L3 Function Configuration

Contents

Chapter 1 L3 Function Configuration

1.1 Introduction to L3 Functions

MyPower S4330 is a 10-Gigabit intelligent routing switch based on the application specific integrated circuit (ASIC) technology and supports layer 2 (L2) and layer 3 (L3) forwarding. It performs L2 forwarding when hosts in the same virtual local area network (VLAN) access each other and L3 forwarding when hosts in different VLANs access each other.

1.2 L3 Function Configuration

1.2.1 L3 Function Configuration List

Table 1-1 L3 function configuration list

Configuration Task	Description	Detailed Configuration
Planning VLANs and creating L3 interfaces	Mandatory	1.2.2
Configuring the forwarding mode	Mandatory	1.2.3
Creating VLAN interfaces for common VLANs	Mandatory	1.2.4
Creating superVLAN interfaces and adding VLANs to the superVLAN	Mandatory	1.2.5
Configuring IP addresses for VLAN or superVLAN interfaces	Mandatory	1.2.6
Configuring an IP address range for VLAN or superVLAN interfaces	Mandatory	1.2.7
Configuring the Address Resolution Protocol (ARP) proxy	Mandatory	1.2.8
Displaying interface configurations	Mandatory	1.2.9
Configuring unicast reverse path forwarding (URPF)	Mandatory	1.2.10
Disabling the function of sending Internet Control Message Protocol (ICMP) packets with an unreachable destination host on interfaces	Mandatory	1.2.11

1.2.2 Planning VLANs and Creating L3 Interfaces

For details about VLAN planning, see VLAN configurations.

L3 interfaces are classified into common VLAN interfaces and superVLAN interfaces. Common VLAN interfaces are created on VLANs and superVLAN interfaces on superVLANs (superVLANs do not exist or contain any port). A superVLAN can contain multiple sub VLANs that exist. The system

supports a maximum of 256 L3 interfaces, including a maximum of 128 superVLAN interfaces. There are a maximum of 256 VLANs contained in all L3 interfaces and each VLAN can exist only in one L3 interface. In a superVLAN, an interface can be untagged only in one sub VLAN and must be tagged in other sub VLANs.
For details about the commands for creating L3 interfaces, see section 1.2.4.

1.2.3 Configuring the Forwarding Mode

MyPower S4330 supports stream forwarding and network topology-based forwarding. In stream forwarding mode, MyPower S4330 identifies the failed route or the unreachable destination host route and sends packets to the CPU for further processing. In network topology-based forwarding mode, MyPower S4330 directly discards the packets. By default, MyPower S4330 works in stream forwarding mode.

Table 1-3 Configuring the forwarding mode

Operation	Command	Remarks
Enter the global configuration mode.	**configure terminal**	N/A
Set the packet forwarding mode in the system to stream forwarding.	**ip def cpu**	Optional
Set the packet forwarding mode in the system to network topology-based forwarding.	**no ip def cpu**	Optional
Display the configured packet forwarding mode.	**show ip def cpu**	This command can be run in all modes.

1.2.4 Creating VLAN Interfaces for Common VLANs

A VLAN interface needs to be configured for each VLAN that performs L3 forwarding or the VLAN needs to be added to the superVLAN.

Table 1-4 Configuring the VLAN conversion function

Operation	Command	Remarks
Enter the global configuration mode.	**configure terminal**	N/A
Create a VLAN interface with the VLAN ID being **vid** and enter the VLAN interface configuration mode.	**interface vlan-interface** *<vid>*	Optional
Return to the global configuration mode.	**exit**	N/A
Delete the VLAN interface with the	**no interface vlan-interface** *<vid>*	Optional

VLAN ID being **vid**.		

1.2.5 Creating SuperVLAN Interfaces and Adding VLANs to the SuperVLAN

SuperVLAN interfaces are used for communication between hosts in different VLANs in the same network segment. SuperVLAN interfaces are implemented through the ARP proxy.

Table 1-5 Creating superVLAN interfaces and adding VLANs to the superVLAN

Operation	Command	Remarks
Enter the global configuration mode.	**configure terminal**	N/A
Create a superVLAN interface with the interface ID being **vid** and enter the superVLAN interface configuration mode.	**interface supervlan-interface** *<vid>*	Optional
Return to the global configuration mode.	**exit**	N/A
Delete the superVLAN interface with the interface ID being **vid**.	**no interface supervlan-interface *<vid>***	Optional
Configure sub VLANs for the superVLAN interface.	**subvlan** <vid>	Optional
Delete the sub VLANs configured for the superVLAN interface.	**no subvlan** <vid>	Optional

1.2.6 Configuring IP Addresses for VLAN or SuperVLAN Interfaces

Each VLAN or superVLAN interface can be configured with a maximum of 32 IP addresses and the IP addresses of VLAN or superVLAN interfaces cannot be in the same network segment. The first IP address of an interface will be automatically selected as the primary IP address. When the primary IP address is deleted, the interface automatically selects another IP address as the primary IP address or a configured IP address can be manually specified as the primary IP address. For example, if the IP address of VLAN interface 1 is 10.11.0.1/16, the IP addresses of other interfaces must not be in the 10.11.0.0/16 network segment (such as 10.11.1.1/24).

Table 1-6 Configuring IP addresses for VLAN or superVLAN interfaces

Operation	Command	Remarks
Enter the global configuration mode.	**configure terminal**	N/A
Enter the VLAN or superVLAN interface configuration mode.	**interface vlan-interface *<vid>*** **interface supervlan-interface** *<vid>*	N/A

Configure an IP address and a mask for the interface.	**ip address** <*ipaddress*> <*ipaddress mask*>	Optional
Delete all IP addresses of the interface.	**no ip address**	Optional
Delete the specified IP address of the interface.	**no ip address** <*ipaddress*> <*ipaddress mask*>	Optional
Configure the primary IP address for the interface.	**ip address primary** <*ipaddress*>	Optional

1.2.7 Configuring an IP Address Range for VLAN or SuperVLAN Interfaces

Each VLAN or superVLAN interface can be configured with a maximum of eight IP address ranges. After an IP address range is configured, only the ARP entries within this range can be learnt so as to restrict user access. When a VLAN or superVLAN interface is deleted, relevant configurations are automatically deleted.

For superVLAN interfaces, sub VLANs can be specified at the same time so that the set address range is applicable only to these sub VLANs.

Table 1-7 Configuring the IP address range for VLAN or superVLAN interfaces

Operation	Command	Remarks
Enter the global configuration mode.	**configure terminal**	N/A
Enter the VLAN or superVLAN interface configuration mode.	**interface vlan-interface *<vid>*** **interface supervlan-interface** <*vid*>	N/A
Configure the IP address range supported by this interface, ranging from **startip** to **endip**.	**ip address range** *startip endip*	Optional
Delete all IP address ranges supported by the interface.	**no ip address range**	Optional
Delete the specified IP address ranges supported by the interface.	**no ip address range** *startip endip*	Optional
Configure the IP address range for sub VLANs of the superVLAN.	**ip address range** *startip endip* **vlan** <*vlanid*>	Optional
Delete the IP address ranges of the sub VLANs of the superVLAN.	**no ip address range** *startip endip* **vlan** <*vlanid*>	Optional

1.2.8 Configuring the ARP Proxy

ARP request packets are broadcast packets and cannot pass through VLANs. If the ARP proxy function is enabled, ARP interaction is supported between hosts in sub VLANs of the same superVLAN. When the ARP proxy is disabled, the hosts of the sub VLANs in the superVLAN interface cannot communicate with each other.

By default, the ARP request packets from all sub VLANs are processed in the preceding manner. In addition, relevant commands can be used to prevent the ARP request packets from a sub VLAN from being broadcast to other sub VLANs when they are processed by the ARP proxy.

Table 1-8 Configuring the ARP proxy

Operation	Command	Remarks
Enter the VLAN configuration mode.	**vlan** *<vlanid>*	N/A
Enable the arp-proxy function for the VLAN.	**arp-proxy**	Optional
Disable the arp-proxy function for the VLAN.	**no arp-proxy**	Optional
Enable the arp-proxy broadcast function for the VLAN.	**arp-proxy broadcast**	Optional
Disable the arp-proxy broadcast function for the VLAN.	**no arp-proxy broadcast**	Optional
Display the information about the ARP proxy configured in the system.	**show arp-proxy**	This command can be run in all modes.
Display information about the ARP proxy broadcast function configured in the system.	**show arp-proxy broadcast**	This command can be run in all modes.

1.2.9 Displaying VLAN and SuperVLAN Interface Information

MyPower S4330 integrates VLAN interface information and superVLAN interface information. They can be viewed by running a unified display command.

Table 1-9 Displaying VLAN and superVLAN interface information

Operation	Command	Remarks
Display information about the VLAN and superVLAN interfaces currently configured in the system.	**show ip interface** [[**vlan-interface** *<vlanid>*] | [**supervlan-interface** *<supervlanid>*]]	This command can be run in all modes.

1.2.10 Configuring URPF

URPF aims to prevent network attack behaviors based on source address spoofing. URPF obtains

the source address and ingress interface of a packet and uses the source address as the destination address to query the routing table for the matching route. The packet is forwarded if it meets conditions and discarded if it does not meet conditions. Two URPF modes are supported:

- Strict mode: In this mode, the source address must exist in the routing table and the egress interface of the source address of the packet is the same as the ingress interface of the packet.
- Loose mode: In this mode, the system only checks whether the source address of the packet exists in the unicast routing table. If yes, the packet is forwarded.

Table 1-10 Configuring URPF

Operation	Command	Remarks
Enter the global configuration mode.	**configure terminal**	N/A
Enter the VLAN or superVLAN interface configuration mode.	**interface vlan-interface** ***<vid>*** **interface supervlan-interface** *<vid>*	N/A
Enable URPF for this interface and specify the URPF mode.	**urpf {loose** | **strict}**	Optional
Disable URPF for this interface.	**no urpf**	Optional
Display URPF information in the system.	**show urpf**	This command can be run in all modes.

1.2.11 Disabling the Function of Sending ICMP Packets with an Unreachable Destination Host on Interfaces

To avoid attacks from address scanning software similar to ip-scan, users can disable the function of sending ICMP packets with an unreachable host on interfaces.

Table 1-11 Disabling the function of sending ICMP packets with an unreachable destination host on interfaces

Operation	Command	Remarks
Enter the global configuration mode.	**configure terminal**	N/A
Enter the VLAN or superVLAN interface configuration mode.	**interface vlan-interface** ***<vid>*** **interface supervlan-interface** *<vid>*	N/A
Enable the function of this interface for sending ICMP packets with an unreachable destination	**ip icmp unreachable**	Optional
Disable the function of this interface for	**no ip icmp unreachable**	Optional

sending ICMP packets with an unreachable destination		
Display the configuration of the function of sending ICMP packets with an unreachable destination	**show ip icmp unreachable**	This command can be run in all modes.

1.3 Configuration Instance

1) To globally disable the stream forwarding mode, run the following commands::
   Switch (config)#no ip def cpu
   Switch(config)#sho ip def cpu
   Routing def routes and def hosts to CPU:FALSE
2) If you need to:
   Create a VLAN interface (VLAN interface 2) and a superVLAN interface (superVLAN interface 2).
   Configure IP address 10.11.0.1/16 for VLAN interface 2 and IP address 10.12.0.1/16 for superVLAN interface 2. SuperVLAN interface 2 contains sub VLANs 3 and 4.
   Set the allowed IP address range to 10.11.0.2 - 10.11.0.200 for VLAN interface 2 and 10.12.0.2 - 10.12.0.200 for superVLAN interface 2.
   Enable the ARP proxy function for VLAN interface 2 and superVLAN interface 2 and disable the function of forwarding the ARP proxy packets on superVLAN interface 2 to other VLANs.
   Set strict URPF for VLAN interface 2 and loose URPF for superVLAN interface 2.
   Disable the function of sending ICMP packets with an unreachable destination host on superVLAN interface 2.
   Run the following commands:
   Switch(config)#vlan 2
   Switch(config-if-vlan)#exit
   Switch(config)#interface vlan-interface 2
   Create vlan-interface successfully!

   Switch(config-if-vlanInterface-2)#exit
   Switch(config)#interface supervlan-interface 2
   Create success!

   Switch(config-if-superVLANInterface-2)#exit
   Switch(config)#interface vlan-interface 2
   Switch(config-if-vlanInterface-2)#ip address 10.11.0.1 255.255.0.0
   This ipaddress will be the primary ipaddress of this interface.
   Config ipaddress successfully!

   Switch(config-if-vlanInterface-2)#exit
   Switch(config)#interface supervlan-interface 2
   Switch(config-if-superVLANInterface-2)#ip address 10.12.0.1 255.255.0.0

```
This ipaddress will be the primary ipaddress of this interface.
Config ipaddress successfully!

Switch(config-if-superVLANInterface-2)#exit
Switch(config)#vlan 3-4
Switch(config-if-vlan)#exit
Switch(config)#interface supervlan-interface 2
Switch(config-if-superVLANInterface-2)#subvlan 3-4
Switch(config-if-superVLANInterface-2)#exit
Switch(config)#interface vlan-interface 2
Switch(config-if-vlanInterface-2)#ip address range 10.11.0.2 10.11.0.200
Switch(config-if-vlanInterface-2)#exit
Switch(config)#interface supervlan-interface 2
Switch(config-if-superVLANInterface-2)#ip address range 10.12.0.2 10.12.0.200
Switch(config-if-superVLANInterface-2)#exit
Switch(config)#vlan 2
Switch(config-if-vlan)#arp-proxy
Config arp-proxy enable successfully.

Switch(config-if-vlan)#vlan 3-4
Switch(config-if-vlan)#no arp-proxy broadcast
Config arp-proxy broadcast disable successfully.

Switch(config-if-vlan)#exit
Switch(config)#interface vlan-interface 2
Switch(config-if-vlanInterface-2)#urpf strict
Configure URPF strict mode successfully.

Switch(config-if-vlanInterface-2)#exit
Switch(config)#interface supervlan-interface 2
Switch(config-if-superVLANInterface-2)#urpf loose
Configure URPF loose mode successfully.

Switch(config-if-superVLANInterface-2)#no ip icmp unreachable
Disable sending ICMP-unreachable on this interface successfully.

Switch(config-if-superVLANInterface-2)#exit
Switch(config)#sho ip interface
Show informations of interface
The mac-address of interface is 00:00:00:02:02:02
Interface name          : VLAN-IF2
Primary ipaddress       : 10.11.0.1/255.255.0.0
Secondary ipaddress : None
VLAN                    : 2
```

Address-range : 10.11.0.2-10.11.0.200,
Interface status : Down

Interface name : superVLAN-IF2
Primary ipaddress : 10.12.0.1/255.255.0.0
Secondary ipaddress : None
VLAN : 3-4
Address-range : 10.12.0.2-10.12.0.200,
Interface status : Down

Total entries: 3 interface.

Switch(config)#sho arp-proxy
The arp-proxy in below vlan-list is open:

VLAN 2

Switch(config)#sho arp-proxy broadcast
The arp-proxy broadcast in below vlan-list is disabled:

VLAN 3 : VLAN 4

Switch(config)#show urpf
Interface URPF Status
VLAN-IF2 Strict Mode
superVLAN-IF2 Loose Mode

Switch(config)#sho ip icmp unreachable
Interface: VLAN-IF2
Send ICMP-Unreachable: enable
Interface: superVLAN-IF2
Send ICMP-Unreachable: disable