Sent: 104 (retransmit: 0), with data: 31, total data bytes: 61

Domain	Description
TCB 0xE77FC8	Internal identifier of the control block for the TCP connection
Connection state is ESTABLISHED	Current state of the TCP connection
	The TCP connection may be in one of the following states:
	LISTEN---Means the TCP connection request from any remote host is being waited.
	SYN_SENT---Means that the response from the peer is being waited after the connection request is transmitted to the peer.
	SYN_RCVD---Means that the connection request acknowledgement from the peer is being waited after the local machine receives the peer's connection request, transmits its acknowledgement and also its own connection request.
	ESTABLISHED---Means that the connection has been established and is now in the data transmission phase in which the upper-layer application can be received or transmitted.
	FIN_WAIT_1---Means that the peer's acknowledgement and connection termination request is being waited after the local machine transmits the connection termination request to the peer.
	FIN_WAIT_2---Means that the peer's connection termination request is being waited after the local machine transmits connection termination request to the peer and receives the peer's acknowledgement.
	CLOSE_WAIT---Means the connection termination request of the peer is received and the local response has been sent out, and now the local user is being waited to close the connection. Once the user requires to close the connection, the system will send the connection termination request.
	CLOSING---Means the connection termination request has been sent to the peer and the peer's connection termination request is also received and the corresponding response is also sent out, and now is waiting for the peer to acknowledge the local connection termination request.
	LAST_ACK---Means that the connection termination request from the peer is received and acknowledged, and now the connection termination request is transmitted and the response is waited.
	Means that a sufficient time is needed to ensure that the peer has already received the local acknowledgement of its connection termination request.
	CLOSED---Means that there is no connection or the connection has been completely shut down.
	For more detailed information, see RFC 793, TRANSMISSION CONTROL PROTOCOL.

Domain	Description
unread input bytes:	Data that is submitted to but not yet received by the upper-layer application after the lower-layer TCP handles
Local host:	Local IP address
Local port:	Local TCP port
Foreign host:	Remote IP address
Foreign port:	Remote TCP port
Enqueued bytes for transmit:	Bytes in the transmission queue, including the transmitted but unacknowledged data bytes and not-yet-transmitted data bytes
input:	Data in the receiver queue which is waiting for being received by the upper-layer application after sorting
mis-ordered:	Number of bytes and number of packets in the mis-ordered queue These data can enter the receiver queue in order and be received by the upper-layer application after other data is received. For example, if packets 1, 2, 3, 4, 5 and 6 are received, packets 1 and 2 can enter the receiver queue, while packets 4, 5 and 6 have to enter the mis-ordered queue to wait for the arrival of packet 3.

The information about the currently-displayed timer will then be displayed, including start-up times, timeout times and next timeout time. Each connection has its independent timers. The timeout times of the timer are generally less than the start-up times of the timer because the timer may be reset when it is running. For example, if the system receives the peer's acknowledgement of all transmitted data when the re-sending timer runs, the re-sending timer will stop running.

Timer	Starts	Wakeup	Next(ms)
Retrans	33	1	0
TimeWait	0	0	0
SendWnd	0	0	0
KeepAlive	102	0	7199500

Domain	Description
Timer	Name of the timer
Starts	Start-up times of the timer
Wakeup	Timeout times of the timer
Next(ms)	Time before next timeout occurs (unit: millisecond) 0 means that the timer is not running.
Retrans	Retransmission timer which is used to retransmit the data. The timer is restarted after the data is transmitted. If the data is not acknowledged by the peer during the timeout time, the data will be resent.
TimeWait	Time-wait timer which is used to ensure that the peer receives the acknowledgement of the connection termination request.

Domain	Description
SendWnd	Timer of the transmission timer, used to ensure that the receiver window resumes the normal size after the TCP acknowledgement is lost.
KeepAlive	KeepAlive timer used to ensure that the communication link is normal and the peer is still in the connection state. It will trigger the transmission of the test packet to detect the state of the communication link and the peer's state.

The sequence number of the TCP connection will then be displayed. The reliable and ordered data transmission is guaranteed through the sequence number. The local/remote host conducts flow control and transmission acknowledgement through the sequence number.

iss: 29139463 snduna: 29139525 sndnxt: 29139525 sndwnd: 17520

irs: 709124039 rcvnxt: 709205436 rcvwnd: 4380

Domain	Description
iss:	Initial transmission sequence number
snduna:	Transmission sequence number of the first byte in the data which has been transmitted but the peer's acknowledgement is not received
sndnxt:	Transmission sequence number of the first byte in the data which will be transmitted next time
sndwnd:	Size of the TCP window of the remote host
irs:	Initial reception sequence number, that is, initial transmission sequence number of the remote host
rcvnxt:	Recently-acknowledged acceptance sequence number
rcvwnd:	Size of the TCP window of the local host

The transmission time recorded by the local host is then displayed. The system can adapt to different networks according to the data.

SRTT: 15 ms, RXT: 2500 ms, RTV: 687 ms

minRXT: 1000 ms, maxRXT: 64000 ms, ACK hold: 200 ms

Domain	Description
SRTT:	Round-trip time after smooth handlement
RXT:	Retransmission timeout time
RTV:	Change value of the round-trip time
MinRXT:	Allowable minimum retransmission timeout
MaxRXT:	Allowable maximum retransmission timeout
ACK hold:	Maximum latency time for delaying the acknowledgement and enabling it to be transmitted together with the data

Datagrams (max data segment is 1460 bytes):

Rcvd: 102 (out of order: 0), with data: 92, total data bytes: 81396

Sent: 104 (retransmit: 0), with data: 31, total data bytes: 61

Domain	Description
max data segment is	Maximum data-segment length allowed by a connection
Rcvd:	Number of packets received by the local host through the connection and the number of mis-ordered packets
with data:	Number of packets which contains valid data
total data bytes:	Total data bytes contained in the packet
Sent:	Total number of packets transmitted by the local host during the connection and the number of resent packets

Related command

show tcp brief

show tcp tcb

4.1.24 show tcp brief

To display the brief information about the TCP connection, run the following command:

show tcp brief [all]

Parameter

Parameter	Description
all	(optional) Displays all ports. If the keyword is not entered, the system will not display the port in listening mode.

Command Mode

EXEC

Example

Router#show tcp brief

TCB	Local Address	Foreign Address	State
0xE9ADC8	192.168.20.22:1023	192.168.20.124:513	ESTABLISHED
0xEA34C8	192.168.20.22:23	192.168.20.125:1472	ESTABLISHED

Domain	Description
TCB	Internal identifier of the TCP connection
Local Address	Local address and local TCP port
Foreign Address	Remote address and remote TCP port
State	State of the connection For details, see the show tcp command.

Related command

show tcp

show tcp tcb

4.1.25 show tcp statistics

To display the statistics data about TCP, run the following command:

show tcp statistics

Parameter

The command has no parameters or keywords.

Command Mode

EXEC

Example

Router#show tcp statistics

Rcvd: 148 Total, 0 no port

0 checksum error, 0 bad offset, 0 too short

131 packets (6974 bytes) in sequence

0 dup packets (0 bytes)

0 partially dup packets (0 bytes)

0 out-of-order packets (0 bytes)

0 packets (0 bytes) with data after window

0 packets after close

0 window probe packets, 0 window update packets

0 dup ack packets, 0 ack packets with unsend data

127 ack packets (247 bytes)

Sent: 239 Total, 0 urgent packets

6 control packets

123 data packets (245 bytes)

0 data packets (0 bytes) retransmitted

110 ack only packets (101 delayed)

0 window probe packets, 0 window update packets

4 Connections initiated, 0 connections accepted, 2 connections established

3 Connections closed (including 0 dropped, 1 embryonic dropped)

5 Total rxmt timeout, 0 connections dropped in rxmt timeout

1 Keepalive timeout, 0 keepalive probe, 1 Connections dropped in keepalive

Domain	Description
Rcvd:	Statistics data of the packets received by the router
Total	Total number of the received packets
no port	Number of received packets which have no destination ports
checksum error	Number of received packets which have checksum error
bad offset	Number of received packets which have offset error
too short	Number of received packets whose length is less than the valid effective length
packets in sequence	Number of packets received in order
dup packets	Number of received duplicate packets
partially dup packets	Number of some duplicate packets received
out-of-order packets	Number of packets received out of order
packets with data after window	Number of received packets whose data exceeds the received window of the router
packets after close	Number of packets received after the connection is closed
window probe packets	Number of received packets about window detection
window update packets	Number of received packets about window update
dup ack packets	Number of packets which are re-acknowledged after received
ack packets with unsent data	Number of packets which are received but not sent
ack packets	Number of acknowledgement packets
Sent	Statistics data of the packets transmitted by the router
Total	Total number of the transmitted packets
urgent packets	Number of transmitted urgent packets
control packets	Total number of control packets (SYN, FIN or RST) which have been transmitted
data packets	Number of transmitted urgent packets
data packets retransmitted	Number of resent data packets
ack only packets	Number of transmitted acknowledgement packets
window probe packets	Number of transmitted packets about window detection
window update packets	Number of transmitted packets about window update
Connections initiated	Number of locally-initiated connections

Domain	Description
connections accepted	Number of locally-accepted connections
connections established	Number of locally-established connections
Connections closed	Number of locally-closed connections
Total rxmt timeout	Total number of re-transmission timeouts
Connections dropped in rxmit timeout	Number of disconnected connections because of re-transmission timeout
Keepalive timeout	Number of keepalive timeouts
keepalive probe	Number of transmitted packets about keepalive detection
Connections dropped in keepalive	Number of connections which are disconnected because of Keepalive

Related command

clear tcp statistics

4.1.26 show tcp tcb

To display the state of a TCP connection, run the following command:

show tcp tcb address

Parameter

Parameter	Description
address	Address of the transmission control block (TCB) for the to-be-displayed TCP connection. TCB is an internal identifier of the TCP connection, which can be obtained through the show tcp brief command.

Command Mode

EXEC

Example

The following information is displayed after the **show tcp** command is run:

```
Router_config#show tcp tcb 0xea38c8
```

TCB 0xEA38C8

Connection state is ESTABLISHED, unread input bytes: 0

Local host: 192.168.20.22, Local port: 23

Foreign host: 192.168.20.125, Foreign port: 1583

Enqueued bytes for transmit: 0, input: 0 mis-ordered: 0 (0 packets)

Timer	Starts	Wakeup	Next(ms)
Retrans	4	0	0
TimeWait	0	0	0
SendWnd	0	0	0
KeepAlive	+5	0	6633000

iss: 10431492 snduna: 10431573 sndnxt: 10431573 sndwnd: 17440
 irs: 915717885 rcvnxt: 915717889 rcvwnd: 4380

SRTT: 2812 ms, RXT: 18500 ms, RTV: 4000 ms

minRXT: 1000 ms, maxRXT: 64000 ms, ACK hold: 200 ms

Datagrams (max data segment is 1460 bytes):

Rcvd: 5 (out of order: 0), with data: 1, total data bytes: 3

Sent: 4 (retransmit: 0), with data: 3, total data bytes: 80

Related command

show tcp

show tcp brief

4.2 ACL Configuration Commands

ACL configuration commands include:

- deny
- ip access-group
- ip access-list
- permit
- show ip access-list

4.2.1 deny

To configure the deny rules in IP ACL configuration mode, run **deny source [source-mask] [log]**; to remove the deny rules from the IP access control list, run **no deny source [source-mask] [log]**.

deny source [source-mask] [log]

no deny source [source-mask] [log]

deny src_range source-begin source-end [log]

no deny src_range source-begin source-end [log]

deny protocol source source-mask destination destination-mask [precedence precedence] [tos tos] [log]

no deny protocol source source-mask destination destination-mask [precedence precedence] [tos tos] [log]

deny protocol src_range source-begin source-end dst_range destination-begin destination-end [precedence precedence] [tos tos] [log]

no deny protocol src_range source-begin source-end dst_range destination-begin destination-end [precedence precedence] [tos tos] [log]

The following syntax can also be applied to ICMP:

```
deny icmp source source-mask destination destination-mask [icmp-type] [precedence precedence] [tos tos] [log]
```

```
deny icmp src_range source-begin source-end dst_range destination-begin destination-end [icmp-type] [precedence precedence] [tos tos] [log]
```

The following syntax can be used for IGMP:

```
deny igmp source source-mask destination destination-mask [igmp-type] [precedence precedence] [tos tos] [log]
```

```
deny igmp src_range source-begin source-end dst_range destination-begin destination-end [igmp-type] [precedence precedence] [tos tos] [log]
```

For TCP, you can use the following syntax:

```
deny tcp source source-mask [operator port] destination destination-mask [operator port ] [established] [precedence precedence] [tos tos] [log]
```

```
deny tcp src_range source-begin source-end [src_portrange port-begin port-end] dst_range destination-begin destination-end [dst_portrange port-begin port-end] [established] [precedence precedence] [tos tos] [log]
```

For UDP, you can use the following syntax:

```
deny udp source source-mask [operator port] destination destination-mask [operator port] [precedence precedence] [tos tos] [log]
```

```
deny udp src_range source-begin source-end [src_portrange port-begin port-end] dst_range destination-begin destination-end [dst_portrange port-begin port-end] [precedence precedence] [tos tos] [log]
```

Parameter

Parameter	Description
protocol	Protocol name or IP protocol number It can be icmp, igmp, igrp, ip, ospf, tcp or udp, or it can be an integer from 0 to 255 which stands for the IP protocol. To match up any Internet protocol, including ICMP, TCP and UDP, you can use the ip keyword. Some protocol can be further limited, which can be further described.
source	Source network or host number Two methods can be used to designate the source: 32-byte binary-system numbers and decimal-system numbers which are separated by four points. The any keyword can be the abbreviation of the source and the source's mask of host 0.0.0.0.0.0.0.
source-mask	Mask of the source address The any keyword can be the abbreviation of the source and the source's mask of host 0.0.0.0.0.0.0.
destination	Source network or host number, which can designated by the decimal numbers or the binary numbers The any keyword can be the abbreviation of the destination and the destination's mask of host 0.0.0.0.0.0.0.
destination-mask	Mask of the destination network The any keyword can be the abbreviation of the destination and the destination's mask of host 0.0.0.0.0.0.0.
precedence precedence	Filters the packets based on the precedence. The precedence of the packet can be designated by an integer from 0 to 7. This parameter is optional.

Parameter	Description
tos tos	An optional parameter, meaning that the packets can be filtered at the service layer. It is designated by any number between 0 and 15.
icmp-type	An optional parameter, which means that the ICMP packet can be filtered based on the type of the ICMP packet. The type of the ICMP packet can be designated by a number between 0 and 255.
igmp-type	An optional parameter, which means that the IGMP packets can be filtered based on the type and name of the IGMP packet. The type of the IGMP packet can be designated by a number between 0 and 15.
operator	Compares the source or destination ports. It is an optional parameter. The operations include lt , gt , eq and neq . If the operator symbol is behind source and source-mask , it must match up the source port. If the operator symbol is behind destination and destination-mask , it must match up the destination port.
ISDN(BRI) interface	Decimal number or name of the TCP/UDP port, which is optional. The port number ranges between 0 and 65535. The name of the TCP port is listed in the Usage Explanation part. When the TCP is filtered, only the name of the TCP port can be used. The names of the UDP ports are also listed in the Usage Explanation part. When the UDP is filtered, only the name of the UDP port can be used.
established	An optional parameter for the TCP protocol, representing an established connection. If the TCP data reports that the ACK or RST is configured, the match-up appears. For the unmatched case, the TCP packet is initialized to establish a connection.
log	An optional parameter, meaning the logs can be recorded.
Source-begin	Enables the source address.
Source-end	Terminates the source address.
Destination-begin	Starts the destination address.
Destination-end	Terminates the destination address.
Port-begin	Starts the port.
Port-end	Terminates the port.

Command Mode

ARP Access List Configuration

Usage Description

You can control the packet transmission on an interface, virtual terminal line access and routing choice update through the access control list. After the match-up is conducted, you shall stop checking the expanded access control list.

The segmented IP packet, not the initial segment, will be immediately accepted by any expanded IP access control list. The expanded ACL

is used to control the access of the virtual terminal line or limit the content of the routing choice update without matching up the source TCP port, the type of the service value or the packet's priority.

NOTE: After an access control list is initially created, any content added later (or entered through the terminal) will be placed at the end of the list.

The following are the names of the TCP port. For reference of these protocols, see RFC of these protocols. You can search the corresponding port number of these protocols by entering a question mark behind the relative command.

- bgp
- ftp
- ftp-data
- login
- pop2
- pop3
- smtp
- telnet
- www

The following are the names of the UDP port. For reference of these protocols, see RFC of these protocols. You can search the corresponding port number of these protocols by entering a question mark behind the relative command.

- domain
- snmp
- syslog
- tftp

Example

The following example shows that network segment 192.168.5.0 is being forbidden.

```
!  
ip access-list standard filter  
deny 192.168.5.0 255.255.255.0  
!
```

NOTE: The IP access control list ends with an implicit deny rule.

Related command

```
ip access-group  
ip access-list  
permit  
show ip access-list
```

4.2.2 ip access-group

To control and access an interface, run **ip access-group {access-list-name}{in | out}**. To delete the designated access group, run **no ip access-group {access-list-name}{in | out}**.

ip access-group {access-list-name}{in | out}

no ip access-group {access-list-name}{in | out}

Parameter

Parameter	Description
<i>access-list-name</i>	Name of the access control list, which is a string with up to 20 characters
in	Uses the access control list on the incoming interface.
out	Uses the access control list on the outgoing interface.

Command Mode

Interface configuration mode

Usage Description

The access control list can be used on the incoming or outgoing interface. For the standard incoming access control list, the source address of the packet will be checked according to the access control list after the packet is received. For the expanded access control list, the router will check the destination address. If the access is the address, the software continues to handle the packet. If the access control list forbids the address, the software drops the packet and returns an ICMP unreachable packet.

For the standard access control list, after a packet is received and routed to a control interface, the software checks the source address of the packet according to the access control list. For the expanded access control list, the router will also check the access control list at the receiver terminal. If the access control list at the receiver terminal permits the packet, the software will then forward the packet. If the access control list forbids the address, the software drops the packet and returns an ICMP unreachable packet.

If the designated access control list does not exist, all packets will be allowed.

Example

The following example shows how to apply the **filter** application list on interface Ethernet 0.

```
!
interface ethernet 0
ip access-group filter out
!
```

Related command

```
ip access-list
show ip access-list
```

4.2.3 ip access-list

To add the IP access control list, run `ip access-list {standard | extended} name`.

To delete an IP access control list, run `no ip access-list {standard | extended} name`.

```
ip access-list {standard | extended} name
```

```
no ip access-list {standard | extended} name
```

Parameter

Parameter	Description
standard	Specifies the standard access control list.
extended	Specifies the expanded access control list.
name	Name of the access control list, which is a string with up to 20 characters

Default

No IP access control list is defined.

Command Mode

Global configuration mode

Usage Description

After the command is run, the system enters the IP access control list mode. You then can run **permit** or **deny** to configure the access rules.

Example

The following example shows that a standard access control list is configured.

```
!
ip access-list standard filter
deny 192.168.1.0 255.255.255.0
permit any
!
```

Related command

```
deny
ip access-group
permit
show ip access-list
```

4.2.4 permit

To configure the **permit** rules in IP ACL configuration mode, run **permit source [source-mask] [log]**; to remove the **permit** rules from the IP access control list, run **no permit source [source-mask] [log]**.

permit source [source-mask] [log]

no permit source [source-mask] [log]

permit src_range source-begin source-end [log]

no permit src_range source-begin source-end [log]

permit protocol source source-mask destination destination-mask [precedence precedence] [tos tos] [log]

no permit protocol source source-mask destination destination-mask [precedence precedence] [tos tos] [log]

permit protocol src_range source-begin source-end dst_range destination-begin destination-end [precedence precedence] [tos tos] [log]

no permit protocol src_range source-begin source-end dst_range destination-begin destination-end [precedence precedence] [tos tos] [log]

The following syntax can also be applied to ICMP:

permit icmp source source-mask destination destination-mask [icmp-type] [precedence precedence] [tos tos] [log]

permit icmp src_range source-begin source-end dst_range destination-begin destination-end [icmp-type] [precedence precedence] [tos tos] [log]

The following syntax can be used for IGMP:

permit igmp source source-mask destination destination-mask [igmp-type] [precedence precedence] [tos tos] [log]

permit igmp src_range source-begin source-end dst_range destination-begin destination-end [igmp-type] [precedence precedence] [tos tos] [log]

For TCP, you can use the following syntax:

permit tcp source source-mask [operator port] destination destination-mask [operator port] [established] [precedence precedence] [tos

tos] [log]

```
permit tcp src_range source-begin source-end [src_portrange port-begin port-end] dst_range destination-begin destination-end
[dst_portrange port-begin port-end] [established] [precedence precedence] [tos tos] [log]
```

For UDP, you can use the following syntax:

```
permit udp source source-mask [operator port [port]] destination destination-mask [operator port] [precedence precedence] [tos tos]
[log]
```

```
permit udp src_range source-begin source-end [src_portrange port-begin port-end] dst_range destination-begin destination-end
[dst_portrange port-begin port-end] [precedence precedence] [tos tos] [log]
```

Parameter

Parameter	Description
protocol	Protocol name or IP protocol number It can be icmp, igmp, igmp, ip, ospf, tcp or udp, or it can be an integer from 0 to 255 which stands for the IP protocol. To match up any Internet protocol, including ICMP, TCP and UDP, you can use the ip keyword. Some protocol can be further limited, which can be further described.
source	Source network or host number Two methods can be used to designate the source: 32-byte binary-system numbers and decimal-system numbers which are separated by four points. The any keyword can be the abbreviation of the source and the source's mask of host 0.0.0.0.0.0.0.
source-mask	Mask of the source address The any keyword can be the abbreviation of the source and the source's mask of host 0.0.0.0.0.0.0.
destination	Source network or host number, which can designated by the decimal numbers or the binary numbers There are two methods to express the destination network or the host's number: the binary system and decimal system The any keyword can be the abbreviation of the destination and the destination's mask of host 0.0.0.0.0.0.0.
destination-mask	Mask of the destination network The any keyword can be the abbreviation of the destination and the destination's mask of host 0.0.0.0.0.0.0.
precedence precedence	Filters the packets based on the precedence. The precedence of the packet can be designated by an integer from 0 to 7. This parameter is optional.
tos tos	An optional parameter, meaning that the packets can be filter at the service layer It is designated by any number between 0 and 15.
icmp-type	An optional packet, which means that the ICMP packet can be filtered based on the type of the ICMP packet The type of the ICMP packet can be designated by a number between 0 and 255.
igmp-type	An optional parameter, which means that the IGMP packets can be filtered based on the type and name of the IGMP packet The type of the IGMP packet can be designated by a number between 0 and 15.

Parameter	Description
operator	Compares the source or destination ports. It is an optional parameter. The operations include lt , gt , eq and neq . If the operator is behind source and source-mask , it must match up the source port. If the operator symbol is behind destination and destination-mask , it must match up the destination port.
ISDN(BRI)	Decimal number or name of the TCP/UDP port, which is optional. The port number ranges between 0 and 65535. The name of the TCP port is listed in the Usage Guide part. When the TCP is filtered, only the name of the TCP port can be used. The names of the UDP ports are also listed in the Usage Explanation part. When the TCP is filtered, only the name of the TCP port can be used. When the UDP is filtered, only the name of the UDP port can be used.
established	An optional parameter for the TCP protocol, representing an established connection. If the TCP data reports that the ACK or RST is configured, the match-up appears. For the unmatched case, the TCP packet is initialized to establish a connection.
log	An optional parameter, meaning the logs can be recorded.
Source-begin	Enables the source address.
Source-end	Terminates the source address.
Destination-begin	Start the destination address.
Destination-end	Terminates the destination address.
Port-begin	Starts the port.
Port-end	Terminates the port.

Command Mode

IP access list configuration mode

Usage Description

You can control the packet transmission on an interface, virtual terminal line access and routing choice update through the access control list. After the match-up is conducted, you shall stop checking the expanded access control list.

The segmented IP packet, not the initial segment, will be immediately accepted by any expanded IP access control list. The expanded ACL is used to control the access of the virtual terminal line or limit the content of the routing choice update without matching up the source TCP port, the type of the service value or the packet's priority.

NOTE: After an access control list is initially created, any content added later (or entered through the terminal) will be placed at the end of the list.

The following are the names of the TCP port. For reference of these protocols, see RFC of these protocols. You can search the corresponding port number of these protocols by entering a question mark behind the command.

- bgp
- ftp
- ftp-data
- login
- pop2

- pop3
- smtp
- telnet
- www

The following are the names of the UDP port. For reference of these protocols, see RFC of these protocols. You can search the corresponding port number of these protocols by entering a question mark behind the command.

- domain
- snmp
- syslog
- tftp

Example

The following example shows that network segment 192.168.5.0 is allowed.

```
!  
ip access-list standard filter  
permit 192.168.5.0 255.255.255.0  
!
```

NOTE: The IP access control list ends with an implicit deny rule.

Related command

```
deny  
ip access-group  
ip access-list  
show ip access-list
```

4.2.5 show ip access-list

To display the content of the current IP access control list, run the following command:

show ip access-list[access-list-name]

Parameter

Parameter	Description
access-list-name	Name of the access control list, which is a string with up to 20 characters

Default

All standard/expanded IP access control lists will be displayed.

Command Mode

EXEC

Usage Description

The **show ip access-list** command enables you to specify an access control list.

Example

The following information is displayed after the **show ip access-list** command is run while an access control list is not specified:

```
Router# show ip access-list
ip access-list standard aaa
permit 192.2.2.1
permit 192.3.3.0 255.255.255.0
ip access-list extended bbb
permit tcp any any eq www
permit ip any any
```

The following information is displayed after you run the **show ip access-list** command with an access control specified:

```
ip access-list extended bbb
permit tcp any any eq www
```



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