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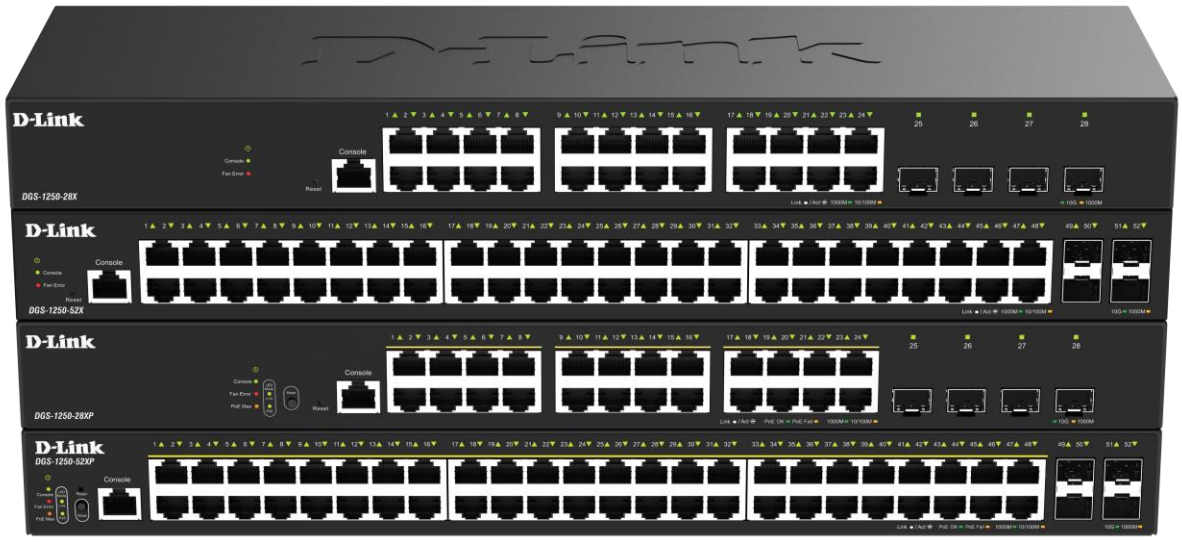

CLI Reference Guide

Gigabit Ethernet (PoE) Smart Managed Switch Series

DGS-1250 Series

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1. Introduction

This manual's command descriptions are based on the software release 1.00. The commands listed here are the subset of commands that are supported by the DGS-1250 Series Smart Managed Switch.

Audience

This CLI Reference Guide is intended for network administrators and other IT networking professionals responsible for managing the switch by using the Command Line Interface (CLI). The CLI is the primary management interface to the DGS-1250 Series Smart Managed Switch, which will be generally be referred to simply as "the Switch" within this manual. This manual is written in a way that assumes that you already have the experience and knowledge of Ethernet and modern networking principles for Local Area Networks.

Other Documentation

The documents below are a further source of information in regards to configuring and troubleshooting the Switch. All the documents are available from the CD bundled with this switch, or from the D-Link website. Other documents related to the Switch are:

- *DGS-1250 Rev.Bx Series User Manual v1.00*

Conventions

Convention	Description
Boldface Font	Commands, command options and keywords are printed in boldface. Keywords, in the command line, are to be entered exactly as they are displayed.
UPPERCASE ITALICS Font	Parameters or values that must be specified are printed in *UPPERCASE ITALICS*. Parameters in the command lineare to be replaced with the actual values that are desired to be used with the command.
Square Brackets [ ]	Square brackets enclose an optional value or set of optional arguments.
Braces { }	Braces enclose alternative keywords separated by vertical bars. Generally, one of the keywords in the separated list can be chosen.
Vertical Bar |	Optional values or arguments are enclosed in square brackets and separated by vertical bars. Generally, one or more of the vales or arguments in the separated list can be chosen.
`Blue Courier Font`	This convention is used to represent an example of a screen console display including example entries of CLI command input with the corresponding output. All examples used in this manual are based on the DGS-1250-28XP switch.

Notes, Notices, and Cautions

Below are examples of the three types of indicators used in this manual. When administering your switch using the information in this document, you should pay special attention to these indicators. Each example below provides an explanatory remark regarding each type of indicator.

NOTE: A note indicates important information that helps you make better use of your device.

NOTICE: A notice indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

CAUTION: A caution indicates a potential for property damage, personal injury, or death.

Command Descriptions

The information pertaining to each command in this reference guide is presented using a number of template fields. The fields are:

- **Description** - This is a short and concise statement describing the commands functionality.
- **Syntax** - The precise form to use when entering and issuing the command.
- **Parameters** - A table where each row describes the optional or required parameters, and their use, that can be issued with the command.
- **Default** - If the command sets a configuration value or administrative state of the Switch then any default settings (i.e. without issuing the command) of the configuration is shown here.
- **Command Mode** - The mode in which the command can be issued. These modes are described in the section titled “Command Modes” below.
- **Command Default Level** – The user privilege level in which the command can be issued.
- **Usage Guideline** - If necessary, a detailed description of the command and its various utilization scenarios is given here.
- **Example(s)** - Each command is accompanied by a practical example of the command being issued in a suitable scenario.

Command Modes

There are several command modes available in the command-line interface (CLI). The set of commands available to the user depends on both the mode the user is currently in and their privilege level. For each case, the user can see all the commands that are available in a particular command mode by entering a question mark (?) at the system prompt.

The command-line interface has threepre-defined privilege levels:

- **Basic User** - Privilege Level 1. This user account level has the lowest priority of the user accounts. The purpose of this type of user account level is for basic system checking.
- **Operator** - Privilege Level 12. This user account level is used to grant system configuration rights for users who need to change or monitor system configuration, except for security related information such as user accounts and SNMP account settings, etc.
- **Administrator** - Privilege Level 15. This administrator user account level can monitor all system information and change any of the system configuration settings expressed in this configuration guide.

The command-line interface has a number of command modes. There are three basic command modes:

- **User EXEC Mode**

- **Privileged EXEC Mode**
- **Global Configuration Mode**

All other sub-configuration modes can be accessed via the **Global Configuration Mode**.

When a user logs in to the Switch, the privilege level of the user determines the command mode the user will enter after initially logging in. The user will either log into **User EXEC Mode** or the **Privileged EXEC Mode**.

- Users with a **basic** user level will log into the Switch in the **User EXEC Mode**.
- Users with **operator** or **administrator** level accounts will log into the Switch in the **Privileged EXEC Mode**.

Therefore, the User EXEC Mode can operate at a basic user level and the Privileged EXEC Mode can operate at the **operator**, or **administrator** levels. The user can only enter the Global Configuration Mode from the Privileged EXEC Mode. The Global Configuration Mode can be accessed by users who have operator or administrator level user accounts.

As for sub-configuration modes, a subset of those can only be accessed by users who have the highest secure administrator level privileges.

The following table briefly lists the available command modes. Only the basic command modes and some of the sub-configuration modes are enumerated. The basic command modes and basic sub-configuration modes are further described in the following chapters. Descriptions for the rest of the sub-configuration modes are not provided in this section. For more information on the additional sub-configuration modes, the user should refer to the chapters relating to these functions.

The available command modes and privilege levels are described below:

Command Mode/ **Privilege Level**	**Purpose**
User EXEC Mode / Basic User level	This level has the lowest priority of the user accounts. It is provided only to check basic system settings.
Privileged EXEC Mode / Operator level	For changing both local and global terminal settings, monitoring, and performing certain system administration tasks. The system administration tasks that can be performed at this level except for any security related information.
Privileged EXEC Mode / Administrator level	This level is identical to privileged EXEC mode at the operator level, except that a user at the administrator level can monitor and clear security related settings.
Global Configuration Mode / Operator level	For applying global settings, except for security related settings, on the entire switch. In addition to applying global settings on the entire switch, the user can access other sub-configuration modes from global configuration mode.
Global Configuration Mode / Administrator level	For applying global settings on the entire switch. In addition to applying global settings on the entire switch, the user can access other sub-configuration modes from global configuration mode.
Interface Configuration Mode /Administrator level	For applying interface related settings.
VLAN Interface Configuration Mode	For applying VLAN interface related settings.

User EXEC Mode at Basic User Level

This command mode is mainly designed for checking basic system settings. This command mode can be entered by logging in as a basic user.

Privileged EXEC Mode at Operator Level

Users logged into the Switch in privileged EXEC mode at this level can change both local and global terminal settings, monitor, and perform system administration tasks (except for security related information). The method to enter privileged EXEC mode at operator level is to login to the Switch with a user account that has a privilege level of 12.

Privileged EXEC Mode at Administrator Level

This command mode has a privilege level of 15. Users logged in with this command mode can monitor all system information and change any system configuration settings mentioned in this Configuration Guide. The method to enter privileged EXEC mode at administrator level is to login to the Switch with a user account that has a privilege level of 15.

Global Configuration Mode

The primary purpose of the global configuration mode is to apply global settings on the entire switch. Global configuration mode can be accessed at operator or administrator level user accounts. However, security related settings are not accessible at operator user account. In addition to applying global settings on the entire switch, the user can also access other sub-configuration modes. In order to access the global configuration mode, the user must be logged in with the corresponding account level and use the **configure terminal** command in the privileged EXEC mode.

In the following example, the user is logged in as an Administrator in the Privileged EXEC Mode and uses the **configure terminal** command to access the Global Configuration Mode:

```
Switch#configure terminal
Switch(config)#
```

The **exit** command is used to exit the global configuration mode and return to the privileged EXEC mode.

```
Switch(config)#exit
Switch#
```

The procedures to enter the different sub-configuration modes can be found in the related chapters in this Configuration Guide. The command modes are used to configure the individual functions.

Interface Configuration Mode

Interface configuration mode is used to configure the parameters for an interface or a range of interfaces. An interface can be a physical port, VLAN, or other virtual interface. Thus, interface configuration mode is distinguished further according to the type of interface. The command prompt for each type of interface is slightly different.

VLAN Interface Configuration Mode

VLAN interface configuration mode is one of the available interface modes and is used to configure the parameters of a VLAN interface.

To access VLAN interface configuration mode, use the following command in global configuration mode:

```
Switch(config)#interface vlan 1
Switch(config-if)#
```

Creating a User Account

You can create different user account for various levels. This section will assist a user with creating a user account by means of the Command Line Interface.

NOTE: By default, one user account is already configured on the Switch. Both the username and password for this account is **admin**, and the privilege level is 15.

Observe the following example.

```
Switch>enable
Switch#configure terminal
Switch(config)#username user1 privilege 15 password 0 pass1234
Switch(config)#line console
Switch(config-line)#
```

In the above example we had to navigate and access the username command.

- Starting in the User EXEC Mode we enter the command **enable** to access the Privileged EXEC Mode.
- After accessing the Privileged EXEC Mode, we entered the command **configure terminal** to access the Global Configuration Mode.The **username** command can be used in the Global Configuration Mode.
- The command **username user1 privilege 15 password 0 pass1234** creates a user account with the username of *user1* and a password of *pass1234*, and assigns a privilege level value of 15 to the user.
- The command **line console** allows us to access the console interface's Line Configuration Mode.
- DGS-1250 series corresponding value: User:priority 1~11,Operator:priority 12~14,Administrator:priority 15
- Radius assign D-Link User-Level mapping DGS-1250 series User-Level info:

Privilege shown in RADIUS server	Privilege used in switch FW	User Level
3	1	User
4	12	Operator
5	15	Administrator

Save the running configuration to the start-up configuration. This means to save the changes made so that when the Switch is rebooted, the configuration will not be lost. The following example shows how to save the running configuration to the start-up configuration.

```
Switch#copy running-config  startup-config

Destination filename startup-config? [y/n]:  y

Saving all configurations to NV-RAM..... Done.

Switch#
```

After the Switch was rebooted, or when the users logs out and back in, the newly created username and password must be entered to access the CLI interface again, as seen below.

```
            DGS-1250-28XP Gigabit Ethernet PoE Smart Managed Switch

                          Command Line Interface
                         Firmware: Build V1.00.006
          Copyright(C) 2025 D-Link Corporation. All rights reserved.

User Access Verification
Username: admin
Password: *****
Switch#
```

Interface Notation

When configuration the physical ports available on this switch, a specific interface notation is used. The following will explain the layout, terminology and use of this notation.

In the following example, we will enter the Global Configuration Mode and then enter the Interface Configuration Mode, using the notation **1/0/1**. After entering the Interface Configuration Mode for port 1, we will change the speed to 1 Gbps, using the **speed 1000** command.

```
Switch# configure terminal
Switch(config)# interface Ethernet 1/0/1
Switch(config-if)# speed 1000
Switch(config-if)#
```

In the above example the notation **1/0/1** was used. The terminology for each parameter is as follows:

- Interface Unit's ID / Open Slot's ID / Port's ID

The Interface Unit's ID is the ID of the stacking unit without the physical stack. If stacking is disabled or this unit is a stand-alone unit, then this parameter is irrelevant. The Open Slot's ID is the ID of the module plugged into the open module slot of the Switch. The DGS-1250 Series does not support any open modules slots, thus this parameters will always by zero for this switch series. Lastly, the Port's ID is the physical port number of the port being configured.

In summary the above example will configure the stacked switch with the ID of 1, with the open slot ID of 0, and the physical port number 1.

Error Messages

When the users issue a command that the Switch does not recognize, error messages will be generated to assist users with basic information about the mistake that was made. A list of possible error messages are found in the table below.

Error Message	Meaning
Ambiguous command	Not enough keywords were entered for the Switch to recognize the command.
Incomplete command	The command was not entered with all the required keyword.
Invalid input detected at ^marker	The command was entered incorrectly.

The following example shows how an ambiguous command error message is generated.

```
Switch# show v
Ambiguous command
Switch#
```

The following example shows how an incomplete command error message is generated.

```
Switch# show
Incomplete command
Switch#
```

The following example shows how an invalid input error message is generated.

```
Switch# show verb
             ^
Invalid input detected at ^marker
Switch#
```

Editing Features

The command line interface of this switch supports to following keyboard keystroke editing features.

Keystroke	Description
Delete	Deletesthe character under the cursor and shifts the remainder of the line to the left.
Backspace	Deletesthe character to the left of the cursor and shifts the remainder of the line to the left.
Left Arrow	Movesthe cursor to the left.
Right Arrow	Moves the cursor to the right.
CTRL+R	Togglesthe insert text function on and off. When on, text can be inserted in the line and the remainder of the text will be shifted to the right. When off, text can be inserted in the line and old text will automatically be replaced with the new text.
Return	Scrolls down to display the next line or used to issue a command.
Space	Scrolls down to display the next page.
ESC	Escapes from the displaying page.

Display Result Output Modifiers

Results displayed by **show** commands can be filtered using the following parameters:

- **begin***FILTER-STRING* - This parameter is used to start the display with the first line that matches the filter string.
- **include***FILTER-STRING* - This parameter is used to display all the lines that match the filter string.
- **exclude***FILTER-STRING* - This parameter is used to exclude the lines that match the filter string from the display.

The example below shows how to use the **begin***FILTER-STRING* parameter in a **show** command.

```
Switch# show running-config begin # aaa
Generate running-config.........done.

Current configuration : 1340 bytes

!----------------------------------------------------------------------
! DGS-1250-28XP Gigabit Ethernet PoE Smart Managed Switch Configuration
!
!                        Firmware: Build V1.00.006
!         Copyright(C) 2025 D-Link Corporation. All rights reserved.
!----------------------------------------------------------------------
!
aaa new-model
aaa authentication dot1x default radius local
aaa authentication login test local none none none
aaa server radius dynamic-author
!
ip dhcp snooping
ip dhcp snooping information option allow-untrusted
ip dhcp snooping station-move deny
ip dhcp snooping database tftp://10.0.0.2/store/dhcp-snp-bind
!
line ssh
 login authentication test
!
CTRL+C ESC q Quit SPACE n Next PageENTER Next Entry a All
```

The example below shows how to use the **include***FILTER-STRING* parameter in a **show** command.

```
Switch# show running-config include # aaa
Generate running-config.........done.

Current configuration : 874 bytes

!----------------------------------------------------------------------
! DGS-1250-28XP Gigabit Ethernet PoE Smart Managed Switch Configuration
!
!                        Firmware: Build V1.00.006
!         Copyright(C) 2025 D-Link Corporation. All rights reserved.
!----------------------------------------------------------------------
!
aaa new-model
aaa authentication dot1x default radius local
aaa authentication login test local none none none
aaa server radius dynamic-author
!
end
Switch#
```

The example below shows how to use the **exclude***FILTER-STRING* parameter in a **show** command.

```
Switch# show running-config exclude # aaa
Generate running-config.........done.

Current configuration : 1422 bytes

!----------------------------------------------------------------------
! DGS-1250-28XP Gigabit Ethernet PoE Smart Managed Switch Configuration
!
!                        Firmware: Build V1.00.006
!         Copyright(C) 2025 D-Link Corporation. All rights reserved.
!----------------------------------------------------------------------
!
radius-server host 10.90.90.12 auth-port 1812 acct-port 1813 timeout 5 retransmi
t 3 key 0 "123456"
tacacs-server host 10.90.90.12 port 49 timeout 5 key 0 "123456"
!
ip dhcp snooping
ip dhcp snooping information option allow-untrusted
ip dhcp snooping station-move deny
ip dhcp snooping database tftp://10.0.0.2/store/dhcp-snp-bind
!
line ssh
 login authentication test
!
vlan 1,10
CTRL+C ESC q Quit SPACE n Next PageENTER Next Entry a All
```

2. Basic CLI Commands

2-1 help

This command is used to display a brief description of the help system.Use the help command in any command mode.

help

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

The help command provides a brief description for the help system, which includes the following functions:

- To list all commands available for a particular command mode, enter a question mark (?) at the system prompt.
- To obtain a list of commands that begin with a particular character string, enter the abbreviated command entry immediately followed by a question mark (?). This form of help is called **word** help, because it lists only the keywords or arguments that begin with the abbreviation entered.
- To list the keywords and arguments associated with a command, enter a question mark (?) in place of a keyword or argument on the command line. This form of help is called the **command syntax** help, because it lists the keywords or arguments that apply based on the command, keywords, and arguments already entered.

Example

This example shows how the help command is used to display a brief description of the help system.

```
Switch# help

The switch CLI provides advanced help feature.
1. Help is available when you are ready to enter a command
   argument (e.g. 'show ?') and want to know each possible
   available options.
2. Help is provided when an abbreviated argument is entered
   and you want to know what arguments match the input(e.g. 'show ve?'.).
   If nothing matches, the help list will be empty and you must backup
   until entering a '?' shows the available options.
3. For completing a partial command name could enter the abbreviated
   command name immediately followed by a <Tab> key.

Note:
Since the character '?' is used for help purpose, to enter
the character '?' in a string argument, press ctrl+v immediately
followed by the character '?'.

Switch#
```

The following example shows how to use the **word** help to display all the Privileged EXEC Mode commands that begin with the letters “re”. The letters entered before the question mark (?) are reprinted on the next command line to allow the user to continue entering the command.

```
Switch# re?
reboot
renew
reset

Switch# re
```

The following example shows how to use the **command syntax** help to display the next argument of a partially complete IP access-list standard command. The characters entered before the question mark (?) is reprinted on the next command line to allow the user to continue entering the command.

```
Switch(config)# ip access-list standard ?

<1-1999>                          Standard IP access-list number
<11000-12999>                     Standard IPv6 access-list number
<CR>

Switch(config)# ip access-list standard
```

2-2 configure terminal

This command is used to enter the Global Configuration Mode.

configure terminal

Parameters

None.

Default

None

Command Mode

User EXEC Mode or Privilege EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enter the Global Configuration Mode.

Example

This example shows how to enter into Global Configuration Mode.

```
Switch# configure terminal
Switch(config)#
```

2-3 logout

This command is used to close an active terminal session by logging off the Switch.

logout

Parameters

None.

Default

None.

Command Mode

User EXEC Mode.

Privilege EXEC Mode.

Command Default Level

Level:1.

Usage Guideline

Use this command to close an active terminal session by logging out of the device.

Example

This example shows how to logout

```
Switch# disable
Switch> logout
```

2-4 end

This command is used to end the current configuration mode and return to the highest mode in the CLI mode hierarchy which is either the User EXEC Mode or the Privileged EXEC Mode.

end

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Executing this command will return access to the highest mode in the CLI hierarchy regardless of what configuration mode or configuration sub-mode currently located at.

Example

This example shows how to end the Interface Configuration Mode and go back to the Privileged EXEC Mode.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)#end
Switch#
```

2-5 exit

This command is used to end the configuration mode and go back to the last mode. If the current mode is the User EXEC Mode or the Privilege EXEC Mode, executing the exit command logs you out of the current session.

exit

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to exit the current configuration mode and go back to the last mode. When the user is in the User EXEC Mode or the Privilege EXEC Mode, this command will logout the session.

Example

This example shows how to exit from the Interface Configuration Mode and return to the Global Configuration Mode.

```
Switch# configure terminal
Switch(config)interface ethernet 1/0/1
Switch(config-if)#exit
Switch(config)#
```

2-6 show history

This command is used to list the commands entered in the current EXEC Mode session.

show history

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Commands entered are recorded by the system. A recorded command can be recalled by pressing CTRL+P or the Up Arrow key which will recall previous commands in sequence. The history buffer size is fixed at 20 commands.

The function key instructions, below, displays how to navigate the command in the history buffer.

- CTRL+P or the Up Arrow key - Recalls commands in the history buffer, beginning with the most recent command. Repeat the key sequence to recall successively older commands.
- CTRL+N or the Down Arrow key - Returns to more recent commands in the history buffer after recalling commands with Ctrl-P or the Up Arrow key. Repeat the key sequence to recall successively more recent commands.

Example

This example shows how to display the command buffer history.

```
Switch# show history

 help
 history

Switch#
```

2-7 show environment

This command is used to display fan, temperature, power availability and status information.

show environment [fan | temperature]

Parameters

fan	(Optional) Specifies to display the Switch fan detailed status.
temperature	(Optional) Specifies to display the Switch temperature detailed status.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If the type is not specified, all types of environment information will be displayed.

5-Speed Fan Operation Mode for DGS-1250 Series:

Fan	Main Interface	DGS-1250-28X	☐ Fanless ■ Fixed inside ☐ N+1 hot swappable ☐ Hot swappable
		DGS-1250-28XP	☐ Fanless ■ Fixed inside ☐ N+1 hot swappable ☐ Hot swappable
		DGS-1250-52X	☐ Fanless ■ Fixed inside ☐ N+1 hot swappable ☐ Hot swappable
		DGS-1250-52XP	☐ Fanless ■ Fixed inside ☐ N+1 hot swappable ☐ Hot swappable
	Quantity	DGS-1250-28X	■ 1x ☐ 2x or 1+1 ☐ 3x or 2+1 ☐ 4x or 3+1 ☐ 5x or 4+1 ☐ 6x or 5+1 ☐ 7x
		DGS-1250-28XP	■ 1x ☐ 2x or 1+1 ☐ 3x or 2+1 ☐ 4x or 3+1 ☐ 5x or 4+1 ☐ 6x or 5+1 ☐ 7x
		DGS-1250-52P	■ 1x ☐ 2x or 1+1 ☐ 3x or 2+1 ☐ 4x or 3+1 ☐ 5x or 4+1 ☐ 6x or 5+1 ☐ 7x
		DGS-1250-52XP	☐ 1x ■ 2x or 1+1 ☐ 3x or 2+1 ☐ 4x or 3+1 ☐ 5x or 4+1 ☐ 6x or 5+1 ☐ 7x
	Location	DGS-1250-28X	☐ Left Side ■ Right Side ☐ Rear Side
		DGS-1250-28XP	☐ Left Side ■ Right Side ☐ Rear Side
		DGS-1250-52X	☐ Left Side ■ Right Side ☐ Rear Side
		DGS-1250-52XP	☐ Left Side ■ Right Side ☐ Rear Side
	Smart Fan Operation	DGS-1250-28X	■ Normal Mode ☐ Quiet Mode ☐ Off Mode
		DGS-1250-28XP	■ Normal Mode ■ Quiet Mode ☐ Off Mode
		DGS-1250-52P	■ Normal Mode ■ Quiet Mode ☐ Off Mode
		DGS-1250-52XP	■ Normal Mode ■ Quiet Mode ☐ Off Mode
	Airflow Type		☐ AFO(AirFlow Out) ☐ AFI(AirFlow In)

Example

This example shows how to display fan, temperature, power availability and status information.

```
Switch# show environment

Detail Temperature Status:
Temperature Descr/ID   Current/Threshold Range   Temper Status
--------------------   -----------------------   -------------
Central Temperature/1  31/10~50                  in threshold range


Fan control current status: Normal mode

Detail Fan Status:
----------------------------------------
    Fan1: Ok-Low

Switch#
```

2-8 show unit

This command is used to display information about system units.

show unit

Parameters

UNIT-ID	(Optional) Specify the unit to display.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays information about the system modules. If no option is specified, then all of units' information will be displayed.

Example

This example shows how to display the information about units on a system.

```
Switch# show unit

Model Descr                    Model Name
---------------------          ---------------
No module description          DGS-1250-28XP

Serial-Number        Status    Up Time
--------------       -------   --------------
QQABC12345600        OK        0DT1H46M54S

Memory       Total        Used         Free
----------   ----------   ----------   ----------
DRAM         524288 k     249836 k     274452 k
FLASH        32768 k      24362 k      8406 k

Switch#
```

2-9 show cpu utilization

This command is used to display the CPU utilization information.

show cpu utilization

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the system's CPU utilization information in 5second, 1minute, and 5 minute intervals.

Example

This example shows how to display the information about CPU utilization.

```
Switch# show cpu utilization

CPU Utilization

Five seconds - 11 %         One minute - 12 %         Five minutes - 11 %


Switch#
```

2-10 show version

This command is used to display the Switch's software version information.

show version

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays version information about the Switch.

Example

```
Switch# show version

System MAC Address:   88-76-B9-AA-49-30

Module Name         Versions
--------------      ----------------------
DGS-1250-28XP       H/W: B1
                    Bootloader: 1.00.003
                    Runtime: V1.00.006
Switch#
```

2-11 snmp-server enable traps environment

This command is used to enable the power, temperature and fan trap state.

snmp-server enable traps environment [fan] [temperature]

no snmp-server enable traps environment [fan] [temperature]

Parameters

fan	(Optional) Specifies to enable the fan trap state for warning fan event (fan failed or fan recover).
temperature	(Optional) Specifies to enable the temperature trap state for warning temperature event (temperature exceeds the thresholds or temperaturerecover).

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the environment temperature threshold which corresponds to the normal range of the temperature defined for the sensor. The low threshold must be smaller than the high threshold. The configured range must fall within the operational range which corresponds to the minimum and maximum allowed temperatures defined for the sensor. When the configured threshold is crossed, a notification will be sent.

Example

This example shows how to configure the environment fan and temperature trap.

```
Switch# configure terminal
Switch(config)# snmp-server enable traps environment fan
Switch(config)# snmp-server enable traps environment temperature
Switch(config)#
```

2-12 environment fan control

This command is used to configure fan speed.

environment fan control {normal | quiet | off}

Parameters

normal	(Optional) Normal mode refer to 5-speed fan operation (listed in 2-7), it is the current behavior and is the default setting.
quiet	(Optional) Fan is running at low usage/speed. When fans running in **quite mode** or **off mode**, if the current operation already exceeds the temperature/POE criteria, fanswill return to the normal mode automatically then send trap and log the event, no need to change to the quiet/off mode againwhen operating condition recovery.
off	(Optional) Trun off Smart fan feature. When fans running in **quite mode** or **off mode**, if the current operation already exceeds the temperature/POE criteria, fanswill return to the normal mode automatically then send trap and log the event, no need to change to the quiet/off mode againwhen operating condition recovery.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure smart fan operation mode. User can configure normal mode, quite mode and off mode.

Example

This example shows how to configure the fan speed as normal mode.

```
Switch# configure terminal
Switch(config)# environment fan control normal
```

2-13 environment temperature threshold

This command is used to configure the environment temperature thresholds. Use the **no** form of this command to revert to the default setting.

environment temperature threshold { low | high } <negative>

no environment temperature threshold { low | high } <negative>

Parameters

high	(Optional) Specifies the high threshold of the temperature in Celsius. The range is from -100 to 200.
low	(Optional) Specifies the low threshold of the temperature in Celsius. The range is from -100 to 200. The low threshold must be smaller than the high threshold.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the environment temperature threshold which corresponds to the normal range of the temperature defined for the sensor. The low threshold must be smaller than the high threshold. The configured range must fall within the operational range which corresponds to the minimum and maximum allowed temperatures defined for the sensor. When the configured threshold is crossed, a notification will be sent.

Example

This example shows how to configure the environment temperature thresholds for thermal sensor ID 1 on unit 1.

```
Switch# configure terminal
Switch(config)# environment temperature threshold low 20
Switch(config)# environment temperature threshold high 100
```

2-14 show privilege

This command is used to display current privilege level.

show privilege

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display current privilege level.

Example

This example shows how to display the current privilege level.

```
Switch# show privilege
Current privilege level is 15
Switch#
```

3. 802.1X Commands

3-1 clear dot1x counters

This command is used to clear 802.1X counters (diagnostics, statistics and session statistics).

clear dot1x counters {all | interface *INTERFACE-ID* **[, | -]}**

Parameters

all	Specifies to clear 802.1X counters (diagnostics, statistics and session statistics) on all interfaces.
interface *INTERFACE-ID*	Specifies to clear 802.1X counters (diagnostics, statistics and session statistics) on the specified interface. Valid interfaces are physical ports (including type, stack member, and port number).
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to clear 802.1X counters (diagnostics, statistics and session statistics).

Example

This example shows how to clear 802.1X counters (diagnostics, statistics and session statistics) on the Ethernet port 1/0/1.

```
Switch# clear dot1x counters interface ethernet 1/0/1
Switch#
```

3-2 dot1x default

This command is used to reset the IEEE 802.1X parameters on a specific port to their default settings.

dot1x default

Parameters

None.

Default

IEEE 802.1X authentication is disabled.

Control direction is bidirectional (both).

Port control is auto.

Forward PDU on port is enabled.

Maximum request is 2 times.

Server timer is 30 seconds.

Supplicant timer is 30 seconds.

Transmit interval is 30 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to reset all the IEEE 802.1X parameters on a specific port to their default settings.

Example

This example shows how to reset the 802.1X parameters on port 1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# dot1x default
Switch(config-if)#
```

3-3 dot1x port-control

This command is used to control the authorization state of a port. Use the **no** form of this command to revert to the default setting.

dot1x port-control {auto | force-authorized | force-unauthorized}

no dot1x port-control

Parameters

auto	Specifies to enable IEEE 802.1X authentication for the port.
force-authorized	Specifies the port to the force authorized state.
force-unauthorized	Specifies the port to the force unauthorized state.

Default

By default, this option is set as **auto**.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command takes effect only when IEEE 802.1X PAE authenticator is globally enabled by the **dot1x system-auth-control** command and is enabled for a specific port by using the dot1x PAE authenticator.

This command is only available for physical port interface configuration.

If the port control is set to **force-authorized**, then the port is not controlled in both directions. If the port control is set to **auto**, then the access to the port for the controlled direction needs to be authenticated. If the port control is set to **force-unauthorized**, then the access to the port for the controlled direction is blocked.

Example

This example shows how to deny all access on Ethernet port 1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# dot1x port-control force-unauthorized
Switch(config-if)#
```

3-4 dot1x forward-pdu

This command is used to enable the forwarding of the dot1x PDU. Use the **no** form of this command to disable the forwarding of the dot1x PDU.

dot1x forward-pdu

no dot1x forward-pdu

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration. This command only takes effect when the dot1x authentication function is disabled on the receipt port. The received PDU will be forwarded in either the tagged or untagged form based on the VLAN setting.

Example

This example shows how to configure the forwarding of the dot1x PDU.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# dot1x forward-pdu
Switch(config-if)#
```

3-5 dot1x initialize

This command is used to initialize the authenticator state machine on a specific port or associated with a specific MAC address.

dot1x initialize {interface *INTERFACE-ID* **[, | -] | mac-address** *MAC-ADDRESS***}**

Parameters

interface *INTERFACE-ID*	Specifies the port on which the authenticator state machine will be initialized. Valid interfaces are physical ports.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before and after the hyphen.
mac-address *MAC-ADDRESS*	Specifies the MAC address to be initialized.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Under the multi-host mode, specify an interface ID to initialize a specific port.

Under the multi-auth mode, specify a MAC address to initialize a specific MAC address.

Example

This example shows how to initialize the authenticator state machine on Ethernet port 1/0/1.

```
Switch# dot1x initialize interface ethernet 1/0/1
Switch#
```

3-6 dot1x max-req

This command is used to configure the maximum number of times that the backend authentication state machine will retransmit an Extensible Authentication Protocol (EAP) request frame to the supplicant before restarting the authentication processUse the **no** form of this command to revert to the default setting.

dot1x max-req *TIMES*

no dot1x max-req

Parameters

TIMES	Specifies the number of times that the Switch retransmits an EAP frame to the supplicant before restarting the authentication process. The range is 1 to 10.

Default

By default, this value is 2.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for physical port interface configuration. If no response to an authentication request from the supplicant within the timeout period (specified by the **dot1x timeout tx-period** *SECONDS* command) the Switch will retransmit the request. This command is used to specify the number of retransmissions.

Example

This example shows how to configure the maximum number of retries on Ethernet port 1/0/1 to be 3.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# dot1x max-req 3
Switch(config-if)#
```

3-7 dot1x pae authenticator

This command is used to configure a specific port as an IEEE 802.1X port access entity (PAE) authenticator. Use the **no** form of this command to disable the port as an IEEE 802.1X authenticator.

dot1x pae authenticator

no dot1x pae authenticator

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration. Globally enable IEEE 802.1X authentication on the Switch by using the **dot1x system-auth-control** command. When IEEE 802.1X authentication is enabled, the system will authenticate the 802.1X user based on the method list configured by the **aaa authentication dot1x default** command.

Example

This example shows how to configure Ethernet port 1/0/1 as an IEEE 802.1X PAE authenticator.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# dot1x pae authenticator
Switch(config-if)#
```

This example shows how to disable IEEE 802.1X authentication on Ethernet port 1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# no dot1x pae authenticator
Switch(config-if)#
```

3-8 dot1x re-authenticate

This command is used to re-authenticate a specific port or a specific MAC address.

dot1x re-authenticate {interface *INTERFACE-ID* **[, | -] | mac-address** *MAC-ADDRESS***}**

Parameters

interface *INTERFACE-ID*	Specifies the port to re-authenticate. Valid interfaces are physical ports.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before and after the hyphen.
mac-address *MAC-ADDRESS*	Specifies the MAC address to re-authenticate.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to re-authenticate a specific port or a specific MAC address.

Example

This example shows how to re-authenticate Ethernet port 1/0/1.

```
Switch# dot1x re-authenticate interface ethernet 1/0/1
Switch#
```

3-9 dot1x system-auth-control

This command is used to globally enable IEEE 802.1X authentication on a switch. Use the **no** form of this command to disable IEEE 802.1X authentication function.

dot1x system-auth-control

no dot1x system-auth-control

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The 802.1X authentication function restricts unauthorized hosts from accessing the network. Use the **dot1x system-auth-control** command to globally enable the 802.1X authentication control. When 802.1X authentication is enabled, the system will authenticate the 802.1X user based on the method list configured by the **aaa authentication dot1x default** command.

Example

This example shows how to enable IEEE 802.1X authentication globally on a switch.

```
Switch# configure terminal
Switch(config)#dot1x system-auth-control
Switch(config)#
```

3-10 dot1x timeout

This command is used to configure IEEE 802.1X timers. Use the **no** form of this command to revert a specific timer setting to the default setting.

dot1x timeout {server-timeout *SECONDS* **| supp-timeout** *SECONDS* **| tx-period** *SECONDS***}**

no dot1x timeout {server-timeout | supp-timeout | tx-period}

Parameters

server-timeout *SECONDS*	Specifies the number of seconds that the Switch will wait for the request from the authentication server before timing out the server. On timeout, authenticator will send EAP-Request packet to client. The range is 1 to 65535.
supp-timeout *SECONDS*	Specifies the number of seconds that the Switch will wait for the response from the supplicant before timing out the supplicant messages other than EAP request ID. The range is 1 to 65535
tx-period *SECONDS*	Specifies the number of seconds that the Switchwill wait for a response to an EAP-Request/Identity frame from the supplicant before retransmitting the request. The range is 1 to 65535

Default

The **server-timeout** is 30 seconds.

The **supp-timeout** is 30 seconds.

The **tx-period** is 30 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration.

Example

This example shows how to configure the servertimeout value, supplicant timeout value, and the TX period on Ethernet port 1/0/1 to be15, 15, and 10 seconds, respectively.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# dot1x timeout server-timeout 15
Switch(config-if)# dot1x timeout supp-timeout 15
Switch(config-if)# dot1x timeout tx-period 10
Switch(config-if)#
```

3-11 show dot1x

This command is used to display the IEEE 802.1X global configuration or interface configuration.

show dot1x [interface *INTERFACE-ID* **[, | -]]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies to display the dot1x configuration on the specified interface or range of interfaces. If not specified, the global configuration will be displayed.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command can be used to display the global configuration or interface configuration. If the configuration command is entered without parameters, the global configuration will be displayed.Otherwise, the configuration on the specified interface will be displayed.

Example

This example shows how to display the dot1X global configuration.

```
Switch# show dot1x

 802.1X          : Enabled
 Trap State      : Disabled

Switch#
```

This example shows how to display the dot1X configuration on Ethernet port 1/0/1.

```
Switch# show dot1x interface ethernet 1/0/1

 Interface          : eth1/0/1
 PAE                : Disabled
 Control Direction  : Both
 Port Control       : ForceUnauthorized
 Tx Period          : 10       sec
 Supp Timeout       : 15       sec
 Server Timeout     : 15       sec
 Max-req            : 3        times
 Forward PDU        : Enabled

Switch#
```

3-12 show dot1x diagnostics

This command is used to display IEEE 802.1X diagnostics. If no interface is specified, information about all interfaces will be displayed.

show dot1x diagnostics [interface *INTERFACE-ID* **[, | -]]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies to display the dot1x diagnostics on the specified interface or range of interfaces. If not specified, information about all interfaces will be displayed.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command can be used to display 802.1X diagnostics. Using this command without parameters will display information about all interfaces. Otherwise, the diagnostics on the specified interface will be displayed.

Example

This example shows how to display the dot1X diagnostics on Ethernet port 1/0/1.

```
Switch# show dot1x diagnostics interface ethernet 1/0/1

 eth1/0/1 dot1x Diagnostics information are following:
 pnacPortAuthEntersConnecting                      : 0
 pnacPortAuthEapLogoffsWhileConnecting             : 0
 pnacPortAuthEntersAuthenticating                  : 0
 pnacPortAuthAuthSuccessWhileAuthenticating        : 0
 pnacPortAuthAuthTimeoutsWhileAuthenticating       : 0
 pnacPortAuthAuthFailWhileAuthenticating           : 0
 pnacPortAuthAuthReauthsWhileAuthenticating        : 0
 pnacPortAuthAuthEapStartsWhileAuthenticating      : 0
 pnacPortAuthAuthEapLogoffWhileAuthenticating      : 0
 pnacPortAuthAuthReauthsWhileAuthenticated         : 0
 pnacPortAuthAuthEapStartsWhileAuthenticated       : 0
 pnacPortAuthAuthEapLogoffWhileAuthenticated       : 0
 pnacPortAuthBackendResponses                      : 0
 pnacPortAuthBackendAccessChallenges               : 0
 pnacPortAuthBackendOtherRequestsToSupplicant      : 0
 pnacPortAuthBackendNonNakResponsesFromSupplicant  : 0
 pnacPortAuthBackendAuthSuccesses                  : 0
 pnacPortAuthBackendAuthFails                      : 0

Switch#
```

3-13 show dot1x statistics

This command is used to display IEEE 802.1X statistics. If no interface is specified, information about all interfaces will be displayed.

show dot1x statistics [interface *INTERFACE-ID* **[, | -]]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies to display the dot1x diagnostics on the specified interface or range of interfaces. If not specified, information about all interfaces will be displayed.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command can be used to display 802.1X statistics. Using this command without parameters will display information about all interfaces.Otherwise, the statistics on the specified interface will be displayed.

Example

This example shows how to display dot1X statistics on Ethernet port 1/0/1.

```
Switch# show dot1x statistics interface ethernet 1/0/1

ethernet1/0/1 dot1x statistics information:
EAPOL Frames RX                : 1
EAPOL Frames TX                : 4
EAPOL-Start Frames RX          : 0
EAPOL-Req/Id Frames TX         : 6
EAPOL-Logoff Frames RX         : 0
EAPOL-Req Frames TX            : 0
EAPOL-Resp/Id Frames RX        : 0
EAPOL-Resp Frames RX           : 0
Invalid EAPOL Frames RX        : 0
EAP-Length Error Frames RX     : 0
Last EAPOL Frame Version       : 0
Last EAPOL Frame Source        : 00-10-28-00-19-78

Switch#
```

3-14 show dot1x session-statistics

This command is used to display IEEE 802.1X session statistics. If no interface specified, information about all interfaces will be displayed.

show dot1x session-statistics [interface *INTERFACE-ID* **[, | -]]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies to display the dot1x diagnostics on the specified interface or range of interfaces. If not specified, information about all interfaces will be displayed.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command can be used to display 802.1X session statistics. Using this command without parameters will display information about all interfaces.Otherwise, the session statistics on the specified interface will be displayed.

Example

This example shows how to display dot1X session statistics on Ethernet port 1/0/1.

```
Switch# show dot1x session-statistics interface ethernet 1/0/1

 eth1/0/1 dot1x session statistics information:
 Octets RX                              : 0
 Octets TX                              : 0
 Frames RX                              : 0
 Frames TX                              : 0
 ID                                     : ether1_1-0
 AuthenticMethod                        : None
 Time                                   : 0
 TerminateCause                         : PortAdminDisabled
 User Name                              : No User

Switch#
```

3-15 snmp-server enable traps dot1x

This command is used to enable sending SNMP notifications for 802.1X authentication. Use the **no** form of this command to disable sending SNMP notifications.

snmp-server enable traps dot1x

no snmp-server enable traps dot1x

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command can be used to enable or disable sending SNMP notifications for 802.1X authentication.

Example

This example shows how to enable sending trap for 802.1X authentication.

```
Switch# configure terminal
Switch(config)#snmp-server enable traps dot1x
Switch(config)#
```

4. Access Control List (ACL) Commands

4-1 access-list resequence

This command is used to re-sequence the sequence number of the accesslist entries in an accesslist. Use the **no** form of this command to revert to the default settings.

access-list resequence {*NAME* **|** *NUMBER***}** *STARTING-SEQUENCE-NUMBER INCREMENT*

no access-list resequence

Parameters

NAME	Specifies the name of the accesslist to be configured. It can be a maximum of 32 characters.
NUMBER	Specifies the number of the accesslist to be configured (1-14999).
STARTING-SEQUENCE-NUMBER	Specifies that the access list entries will be re-sequenced using this initial value. The default value is 10. The range of possible sequence numbers is 1 through 65535.
INCREMENT	Specifies the number that the sequence numbers step. The default value is 10. For example, if the increment (step) value is 5 and the beginning sequence number is 20, the subsequent sequence numbers are 25, 30, 35, 40, and so on. The range of valid values is from 1 to 32.

Default

The default start sequence number is 10.

The default increment is 10.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This feature allows the user to re-sequence the entries of a specified access list with an initial sequence number determined by the *STARTING-SEQUENCE-NUMBER* parameter and continuing in the increments determined by the *INCREMENT* parameter. If the highest sequence number exceeds the maximum possible sequence number, then there will be no re-sequencing.

If a rule entry is created without specifying the sequence number, the sequence number will be automatically assigned. If it is the first entry, a start sequence number is assigned. Subsequent rule entries are assigned a sequence number that is increment value greater than the largest sequence number in that access list and the entry is placed at the end of the list.

After the start sequence number or increment change, the sequence number of all previous rules (include the rules that assigned sequence by user) will change according to the new sequence setting.

Example

This example shows how to re-sequence the sequence number of an IP access-list, named R&D.

```
Switch# configure terminal
Switch(config)# show access-list ip R&D
Extended IP access list R&D(ID: 3552)
10 permit tcp any 10.20.0.0 255.255.0.0
20 permit tcp any host 10.100.1.2
30 permit icmp any any
Switch(config)# ip access-list extended R&D
Switch(config-ip-ext-acl)# rule 5 permit tcp any 10.30.0.0 255.255.0.0
Switch(config-ip-ext-acl)# exit
Switch(config)# show access-list ip R&D
Extended IP access list R&D(ID: 3552)5 permit tcp any 10.30.0.0 255.255.0.0
10 permit tcp any 10.20.0.0 255.255.0.0
20 permit tcp any host 10.100.1.2
30 permit icmp any any
Switch(config)# access-list resequence R&D 1 2
Switch(config)# show access-list ip R&D
Extended IP access list R&D(ID: 3552)
1 permit tcp any 10.30.0.0 255.255.0.0
3 permit tcp any 10.20.0.0 255.255.0.0
5 permit tcp any host 10.100.1.2
7 permit icmp any any
Switch(config)#
```

4-2 acl-hardware-counter

This command is used to enable the ACL hardware counter of the specified access-list name for access group functions or access map for the VLAN filter function. Use the **no** form of this command to disable the ACL hardware counter function.

acl-hardware-counter access-group {*ACCESS-LIST-NAME* **|** *ACCESS-LIST-NUMBER***}**

no acl-hardware-counter access-group {*ACCESS-LIST-NAME* **|** *ACCESS-LIST-NUMBER***}**

Parameters

access-group *ACCESS-LIST-NAME*	Specifies the name of the accesslist to be configured.
access-group *ACCESS-LIST-NUMBER*	Specifies the number of the accesslist to be configured.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command with parameter **access-group** will enable the ACL hardware counter for all ports that have applied the specified access-list name or number. The number of packets, that match each rule, are counted.

The command with parameter **vlan-filter** will enable the ACL hardware counter for all VLAN(s) that have applied the specified VLAN access-map. The number of packets that permitted by each access map are counted.

Example

This example shows how to enable the ACL hardware counter.

```
Switch# configure terminal
Switch(config)#acl-hardware-counter access-group abc
Switch(config)#
```

4-3 clear acl-hardware-counter

This command is used to clear the ACL hardware counter.

clear acl-hardware-counter access-group [*ACCESS-LIST-NAME* **|** *ACCESS-LIST-NUMBER***]**

Parameters

access-group *ACCESS-LIST-NAME*	Specifies the name of the accesslist to be cleared.
access-group *ACCESS-LIST-NUMBER*	Specifies the number of the accesslist to be configured.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

If no access-list name or number is specified with the parameter **access-group**, all access-group hardware counters will be cleared. If no access-map name is specified with the parameter **vlan-filter**, all VLAN filter hardware counters will be cleared.

Example

This example shows how to clear the ACL hardware counter.

```
Switch(config)# clear acl-hardware-counter access-group abc
Switch#
```

4-4 expert access-group

This command is used to apply a specific expert ACL to an interface. Use the **no** form of this command to cancel the application.

expert access-group {*NAME* **|** *NUMBER***} [in]**

no expert access-group [*NAME* **|** *NUMBER***] [in]**

Parameters

NAME	Specifies the name of the expert access-list to be configured. The name can be up to 32 characters.
NUMBER	Specifies the number of the expert accesslist to be configured.
in	(Optional) Specifies to filter the incoming packets of the

	interface. If the direction is not specified, **in** is used.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If expert access group is already configured on the interface, the command applied later will overwrite the previous setting. Only one access-list of the same type can be applied to the same interface; but access-lists of different types can be applied to the same interface.

Example

This example shows how to apply an expert ACL to an interface. The purpose is to apply the ACL “exp_acl” on the Ethernet port 1/0/2 to filter the incoming packets.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/2
Switch(config-if)# expert access-group exp_acl in
Switch(config-if)# end
Switch# show access-group interface ethernet 1/0/2
ethernet1/0/2:
  Inbound expert access-list : exp_acl(ID: 8999)
Switch#
```

4-5 expert access-list

This command is used to create or modify an extended expert ACL. This command will enter into the extended expert access-list configuration mode. Use the **no** form of this command to remove an extended expert access-list.

expert access-list extended *NAME* **[***NUMBER***]**

no expert access-list extended {*NAME* **|** *NUMBER***}**

Parameters

NAME	Specifies the name of the extended expert access-list to be configured. The name can be up to 32 characters.
NUMBER	Specifies the ID number of expert accesslist. For extended expert accesslists, the value is from 8000 to 9999.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The name must be unique among all access lists. The characters used in the name are case sensitive.If the accesslist number is not specified, the biggest unused number in the range of the expert access list numbers will be assigned automatically.

Example

This example shows how to create an extended expert ACL.

```
Switch# configure terminal
Switch(config)# expert access-list extended exp_acl
Switch(config-exp-nacl)# end
Switch# show access-list
Access-List-Name                      Type
------------------------------------- ---------------
exp_acl(ID: 8999)                     expert ext-acl

Total Entries: 1

Switch#
```

4-6 ip access-group

This command is used to specify the IP accesslist to be applied to an interface. Use the **no** form of this command to remove an IP access list.

ip access-group {*NAME* **|** *NUMBER***} [in]**

no ip access-group [*NAME* **|** *NUMBER***] [in]**

Parameters

NAME	Specifies the name of the IP accesslist to be applied. The maximum length is 32 characters.
NUMBER	Specifies the number of the IP accesslist to be applied.
in	(Optional) Specifies that the IP access list will be applied to check packets in the ingress direction. If the direction is not specified, **in** is used.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If an IP access group is already configured on the interface, the command applied later will overwrite the previous setting. Only one access list of the same type can be applied to the same interface; but access-lists of different types can be applied to the same interface.

The association of an access group with an interface will consume the filtering entry resource in the switch controller. If the resources are insufficient to commit the command, then an error message will be displayed. There is a limitation on the number of port operator resources. If applying the command exhausts the available port selectors, then an error message will be displayed.

Example

This example shows how to specify the IP accesslist “Strict-Control” as an IP access group for an Ethernet port 1/0/2.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/2
Switch(config-if)#ip access-group Strict-Control
The remaining applicable IP related access entries are 526
Switch(config-if)#
```

4-7 ip access-list

This command is used to create or modify an IP access list. This command will enter into the IP accesslist configuration mode. Use the **no** form of this command to remove an IP accesslist.

ip access-list [extended] *NAME* **[***NUMBER***]**

no ip access-list [extended] {*NAME* | *NUMBER***}**

Parameters

extended	(Optional) Specifies that without this option the IP access list is a standard IP access list. When using the extended option, more fields can be chosen for the filter.
NAME	Specifies the name of the IP accesslist to be configured. The maximum length is 32 characters. The first character must be a letter.
NUMBER	Specifies the ID number of the IP access list. For standard IP access lists, this value is from 1 to 1999. For extended IP access lists, this value is from 2000 to 3999.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The name must be unique among all accesslists. The characters used in the name are case sensitive.If the accesslist number is not specified, the biggest unused number in the range of IP access list numbers will be assigned automatically.

Example

This example shows how to configure an extended IP accesslist, named “Strict-Control” and an IP access-list, named “pim-srcfilter”.

```
Switch# configure terminal
Switch(config)#ip access-list extended Strict-Control
Swtich(config-ip-ext-acl)# rule permit tcp any 10.20.0.0 255.255.0.0
Swtich(config-ip-ext-acl)# exit
Swtich(config)# ip access-list pim-srcfilter
Switch(config-ip-acl)# rule permit host 172.16.65.193 any
Switch(config-ip-acl)#
```

4-8 ipv6 access-group

This command is used to specify the IPv6 accesslist to be applied to an interface. Use the **no** form of this command to remove an IPv6 access list.

ipv6 access-group {*NAME* **|** *NUMBER***} [in]**

no ipv6 access-group [*NAME* **|** *NUMBER***] [in]**

Parameters

NAME	Specifies the name of the IPv6 accesslist to be applied.
NUMBER	Specifies the number of the IPv6 accesslist to be applied.
in	(Optional) Specifies that the IPv6 access list will be applied to check in the ingress direction. If the direction is not specified, **in** is used.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only one access list of the same type can be applied to the same interface; but access lists of different types can be applied to the same interface. The association of an access group with an interface will consume the filtering entry resource in the switch controller. If the resource is insufficient to commit the command, then an error message will be displayed.

There is a limitation on the number of port operator resources. If applying the command exhausts the available port selectors, then an error message will be displayed.

Example

This example shows how to specify the IPv6 accesslist “ip6-control” as an IP access group for ethernet 1/0/3.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/3
Switch(config-if)# ipv6 access-group ip6-control in
The remaining applicable IPv6 related access entries are 156
Switch(config-if)#
```

4-9 ipv6 access-list

This command is used to create or modify an IPv6 access list. This command will enter into IPv6 access-list configuration mode. Use the **no** form of this command to remove an IPv6 accesslist.

ipv6 access-list [extended] *NAME* **[***NUMBER***]**

no ipv6 access-list [extended] {*NAME* **|** *NUMBER***}**

Parameters

extended	(Optional) Specifies that without this option the IPv6 access list is a standard IPv6 access list. When using the extended option,

	the IPv6 access list is an extended IPv6 access list and more fields can be chosen for the filter.
NAME	Specifies the name of the IPv6 accesslist to be configured. The maximum length is 32 characters.
NUMBER	Specifies the ID number of the IPv6 access list. For standard IPv6 access lists, this value is from 11000 to 12999. For extended IPv6 access lists, this value is from 13000 to 14999.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The name must be unique among all accesslists. The characters used in the name are case sensitive.If the accesslist number is not specified, the biggest unused number in the range of the IPv6 access list numbers will be assigned automatically.

Example

This example shows how to configure an IPv6 extended accesslist, named ip6-control.

```
Switch# configure terminal
Switch(config)#ipv6 access-list extended ip6-control
Swtich(config-ipv6-ext-acl)# rule permit tcp any 2002:f03::1/16
Switch(config-ipv6-ext-acl)#
```

This example shows how to configure an IPv6 standard accesslist, named ip6-std-control.

```
Switch# configure terminal
Switch(config)#ipv6 access-list ip6-std-control
Swtich(config-ipv6-acl)# rule permit any fe80::101:1/54
Switch(config-ipv6-acl)#
```

4-10 list-remark

This command is used to add remarks for the specified ACL. Use the **no** form of this command todelete the remarks.

list-remark *TEXT*

no list-remark

Parameters

TEXT	Specifies the remark information.The information can be up to 256 characters long.

Default

None.

Command Mode

Access-list Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available in the MAC, IP, IPv6, and Expert Access-list Configure mode.

Example

This example shows how to add a remark to the access-list.

```
Switch# configure terminal
Switch(config)#ip access-list extended R&D
Switch(config-ip-ext-acl)# list-remark "This access-list is used to match any IP packets from
the host 10.2.2.1"
Switch(config-ip-ext-acl)# end
Switch# show access-list ip

Extended IP access list R&D(ID: 3999)
  10 permit host 10.2.2.1 any
  This access-list is used to match any IP packets from the host 10.2.2.1
Switch#
```

4-11 mac access-group

This command is used to specify a MAC accesslist to be applied to an interface. Use the **no** form of this command to remove the access group control from the interface.

mac access-group {*NAME* **|** *NUMBER***} [in]**

no mac access-group [*NAME* **|** *NUMBER***] [in]**

Parameters

NAME	Specifies the name of the MAC accesslist to be applied.
NUMBER	Specifies the number of the MAC accesslist to be applied.
in	(Optional) Specifies that the MAC access list will be applied to check in the ingress direction. If direction is not specified, **in** is used.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If MAC access group is already configured on the interface, the command applied later will overwrite the previous setting. MAC access-groups will only check non-IP packets.

Only one access list of the same type can be applied to the same interface; but access lists of different types can be applied to the same interface.

The association of an access group with an interface will consume the filtering entry resource in the switch controller. If the resource is insufficient to commit the command, then an error message will be displayed.

Example

This example shows how to apply the MAC accesslist daily-profile to Ethernet port 5/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# mac access-group daily-profile in
The remaining applicable MAC access entries are 204
Switch(config-if)#
```

4-12 mac access-list

This command is used to create or modify an MAC access list and this command will enter the MAC access list configuration mode. Use the **no** form of this command todelete a MAC accesslist.

mac access-list extended *NAME* **[***NUMBER***]**

no mac access-list extended {*NAME* **|** *NUMBER***}**

Parameters

NAME	Specifies the name of the MAC access-list to be configured. The maximum length is 32 characters.
NUMBER	Specifies the ID number of the MAC access list, For extended MAC access lists, this value is from 6000 to 7999.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enter the MAC access-list configuration mode and use the permit or deny command to specify the entries. The name must be unique among all access lists. The characters of the name are case sensitive.If the accesslist number is not specified, the biggest unused number in the range of the MAC access list numbers will be assigned automatically.

Example

This example shows how to enter the MAC accesslist configuration mode for a MAC access list named “daily profile”.

```
Switch# configure terminal
Switch(config)#mac access-list extended daily-profile
Switch(config-mac-ext-acl)#
```

4-13 permit | deny (expert access-list)

This command is used to add a permit or deny entry. Use the **no** form of this command to remove an entry.

Extended Expert ACL:

rule [*SEQUENCE-NUMBER***] {permit | deny}** *PROTOCOL* **{***SRC-IP-ADDR SRC-IP-WILDCARD* **| host** *SRC-IP-ADDR* **| any} {***SRC-MAC-ADDR SRC-MAC-WILDCARD* **| host** *SRC-MAC-ADDR* **| any} {***DST-IP-ADDR DST-IP-WILDCARD* **| host** *DST-IP-ADDR* **| any} {***DST-MAC-ADDR DST-MAC-*

WILDCARD | **host** *DST-MAC-ADDR* | **any} [cos** *OTER-COS*] **[vlan** *OUTER-VLAN*] **[fragments] [[precedence** *PRECEDENCE*] **[tos** *TOS*] | **dscp** *DSCP*] **[time-range** *PROFILE-NAME*]

rule [*SEQUENCE-NUMBER***] {permit | deny} tcp {***SRC-IP-ADDR SRC-IP-WILDCARD* | **host** *SRC-IP-ADDR* | **any} {***SRC-MAC-ADDR SRC-MAC-WILDCARD* | **host** *SRC-MAC-ADDR* | **any} [{eq | lt | gt | neq}** *PORT* | **range** *MIN-PORT MAX-PORT*] **{***DST-IP-ADDR DST-IP-WILDCARD* | **host** *DST-IP-ADDR* | **any} {***DST-MAC-ADDR DST-MAC-WILDCARD* | **host** *DST-MAC-ADDR* | **any} [{eq | lt | gt | neq}** *PORT* | **range** *MIN-PORT MAX-PORT*] **[***TCP-FLAG***] [cos** *OUTER-COS*] **[vlan** *OUTER-VLAN*] **[[precedence** *PRECEDENCE*] **[tos** *TOS*] | **dscp** *DSCP*] **[time-range** *PROFILE-NAME*]

rule [*SEQUENCE-NUMBER***] {permit | deny} udp {***SRC-IP-ADDR SRC-IP-WILDCARD* | **host** *SRC-IP-ADDR* | **any} {***SRC-MAC-ADDR SRC-MAC-WILDCARD* | **host** *SRC-MAC-ADDR* | **any} [{eq | lt | gt | neq}** *PORT* | **range** *MIN-PORT MAX-PORT*] **{***DST-IP-ADDR DST-IP-WILDCARD* | **host** *DST-IP-ADDR* | **any} {***DST-MAC-ADDR DST-MAC-WILDCARD* | **host** *DST-MAC-ADDR* | **any} [{eq | lt | gt | neq}** *PORT* | **range** *MIN-PORT MAX-PORT*] **[cos** *OUTER-COS*] **[vlan** *OUTER-VLAN*] **[[precedence** *PRECEDENCE*] **[tos** *TOS*] | **dscp** *DSCP*] **[time-range** *PROFILE-NAME*]

rule [*SEQUENCE-NUMBER***] {permit | deny} icmp {***SRC-IP-ADDR SRC-IP-WILDCARD* | **host** *SRC-IP-ADDR* | **any} {***SRC-MAC-ADDR SRC-MAC-WILDCARD* | **host** *SRC-MAC-ADDR* | **any} {***DST-IP-ADDR DST-IP-WILDCARD* | **host** *DST-IP-ADDR* | **any} {***DST-MAC-ADDR DST-MAC-WILDCARD* | **host** *DST-MAC-ADDR* | **any} [***ICMP-TYPE* **[***ICMP-CODE***]** | *ICMP-MESSAGE*] **[cos** *OUTER-COS*] **[vlan** *OUTER-VLAN*] **[[precedence** *PRECEDENCE*] **[tos** *TOS*] | **dscp** *DSCP*] **[time-range** *PROFILE-NAME*]

no *SEQUENCE-NUMBER*

Parameters

SEQUENCE-NUMBER	Specifies the sequence number. The range is from 1 to 65535. The lower the number is, the higher the priority of the permit/deny rule.
cos *OUTER-COS*	(Optional) Specifies the outer priority value. This value must be between 0 and 7.
vlan *OUTER-VLAN*	(Optional) Specifies the outer VLAN ID.
any	Specifies to use any source MAC address, any destination MAC address, any source IP address, or any destination IP address.
host *SRC-MAC-ADDR*	Specifies a specific source host MAC address.
SRC-MAC-ADDR SRC-MAC-WILDCARD	Specifies a group of source MAC addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to bit value 0 will be checked.
host *DST-MAC-ADDR*	Specifies a specific destination host MAC address.
DST-MAC-ADDR DST-MAC-WILDCARD	Specifies a group of destination MAC addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to the bit value 0 will be checked.
PROTOCOL	(Optional)Specifies the IP protocol ID. Enter the following keywords: **eigrp**, **esp**, **gre**, **igmp**, **ospf**, **pim**, **vrrp**, **pcp**, and **ipinip**.
host *SRC-IP-ADDR*	Specifies a specific source host IP address.
SRC-IP-ADDR SRC-IP-WILDCARD	Specifies a group of source IP addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to the bit value 0 will be checked.
host *DST-IP-ADDR*	Specifies a specific destination host IP address.
DST-IP-ADDR DST-IP-WILDCARD	Specifies a group of destination IP addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to the bit value 0 will be checked.
precedence *PRECEDENCE*	(Optional) Specifies that packets can be filtered by precedence level, as specified by a number from 0 to 7.
tos *TOS*	(Optional) Specifies that packets can be filtered by type of

	service level, as specified by a number from 0 to 15.
dscp *DSCP*	(Optional) Specifies the matching DSCP code in IP header. The range is from 0 to 63, or select the following DSCP name: af11 - 001010, af12 -001100, af13 - 001110, af21 - 010010, af22 - 010100, af23 - 010110, af31 - 011010, af32 - 011100, af33 - 011110, af41 - 100010, af42 - 100100, af43 - 100110, cs1 - 001000, cs2 - 010000, cs3 - 011000, cs4 - 100000, cs5 - 101000, cs6 - 110000, cs7 - 111000, default - 000000, ef – 101110.
lt *PORT*	(Optional) Specifies to match if less than the specified port number.
gt *PORT*	(Optional) Specifies to match if greater than the specified port number.
eq *PORT*	(Optional) Specifies to match if equal to the specified port number.
neq *PORT*	(Optional) Specifies to match if not equal to the specified port number.
range *MIN-PORT MAX-PORT*	(Optional) Specifies to match if fall within the range of ports.
TCP-FLAG	(Optional) Specifies the TCP flag fields and the specified TCP header bits called**ack** (acknowledge), **fin** (finish), **psh** (push), **rst** (reset), **syn** (synchronize), or **urg** (urgent).
fragments	(Optional)Specifies the packet fragment's filtering.
time-range *PROFILE-NAME*	(Optional) Specifies the name of timeperiod profile associated with the accesslist delineating its activation period.
ICMP-TYPE	(Optional) Specifies the ICMP message type. The valid number for the message type is from 0 to 255.
ICMP-CODE	(Optional) Specifies the ICMP message code. The valid number for the message code is from 0 to 255.
ICMP-MESSAGE	(Optional) Specifies the ICMP message. The following pre-defined parameters are available for selection: beyond-scope, destination-unreachable, echo-reply, echo-request, header, hop-limit, mld-query, mld-reduction, mld-report, nd-na, nd-ns, next-header, no-admin, no-route, packet-too-big, parameter-option, parameter-problem, port-unreachable, reassembly-timeout, redirect, renum-command, renum-result, renum-seq-number, router-advertisement, router-renumbering, router-solicitation, time-exceeded, unreachable.

Default

None.

Command Mode

Extended Expert Access-list Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If a rule entry is created without a sequence number, a sequence number will be automatically assigned. If it is the first entry, the sequence number 10 is assigned. A subsequent rule entry will be assigned a sequence number that is 10 greater than the largest sequence number in that access list and is placed at the end of the list.

The user can use the command access-list sequence to change the start sequence number and increment number for the specified access list. After the command is applied, the new rule without specified sequence number will be assigned sequence based new sequence setting of the specified access list.

When you manually assign the sequence number, it is better to have a reserved interval for future lower sequence number entries. Otherwise, it will create extra effort to insert an entry with a lower sequence number.

The sequence number must be unique in the domain of an access-list. If you enter a sequence number that is already present, an error message will be shown.

Example

This example shows how to use the extended expert ACL. The purpose is to deny all the TCP packets with the source IP address 192.168.4.12 and the source MAC address 00:13:00:49:82:72.

```
Switch# configure terminal
Switch(config)#expert access-list extended exp_acl
Switch(config-exp-nacl)# rule deny tcp host 192.168.4.12 host 0013.0049.8272 any any
Switch(config-exp-nacl)# end
Switch# show access-list expert
Extended EXPERT access list exp_acl(ID: 9998)
  10 deny TCP host 192.168.4.12 any host 00:13:00:49:82:72 any
```

4-14 permit | deny (ip access-list)

This command is used to add a permit or a deny entry. Use the **no** form of this command to remove an entry.

Extended Access List:

rule [*SEQUENCE-NUMBER***] {permit | deny} tcp {any | host** *SRC-IP-ADDR* **|** *SRC-IP-ADDR SRC-IP-WILDCARD***} [{eq | lt | gt | neq}** *PORT* **| range** *MIN-PORT MAX-PORT***] {any | host** *DST-IP-ADDR* **|** *DST-IP-ADDR DST-IP-WILDCARD***} [{eq | lt | gt | neq}** *PORT* **| range** *MIN-PORT MAX-PORT***] [***TCP-FLAG***] [[precedence** *PRECEDENCE***] [tos** *TOS***] | dscp** *DSCP***] [time-range** *PROFILE-NAME***]**

rule [*SEQUENCE-NUMBER***] {permit | deny} udp {any | host** *SRC-IP-ADDR* **|** *SRC-IP-ADDR SRC-IP-WILDCARD***} [{eq | lt | gt | neq}** *PORT* **| range** *MIN-PORT MAX-PORT***] {any | host** *DST-IP-ADDR* **|** *DST-IP-ADDR DST-IP-WILDCARD***} [{eq | lt | gt | neq}** *PORT* **| range** *MIN-PORT MAX-PORT***] [[precedence** *PRECEDENCE***] [tos** *TOS***] | dscp** *DSCP***] [time-range** *PROFILE-NAME***]**

rule [*SEQUENCE-NUMBER***] {permit | deny} icmp {any | host** *SRC-IP-ADDR* **|** *SRC-IP-ADDR SRC-IP-WILDCARD***} {any | host** *DST-IP-ADDR* **|** *DST-IP-ADDR DST-IP-WILDCARD***} [***ICMP-TYPE***] [***ICMP-CODE***] |** *ICMP-MESSAGE***] [[precedence** *PRECEDENCE***] [tos** *TOS***] | dscp** *DSCP***] [time-range** *PROFILE-NAME***]**

rule [*SEQUENCE-NUMBER***] {permit | deny} {gre | esp | eigrp | igmp | ipinip | ospf | pcp | pim | vrrp | protocol-id** *PROTOCOL-ID***} {any | host** *SRC-IP-ADDR* **|** *SRC-IP-ADDR SRC-IP-WILDCARD***} {any | host** *DST-IP-ADDR* **|** *DST-IP-ADDR DST-IP-WILDCARD***} [fragments] [[precedence** *PRECEDENCE***] [tos** *TOS***] | dscp** *DSCP***] [time-range** *PROFILE-NAME***]**

rule [*SEQUENCE-NUMBER***] {permit | deny} {any | host** *SRC-IP-ADDR* **|** *SRC-IP-ADDR SRC-IP-WILDCARD***} [any | host** *DST-IP-ADDR* **|** *DST-IP-ADDR DST-IP-WILDCARD***] [fragments] [[precedence** *PRECEDENCE***] [tos** *TOS***] | dscp** *DSCP***] [time-range** *PROFILE-NAME***]**

Standard IP Access List:

rule [*SEQUENCE-NUMBER***] {permit | deny} {any | host** *SRC-IP-ADDR* **|** *SRC-IP-ADDR SRC-IP-WILDCARD***} [any | host** *DST-IP-ADDR* **|** *DST-IP-ADDR DST-IP-WILDCARD***] [time-range** *PROFILE-NAME***]**

no *SEQUENCE-NUMBER*

Parameters

SEQUENCE-NUMBER	Specifies the sequence number. The range is from 1 to 65535. The lower the number is, the higher the priority of the permit/deny rule.

any	Specifies any source IP address or any destination IP address.
host *SRC-IP-ADDR*	Specifies a specific source host IP address.
SRC-IP-ADDR SRC-IP-WILDCARD	Specifies a group of source IP addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to the bit value 0 will be checked.
host *DST-IP-ADDR*	Specifies a specific destination host IP address.
DST-IP-ADDR DST-IP-WILDCARD	Specifies a group of destination IP addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to the bit value 0 will be checked.
precedence *PRECEDENCE*	(Optional) Specifies that packets can be filtered by precedence level, as specified by a number from 0 to 7.
dscp *DSCP*	(Optional) Specifies the matching DSCP code in IP header. The range is from 0 to 63, or select the following DSCP name: af11 - 001010, af12 -001100, af13 - 001110, af21 - 010010, af22 - 010100, af23 - 010110, af31 - 011010, af32 - 011100, af33 - 011110, af41 - 100010, af42 - 100100, af43 - 100110, cs1 - 001000, cs2 - 010000, cs3 - 011000, cs4 - 100000, cs5 - 101000, cs6 - 110000, cs7 - 111000, default - 000000, ef – 101110.
tos *TOS*	(Optional) Specifies that packets can be filtered by type of service level, as specified by a number from 0 to 15.
lt *PORT*	(Optional) Specifies to match if less than the specified port number.
gt *PORT*	(Optional) Specifies to match if greater than the specified port number.
eq *PORT*	(Optional) Specifies to match if equal to the specified port number.
neq *PORT*	(Optional) Specifies to match if not equal to the specified port number.
range *MIN-PORT MAX-PORT*	(Optional) Specifies to match if fall within the range of ports.
TCP-FLAG	(Optional) Specifies the TCP flag fields and the specified TCP header bits called**ack** (acknowledge), **fin** (finish), **psh** (push), **rst** (reset), **syn** (synchronize), or **urg** (urgent).
fragments	(Optional)Specifies the packet fragment's filtering.
time-range *PROFILE-NAME*	(Optional) Specifies the name of the timeperiod profile associated with the accesslist delineating its activation period.
tcp, udp, igmp, ipinip, gre, esp, eigrp, ospf, pcp, pim, vrrp	Specifies Layer 4 protocols.
PROTOCOL-ID	(Optional) Specifies the protocol ID. The valid value is from 0 to 255.
ICMP-TYPE	(Optional) Specifies the ICMP message type. The valid number for the message type is from 0 to 255.
ICMP-CODE	(Optional) Specifies the ICMP message code. The valid number for the message code is from 0 to 255.
ICMP-MESSAGE	(Optional) Specifies the ICMP message. The pre-defined parameters are available for selection: administratively-prohibited,alternate-address,conversion-error,host-prohibited,net-prohibited,echo,echo-reply,pointer-indicates-error,host-isolated,host-precedence-violation,host-redirect,host-tos-redirect,host-tos-unreachable,host-unknown,host-unreachable, information-reply,information-request,mask-reply,mask-request,mobile-redirect,net-redirect,net-tos-

	redirect,net-tos-unreachable, net-unreachable,net-unknown,bad-length,option-missing,packet-fragment,parameter-problem,port-unreachable,precedence-cutoff, protocol-unreachable,reassembly-timeout,redirect-message,router-advertisement,router-solicitation,source-quench,source-route-failed, time-exceeded,timestamp-reply,timestamp-request,traceroute,ttl-expired,unreachable.

Default

None.

Command Mode

IP Access-list Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If a rule entry is created without a sequence number, a sequence number will be automatically assigned. If it is the first entry, the sequence number 10 is assigned. A subsequent rule entry will be assigned a sequence number that is 10 greater than the largest sequence number in that access list and is placed at the end of the list.

The user can use the command access-list sequence to change the start sequence number and increment number for the specified access list. After the command is applied, the new rule without specified sequence number will be assigned sequence based new sequence setting of the specified access list.

When you manually assign the sequence number, it is better to have a reserved interval for future lower sequence number entries. Otherwise, it will create extra effort to insert an entry with a lower sequence number.

The sequence number must be unique in the domain of an access-list. If you enter a sequence number that is already present, an error message will be shown.

To create a matching rule for an IP standard access list, only the source IP address or destination IP address fields can be specified.

Example

This example shows how to create four entries for an IP extended access list, named Strict-Control. These entries are: permit TCP packets destined to network 10.20.0.0, permit TCP packets destined to host 10.100.1.2, permit all TCP packets go to TCP destination port 80 and permit all ICMP packets.

```
Switch# configure terminal
Switch(config)#ip access-list extended Strict-Control
Switch(config-ip-ext-acl)# rule permit tcp any 10.20.0.0 0.0.255.255
Switch(config-ip-ext-acl)# rule permit tcp any host 10.100.1.2
Switch(config-ip-ext-acl)# rule permit tcp any any eq 80
Switch(config-ip-ext-acl)# rule permit icmp any any
Switch(config-ip-ext-acl)#
```

This example shows how to create two entries for an IP standard access-list, named “std-ip”.These entries are: permit IP packets destined to network 10.20.0.0, permit IP packets destined to host 10.100.1.2.

```
Switch# configure terminal
Switch(config)#ip access-list std-acl
Switch(config-ip-acl)# rule permit any 10.20.0.0 0.0.255.255
Switch(config-ip- acl)# rule permit any host 10.100.1.2
Switch(config-ip- acl)#
```

4-15 permit | deny (ipv6 access-list)

This command is used to add a permit entry or deny entry to the IPv6 accesslist. Use the **no** form of this command to remove an entry from the IPv6 accesslist.

Extended IPv6 Access List:

rule [*SEQUENCE-NUMBER***] {permit | deny} tcp {any | host** *SRC-IPV6-ADDR* **|** *SRC-IPV6-ADDRIPREFIX-LENGTH***} [{eq | lt | gt | neq}** *PORT* **| range** *MIN-PORT MAX-PORT***] {any | host** *DST-IPV6-ADDR* **|** *DST-IPV6-ADDRIPREFIX-LENGTH***} [{eq | lt | gt | neq}** *PORT* **| range** *MIN-PORT MAX-PORT***] [***TCP-FLAG***] [dscp** *VALUE***] [flow-label** *FLOW-LABEL***] [time-range** *PROFILE-NAME***]**

rule [*SEQUENCE-NUMBER***] {permit | deny} udp {any | host** *SRC-IPV6-ADDR* **|** *SRC-IPV6-ADDRIPREFIX-LENGTH***} [{eq | lt | gt | neq}** *PORT* **| range** *MIN-PORT MAX-PORT***] {any | host** *DST-IPV6-ADDR* **|** *DST-IPV6-ADDRIPREFIX-LENGTH***} [{eq | lt | gt | neq}** *PORT* **| range** *MIN-PORT MAX-PORT***] [dscp** *VALUE***] [flow-label** *FLOW-LABEL***] [time-range** *PROFILE-NAME***]**

rule [*SEQUENCE-NUMBER***] {permit | deny} icmp {any | host** *SRC-IPV6-ADDR* **|** *SRC-IPV6-ADDRIPREFIX-LENGTH***} {any | host** *DST-IPV6-ADDR* **|** *DST-IPV6-ADDRIPREFIX-LENGTH***} [***ICMP-TYPE* **[***ICMP-CODE***] |** *ICMP-MESSAGE***] [dscp** *VALUE***] [flow-label** *FLOW-LABEL***] [time-range** *PROFILE-NAME***]**

rule [*SEQUENCE-NUMBER***] {permit | deny} {esp | pcp | sctp | protocol-id** *PROTOCOL-ID***} {any | host** *SRC-IPV6-ADDR* **|** *SRC-IPV6-ADDRIPREFIX-LENGTH***} {any | host** *DST-IPV6-ADDR* **|** *DST-IPV6-ADDRIPREFIX-LENGTH***} [fragments] [dscp** *VALUE***] [flow-label** *FLOW-LABEL***] [time-range** *PROFILE-NAME***]**

rule [*SEQUENCE-NUMBER***] {permit | deny} {any | host** *SRC-IPV6-ADDR* **|** *SRC-IPV6-ADDRIPREFIX-LENGTH***} [any | host** *DST-IPV6-ADDR* **|** *DST-IPV6-ADDRIPREFIX-LENGTH***] [fragments] [dscp** *VALUE***] [flow-label** *FLOW-LABEL***] [time-range** *PROFILE-NAME***]**

Standard IPv6 Access List:

rule [*SEQUENCE-NUMBER***] {permit | deny} {any | host** *SRC-IPV6-ADDR* **|** *SRC-IPV6-ADDRIPREFIX-LENGTH***} [any | host** *DST-IPV6-ADDR* **|** *DST-IPV6-ADDRIPREFIX-LENGTH***][time-range** *PROFILE-NAME***]**

no *SEQUENCE-NUMBER*

Parameters

SEQUENCE-NUMBER	Specifies the sequence number. The range is from 1 to 65535. The lower the number is, the higher the priority of the permit/deny rule.
any	Specifies any source IPv6 address or any destination IPv6 address.
host *SRC-IPV6-ADDR*	Specifies a specific source host IPv6 address.
SRC-IPV6-ADDR/PREFIX-LENGTH	Specifies a source IPv6 network.
host *DST-IPV6-ADDR*	Specifies a specific destination host IPv6 address.
DST-IPV6-ADDRIPREFIX-LENGTH	Specifies a destination IPv6 network.
tcp, udp, icmp, esp, pcp ,sctp	Specifies the Layer 4 protocol type.
dscp *VALUE*	(Optional) Specifies the matching traffic class value in IPv6 header. The range is from 0 to 63, or select the following DSCP name: af11 - 001010, af12 -001100, af13 - 001110, af21 - 010010, af22 - 010100, af23 - 010110, af31 - 011010, af32 - 011100, af33 - 011110, af41 - 100010, af42 - 100100, af43 - 100110, cs1 - 001000, cs2 - 010000, cs3 - 011000, cs4 - 100000, cs5 - 101000, cs6 - 110000, cs7 - 111000, default - 000000, ef – 101110.
lt *PORT*	(Optional) Specifies to match if less than the specified port number.
gt *PORT*	(Optional) Specifies to match if greater than the specified port

	number.
eq *PORT*	(Optional) Specifies to match if equal to the specified port number.
neq *PORT*	(Optional) Specifies to match if not equal to the specified port number.
range *MIN-PORT MAX-PORT*	(Optional) Specifies to match if fall within the range of ports.
PROTOCOL-ID	(Optional) Specifies the protocol ID. The valid value is from 0 to 255.
ICMP-TYPE	(Optional) Specifies the ICMP message type. The valid number of the message type is from 0 to 255.
ICMP-CODE	(Optional)Specifies the ICMP message code. The valid number of the code type is from 0 to 255.
ICMP-MESSAGE	(Optional) Specifies the ICMP message. The following pre-defined parameters are available for selection: beyond-scope, destination-unreachable, echo-reply, echo-request, erroneous_header, hop-limit, multicast-listener-query, multicast-listener-done, multicast-listener-report, nd-na, nd-ns, next-header, no-admin, no-route, packet-too-big, parameter-option, parameter-problem, port-unreachable, reassembly-timeout, redirect, renum-command, renum-result, renum-seq-number, router-advertisement, router-renumbering, router-solicitation, time-exceeded, unreachable.
TCP-FLAG	(Optional) Specifies the TCP flag fields and the specified TCP header bits called**ack** (acknowledge), **fin** (finish), **psh** (push), **rst** (reset), **syn** (synchronize), or **urg** (urgent).
flow-label *FLOW-LABEL*	(Optional) Specifies the flow label value, within the range of 0 to 1048575.
fragments	(Optional)Specifies the packet fragment’s filtering.
time-range *PROFILE-NAME*	(Optional) Specifies the name of time period profile associated with the access list delineating its activation period.

Default

None.

Command Mode

IPv6 Access-list Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If a rule entry is created without a sequence number, a sequence number will be automatically assigned. If it is the first entry, the sequence number 10 is assigned. A subsequent rule entry will be assigned a sequence number that is 10 greater than the largest sequence number in that access list and is placed at the end of the list.

The user can use the command access-list sequence to change the start sequence number and increment number for the specified access list. After the command is applied, the new rule without specified sequence number will be assigned sequence based new sequence setting of the specified access list.

When you manually assign the sequence number, it is better to have a reserved interval for future lower sequence number entries. Otherwise, it will create extra effort to insert an entry with a lower sequence number.

The sequence number must be unique in the domain of an access-list. If you enter a sequence number that is already present, an error message will be shown.

Example

This example shows how to create four entries for an IPv6 extended access list named “ipv6-control”. These entries are: permit TCP packets destined to network ff02::0:2/16, permit TCP packets destined to host ff02::1:2, permit all TCP packets go to port 80 and permit all ICMP packets.

```
Switch# configure terminal
Switch(config)#ipv6 access-list extended ipv6-control
Switch(config-ipv6-ext-acl)# rule permit tcp any ff02::0:2/16
Switch(config-ipv6-ext-acl)# rule permit tcp any host ff02::1:2
Switch(config-ipv6-ext-acl)# rule permit tcp any any eq 80
Switch(config-ipv6-ext-acl)# rule permit icmp any any
Switch(config-ipv6-ext-acl)#
```

This example shows how to create two entries for an IPv6 standard access-list named “ipv6-std-control”. These entries are: permit IP packets destined to network ff02::0:2/16, and permit IP packets destined to host ff02::1:2.

```
Switch# configure terminal
Switch(config)#ipv6 access-list ipv6-std-control
Switch(config-ipv6-acl)# rule permit any ff02::0:2/16
Switch(config-ipv6-acl)# rule permit any host ff02::1:2
Switch(config-ipv6-acl)#
```

4-16 permit | deny (mac access-list)

This command is used to define the rule for packets that will be permitted or denied. Use the **no** form of this command to remove an entry

rule [*SEQUENCE-NUMBER***] {permit | deny} {any | host** *SRC-MAC-ADDR* **|** *SRC-MAC-ADDR SRC-MAC-WILDCARD***} {any | host** *DST-MAC-ADDR* **|** *DST-MAC-ADDR DST-MAC-WILDCARD***} [ethernet-type** *TYPE MASK* **[cos** *VALUE***] [vlan** *VLAN-ID***] [time-range** *PROFILE-NAME***]**

no *SEQUENCE-NUMBER*

Parameters

SEQUENCE-NUMBER	Specifies the sequence number. The range is from 1 to 65535. The lower the number is, the higher the priority of the permit/deny rule.
any	Specifies any source MAC address or any destination MAC address.
host *SRC-MAC-ADDR*	Specifies a specific source host MAC address.
SRC-MAC-ADDR SRC-MAC-WILDCARD	Specifies a group of source MAC addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to the bit value 0 will be checked.
host *DST-MAC-ADDR*	Specifies a specific destination host MAC address.
DST-MAC-ADDR DST-MAC-WILDCARD	Specifies a group of destination MAC addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to the bit value 0 will be checked.
ethernet-type*TYPE MASK*	(Optional) Specifies that the Ethernet type which is a hexadecimal number from 0 to FFFF or the name of an Ethernet type which can be one of the following: aarp, appletalk, decnet-iv, etype-6000, etype-8042, lat, lavc-sca, mop-console, mop-dump, vines-echo, vines-ip, xns-idp., arp.
cos *VALUE*	(Optional) Specifies the priority value of 0 to 7.
vlan *VLAN-ID*	(Optional) Specifies the VLAN-ID.
time-range *PROFILE-*	(Optional) Specifies the name of time period profile associated

NAME	with the accesslist delineating its activation period

Default

None.

Command Mode

MAC Access-list Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If a rule entry is created without a sequence number, a sequence number will be automatically assigned. If it is the first entry, the sequence number 10 is assigned. A subsequent rule entry will be assigned a sequence number that is 10 greater than the largest sequence number in that access list and is placed at the end of the list.

The user can use the command access-list sequence to change the start sequence number and increment number for the specified access list. After the command is applied, the new rule without specified sequence number will be assigned sequence based new sequence setting of the specified access list.

When you manually assign the sequence number, it is better to have a reserved interval for future lower sequence number entries. Otherwise, it will create extra effort to insert an entry with a lower sequence number.

The sequence number must be unique in the domain of an access-list. If you enter a sequence number that is already present, an error message will be displayed.

Multiple entries can be added to the list, and you can use permit for one entry and use deny for the other entry. Different permit and deny commands can match different fields available for setting.

Example

This example shows how to configure MAC access entries in the profile daily-profile to allow two sets of source MAC addresses.

```
Switch# configure terminal
Switch(config)#mac access-list extended daily-profile
Switch(config-mac-ext-acl)# rule permit 00:80:33:00:00:00  00:00:00:ff:ff:ff any
Switch(config-mac-ext-acl)# rule permit 00:f4:57:00:00:00 00:00:00:ff:ff:ff any
Switch(config-mac-ext-acl)#
```

4-17 show access-group

This command is used to display access group information for interface(s).

show access-group [interface *INTERFACE-ID***]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies the interface to be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If interface is not specified, all of the interfaces that have access list configured will be displayed.

Example

This example shows how to display accesslists that are applied to all of the interfaces.

```
Switch# show access-group

ethernet1/0/1:
  Inbound mac access-list : simple-mac-acl(ID: 7998)
  Inbound ip access-list  : simple-ip-acl(ID: 1998)

Switch#
```

4-18 show access-list

This command is used to display the accesslist configuration information.

show access-list [ip [*NAME* | *NUMBER***] | mac [***NAME* | *NUMBER***] | ipv6 [***NAME* | *NUMBER***] | expert [***NAME* | *NUMBER***] | arp [***NAME***]]**

Parameters

ip	(Optional) Specifies to display a listing of all IP accesslists.
mac	(Optional) Specifies to display a listing of all MAC accesslists.
ipv6	(Optional) Specifies to display a listing of all IPv6 accesslists.
expert	(Optional) Specifies to display a listing of all expert accesslists.
NAME | *NUMBER*	Specifies to display the contents of the specified accesslist.
arp	Specifies to display the ARP access list.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays access list information. If no option is specified, a listing of all configured access lists is displayed. If the type of access list is specified, detailed information of the access list will be displayed. If the user enables the ACL hardware counter for an access list, the counter will be displayed based on each access list entry.

Example

This example shows how to display all access lists.

```
Switch# show access-list

Access-List-Name                        Type
--------------------------------------- ---------------
simple-ip-acl(ID: 3998)                 ip ext-acl
simple-rd-acl(ID: 3999)                 ip ext-acl
rd-mac-acl(ID: 6998)                    mac ext-acl
rd-ip-acl(ID: 1998)                     ip acl
ip6-acl(ID: 12999)                      ipv6 ext-acl
park-arp-acl                            arp acl

Total Entries: 6

Switch#
```

This example shows how to display the IP accesslist called R&D.

```
Switch# show access-list ip R&D

IP access list R&D(ID:3996)
10 permit tcp any 10.20.0.0 0.0.255.255
20 permit tcp any host 10.100.1.2
30 permit icmp any any

Switch#
```

This example shows how to display the content for the accesslist if its hardware counter is enabled.

```
Switch# show access-list ip simple-ip-acl

IP access list simple-ip-acl(ID:3994)
10 permit tcp any 10.20.0.0 0.0.255.255  (Ing: 12410 packets)
20 permit tcp any host 10.100.1.2   (Ing: 6532 packets)
30 permit icmp any any   (Ing: 8758 packets)

Counter enable on following port(s):
 Ingress port(s): ethernet1/0/5-ethernet1/0/8

Switch#
```

5. Access Management Commands

5-1 access class

This command is used to specify an access list to restrict the access via a line.Use the **no** form of this command to remove the specified access list check.

access-class *IP-ACL*

no access-class *IP-ACL*

Parameters

IP-ACL	Specifies a standard IP access list. The source address field of the permit or deny entry define the valid or invalid host.

Default

None.

Command Mode

Line Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command specifies access lists to restrict the access via a line. At most two access lists can be applied to a line. If two access lists are already applied, an attempt to apply a new access list will be rejected until an applied access list is removed by the **no** form of this command.

Example

This example shows how a standard IP access list is created and is specified as the access list to restrict access via Telnet. Only the host 226.1.1.1 is allowed to access the server.

```
Switch# configure terminal
Switch(config)#ip access-list vty-filter
Switch(config-ip-acl)#rule permit 226.1.1.1 0.0.0.0
Switch(config-ip-acl)# exit
Switch(config)# line telnet
Switch(config-line)# access-class vty-filter
Switch(config-line)#
```

5-2 ip http server

This command is used to enable the HTTP server. Use the **no** form of this command to disable the HTTP server function.

ip http server

no ip http server

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command enables the HTTP server function. The HTTPs access interface is separately controlled by SSL commands.

Example

This example shows how to enable the HTTP server.

```
Switch# configure terminal
Switch(config)#ip http server
The SSL function will be set to disable.
Switch(config)#
```

5-3 ip http secure-server

This command is used to enable the HTTPS server. Use the **ip http secure-server ssl-service-policy**command to specify which SSL service policy is used for HTTPS. Use the **no** form of this command todisable the HTTPS server function.

ip http secure-server [ssl-service-policy *POLICY-NAME***]**

no ip http secure-server

Parameters

POLICY-NAME	(Optional) Specifies the SSL service policy name. Use this **ssl-service-policy** keyword only if you have already declared an SSL service policy using the **ssl-service-policy** command. When no keywordis specified, a built-in local certificate will be used for HTTPS.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command enables the HTTPS server function and uses the specified SSL service policy for HTTPS.

Example

This example shows how to enable the HTTPS server function and use the service policy called “sp1” for HTTPS.

```
Switch# configure terminal
Switch(config)#ip http secure-server ssl-service-policy sp1
Switch(config)#
```

5-4 ip http access-class

This command is used to specify an access list to restrict the access to the HTTP server. Use the **no** form of this command to remove the access list check.

ip http access-class *IP-ACL*

no ip http access-class *IP-ACL*

Parameters

IP-ACL	Specifies a standard IP access list. The source address field of the entry defines the valid or invalid host.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command specifies an access list to restrict the access to the HTTP server. If the specified access list does not exist, the command does not take effect, thus no access list is checked for the user's access to HTTP.

Example

This example shows how a standard IP access list is created and is specified as the access list to access the HTTP server. Only the host 226.1.1.1 is allowed to access the server.

```
Switch# configure terminal
Switch(config)#ip access-list http-filter
Switch(config-ip-acl)# rule permit 226.1.1.1 255.255.255.255
Switch(config-ip-acl)# exit
Switch(config)# ip http access-class http-filter
Switch(config)#
```

5-5 ip http service-port

This command is used to specify the HTTP service port. Use the **no** form of this command toreturn the service port to 80.

ip http service-port *TCP-PORT*

no ip http service-port

Parameters

TCP-PORT	Specifies the TCP port number. TCP ports are numbered between 1 and 65535. The "well-known" TCP port for the HTTP protocol is 80.

Default

By default, this port number is 80.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command configures the TCP port number for the HTTP server.

Example

This example shows how to configure theHTTP TCP port number to 8080.

```
Switch# configure terminal
Switch(config)# ip http service-port 8080
Switch(config)#
```

5-6 ip http timeout-policy idle

This command is used to set idle timeout of a http server connection in seconds. Use the **no** form of this command toset the idle timeout to default value.

ip http timeout-policy idle *INT*

no ip http timeout-policy idle

Parameters

INT	Specifies the idle timeout value.This value is between 60 and 36000.

Default

By default, this value is 180 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is use to configure the idle timeout value of a http server connection in seconds.

Example

This example shows how to configure the idle timeout value to 100 seconds .

```
Switch#configure terminal
Switch(config)#ip http timeout-policy idle 100
Switch(config)#
```

5-7 ip telnet server

This command is used to enable a Telnet server. Use the **no** form of this command to disable the Telnet server function

ip telnet server

no ip telnet server

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command enables or disables the Telnet server. The SSH access interface is separately controlled by SSH commands.

Example

This example shows how to enable the Telnet server.

```
Switch# configure terminal
Switch(config)# ip telnet server
Switch(config)#
```

5-8 ip telnet service-port

This command is used to specify the service port for Telnet. Use the **no** form of this command to revert to the default setting.

ip telnet service-port *TCP-PORT*

no ip telnet service-port

Parameters

TCP-PORT	Specifies the TCP port number. TCP ports are numbered between 1 and 65535.The “well-known” TCP port for the TELNET protocol is 23.

Default

By default, this value is 23.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command configures the TCP port number for Telnet access

Example

This example shows how to change the Telnet service port number to 3000.

```
Switch# configure terminal
Switch(config)# ip telnet service-port 3000
Switch(config)#
```

5-9 line

This command is used to identify a line type for configuration and enter line configuration mode.

line {console | telnet | SSH }

Parameters

console	Specifies the local console terminal to line mode.
telnet	Specifies the Telnet session to line mode.
SSH	Specifies the SSH session to line mode

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The line command is used to enter the Line Configuration Mode.

Example

This example shows how to enter the Line Configuration Mode for the console terminal line and configures its access class as"vty-filter".

```
Switch# configure terminal
Switch(config)#line console
Switch(config-line)# access-class vty-filter
Switch(config-line)#
```

5-10 service password-encryption

This command is used to enable the encryption of the password before stored in the configuration file. Use the **no** form of this command todisable the encryption.

service password-encryption {7 | 15}

no service password-encryption

Parameters

7	Specifies the password in the encrypted form based on SHA-1.
15	Specifies the password in the encrypted form based on MD5.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level:15.

Usage Guideline

The user account configuration information is stored in the running configuration file and can be applied to the system later. If the **service password-encryption** command is enabled, the password will be stored in the encrypted form.

When the service password encryption option is disabled and the password is specified in the plain text form, the password will be in plain text form. However, if the password is specified in the encrypted form or if the password has been converted to the encrypted form by the last enable password encryptionoption, the password will still be in the encrypted form. It cannot be reverted back to plain text.

The password affected by this command includes the user account password, enable password, and the authentication password.

Example

This example shows how to enable the encryption SHA-1 of the password before stored in the configuration file.

```
Switch# configure terminal
Switch(config)# service password encryption 7
Switch(config)#
```

5-11 show terminal

This command is used to obtain information about the terminal configuration parameter settings for the current terminal line.Use this command in any EXEC mode or any configuration mode.

show terminal

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information about the terminal configuration parameters for the current terminal line.

Example

This example shows how to display information about the terminal configuration parameter settings for the current terminal line.

```
Switch# show terminal

Terminal Settings:
Length: 25 lines
Width: 80 columns
Default Length: 25 lines
Default Width: 80 columns
Baud rate: 115200 bps

Switch#
```

5-12 show ip telnet server

This command is used to obtain information about the Telnet server status.Use this command in any EXEC mode or any configuration mode.

show ip telnet server

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information about the Telnet server status.

Example

This example shows how to display information about the Telnet server status.

```
Switch# show ip telnet server

Server State: Enabled

Switch#
```

5-13 show ip http server

This command is used to obtain information about the http server status.Use this command in EXEC mode or any configuration mode.

show ip http server

Parameters

None.

Default

By default, the state is enabled.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information about the http server status.

Example

This example shows how to display information about the http server status.

```
Switch#show ip http server

ip http server state :  enable
Switch#
```

5-14 show users

This command is used to display information about the active lines on the Switch.

show users

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays information about the active lines on the Switch.

Example

This example shows how to display all session information.

```
Switch# show users
ID   Type      User-Name       Privilege Login-Time          IP address
------------------------------------------------------------------------------
0    * console admin           15        4S

Total Entries: 1

Switch#
```

5-15 terminal length

The command is used to configure the number of lines displayed on the screen. The **terminal length** command will only affect the current session. The **terminal length default**command will set the default value but it doesn't affect the current session. The newly created, saved session terminal length will use the default value. Use the **no** form of this command to revert to the default setting.

terminal length *NUMBER*

no terminal length

Parameters

NUMBER	Specifies the number of lines to display on the screen. This value must be between 0 and 512.When the terminal length is 0, the display will not stop until it reaches the end of the display.

Default

By default, this value is 25.

Command Mode

Use the EXEC Mode or Privilege EXEC Mode for the **terminal length** command.

Command Default Level

Level: 1 (for the **terminal length** command).

Usage Guideline

When the terminal length is 0, the display will not stop until it reaches the end of the display.

If the terminal length is specified to a value other than 0, for example 50, then the display will stop after every 50 lines. The terminal length is used to set the number of lines displayed on the current terminal screen. This command also applies to Telnet and SSH sessions. Valid entries are from 0 to 512. The default is 24 lines. A selection of 0's instructs the Switch to scroll continuously (no pausing).

Output from a single command that overflows a single display screen is followed by the **--More--** prompt. At the **--More--** prompt, press CTRL+C, q, Q, or ESC to interrupt the output and return to the prompt. Press the Spacebar to display an additional screen of output, or press Return to display one more line of output. Setting the screen length to 0 turns off the scrolling feature and causes the entire output to display at once. Unless the **default** keyword is used, a change to the terminal length value applies only to the current session. When using the no form of this command, the number of lines in the terminal display screen is reset to 24.

Example

This example shows how to change the lines to be displayed on a screen to 60.

```
Switch# terminal length 60
Switch#
```

5-16 session timeout

This command is used to configure the line session (console, telnet, SSH) timeout value. Use the **no** form of this command to revert to the default setting.

session-timeout *MINUTES*

no session-timeout

Parameters

MINUTES	Specifies the timeout length in minutes. 0 represents never

	timeout. Range <0-1439>

Default

By default, console, telnet and SSH sessions timeout value is 3 miuntes.

Command Mode

Line Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This timer specifies the timeout for auto-logout sessions established by the line that is being configured.

Example

This example shows how to configure the console session to never timeout.

```
Switch# configure terminal
Switch(config)# line console
Switch(config-line)# session-timeout 0
Switch(config-line)#
```

5-17 terminal width

The command is used to set the number of character columns on the terminal screen for the current session line. The terminal width command will only affect the current session. The terminal width default command will set the default value, but it doesn't affect any current sessions.

terminal width *NUMBER*

no terminal width

Parameters

NUMBER	Specifies the number of characters to display on the screen. Valid values are from 40 to 255.

Default

By default, terminal width is 200 columns.

Command Mode

Use the EXEC Mode or Privilege EXEC Mode for the **terminal width** command.

Command Default Level

Level: 1 (for the **terminal width** command).

Usage Guideline

By default, the Switch's system terminal provides a screen display width of 80 characters. The **terminal width** command changes the terminal width value which applies only to the current session. When changing the value in a session, the value applies only to that session. When the **no** form of this command is used, the number of lines in the terminal display screen is reset to the default, which is 80 characters.

However, for remote CLI session access such as Telnet, the auto-negotiation terminal width result will take precedence over the default setting if the negotiation is successful. Otherwise, the default settings take effect.

Example

This example shows how to adjust the current session terminal width to 120 characters.

```
Switch# show terminal
Terminal Settings:
Length: 24 lines
width: 200 columns
Default Length: 24 lines
Default Width: 200 columns
Baud Rate: 115200 bps

Switch# terminal width 120
Switch# show terminal
Terminal Settings:
Length: 24 lines
width: 120 columns
Default Length: 24 lines
Default Width: 200 columns
Baud Rate: 115200 bps

Switch#
```

5-18 username

This command is used to create a user account. Use the **no** form of this command to delete the user account.

username *NAME* **[privilege** *LEVEL***] [nopassword | password [0 | 7 | 15]** *PASSWORD***]**

no username [*NAME***]**

Parameters

NAME	Specifies the user name with a maximum of 32 characters.
privilege *LEVEL*	(Optional) Specifies the privilege level for each user. The privilege level must be between 1 and 15.
nopassword	(Optional) Specifies that there will be no password associated with this account.
password	(Optional) Specifies the password for the user.
0	(Optional) Specifies the password in clear, plain text. The password length is between 1 and 32 characters and can contain embedded spaces. It is case-sensitive. If the password syntax cannot be specified, the syntax remains plaintext.
7	(Optional) Specifies the encrypted password based on SHA-1. The password length is fixed at 35 bytes. It is case-sensitive. The password is encrypted. If the password syntax is not specified, the syntax is plain text.
15	(Optional) Specifies the encrypted password based on MD5. The password length is fixed at 31 bytes. It is case-sensitive. The password is encrypted. If the password syntax is not specified, the syntax is plain text.
PASSWORD	(Optional) Specifies the password string based on the type.

Default

By default, the user name is *admin*, password is *admin*, and the privilege level is 15.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command creates user accounts with different access levels. When the user login with Level 1, the user will be in the User EXEC Mode. The user needs to further use the **enable**command to enter the Privileged EXEC Mode.

When the user login with a Level higher than or equal to 2, the user will directly enter the Privileged EXEC Mode. Therefore, the Privileged EXEC Mode can be in Levels 2 to 15.

The user can specify the password in the encrypted form or in the plain-text form. If it is in the plain-text form, but the service passwordencryptionoption is enabled, the password will be converted to the encrypted form.

If the **no username** command is used without the user name specified, all users are removed.

By default, the user account is empty. When the user account is empty, the user will be directly in the User EXEC Mode at Level 1. The user can further enter the Privileged EXEC Mode using the **enable** command.

Example

This example shows how to create anadministrative username, called **admin**, and a password, called “mypassword”.

```
Switch# configure terminal
Switch(config)# username admin privilege 15 password 0 mypassword
Switch(config)#
```

This example shows how to remove the user account with the username **admin**.

```
Switch# configure terminal
Switch(config)# no username admin
Switch(config)#
```

5-19 show user-account

This command is used to display information about the user accounts created on the Switch.

show user-account

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays information about the user accounts created on the Switch.

Example

This example shows how to display all user accounts information.

```
Switch# show user-account
User Name           Privilege  Password  Password Type
------------------  ---------  --------  -------------
admin               15         ******    Plain Text

Total Entries: 1

Switch#
```

5-20 show service password-encryption

This command is used to display information about the password-encryption.

show service password-encryption

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays information about the password-encryption.

Example

This example shows how to display password-encryption.

```
Switch# show service password-encryption

Password Encryption State: Disabled
Switch#
```

5-21 show session-timeout

This command is used to display information about the session-timeout.

show session-timeout

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays information about the session-timeout.

Example

This example shows how to display session-timeout.

```
Switch# show session-timeout

Web Session Timeout     (second): 180
Telnet Session Timeout  (minute): 30
Console Session Timeout (minute): 30
SSH Session Timeout     (minute): 30

Switch#
```

5-22 show ip {http | telnet} service-port

This command is used to display information about the http or telnet service port.

show ip {http | telnet} service-port

Parameters

http	Specifies the http service port.
telnet	Specifies the telnet service port.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays information about the http or telnet service port.

Example

This example shows how to display http service port.

```
Switch# show ip http service-port

IP HTTP server port : 80
Switch#
```

5-23 ping access-class

This command is used to specify an access list to restrict the access to ping switch. Use the no form of the command to remove the access list check.

ping access-class *IP-ACL*

no ping access-class *IP-ACL*

Parameters

IP-ACL	Specifies a standard IP access list. The source address field of the permit or deny entry define the valid or invalid host.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to specify an access list to restrict the access to ping switch. Use the no form of the command to remove the access list check.

Example

This example shows how a standard IP access list is created and is specified as the access list to restrict the access to ping switch.Only the host 226.1.1.1 is allowed to access the server.

```
Switch# configure terminal
Switch(config)#ip access-list ping-filter
Switch(config-ip-acl)#rule permit 226.1.1.1 255.255.255.0
Switch(config-ip-acl)# exit
Switch(config)# ping access-class ping-filter
Switch(config)#
```

5-24 ip https access-class

This command is used to specify an access list to restrict the access to the HTTPS server. Use the no form of the command to remove the access list check.

ip https access-class *IP-ACL*

no ip https access-class *IP-ACL*

Parameters

IP-ACL	Specifies a standard IP access list. The source address field of the permit or deny entry define the valid or invalid host.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to specify an access list to restrict the access to the HTTPS server. Use the no form of the command to remove the access list check.

Example

This example shows how a standard IP access list is created and is specified as the access list to restrict the access to the HTTPS server.Only the host 226.1.1.1 is allowed to access the server.

```
Switch# configure terminal
Switch(config)#ip access-list https-filter
Switch(config-ip-acl)#rule permit 226.1.1.1 255.255.255.0
Switch(config-ip-acl)# exit
Switch(config)# ip https access-class https-filter
Switch(config)#
```

5-25 show trusted host

This command is used to display trusted host information of telnet,ping, http, https.

show trusted host [telnet | ping | http | https]

Parameters

telnet	Specifies the telnet trusted host information.
ping	Specifies the ping trusted host information.
http	Specifies http telnet trusted host information.
https	Specifies https telnet trusted host information.

Default

Show all trusted host information.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display trusted host information for telnet, ping, http, https.

Example

This example shows how to display trusted host information of https.

```
Switch# show trusted host https
Type    ACL Name
------  --------------------------------
https   https-filter

Total Entries: 1

Switch#
```

6. Asymmetric VLAN Commands

6-1 asymmetric-vlan

This command is used to enable the asymmetric VLAN function. Use the **no** form of this command to disable the asymmetric VLAN function.

asymmetric-vlan

no asymmetric-vlan

Parameters

None.

Default

By default, this feature is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable or disable the asymmetric VLAN function.

Example

This example shows how to enable asymmetric VLAN.

```
Switch# configure terminal
Switch(config)# asymmetric-vlan
```

This example shows how to disable asymmetric VLAN.

```
Switch# configure terminal
Switch(config)# no asymmetric-vlan
```

6-2 show asymmetric-vlan

This command is used to display asymmetric VLAN information

show asymmetric-vlan

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays asymmetric VLAN information.

Example

This example shows how to display asymmetric VLAN information.

```
Switch# show asymmetric-vlan

Asymmetric VLAN State: Disabled

Switch#
```

7. Authentication, Authorization, and Accounting (AAA) Commands

7-1 aaa new-model

This command is used to enable AAA for the authentication or accounting function. Use the **no** form of this command todisable the AAA function.

aaa new-model

no aaa new-model

Parameters

None.

Default

By default, this feature is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to enable AAA before the authentication and accounting via the AAA method lists take effect. If AAA is disabled, the login user will be authenticated via the local user account table created by the username command. The enable password will be authenticated via the local table which is defined via the enable password command.

Example

This example shows how to enable the AAA function.

```
Switch#configure terminal
Switch(config)# aaa new-model
Switch(config)#
```

7-2 aaa group server radius

This command is used to enter the RADIUS group server configuration mode to associate server hosts with the group. Use the **no** form of this command to remove a RADIUS server group

aaa group server radius *GROUP-NAME*

no aaa group server radius *GROUP-NAME*

Parameters

GROUP-NAME	Specifiesthe name of the server group.This name can be up to 32 characters long. The syntax is a general string that does not allow spaces.

Default

There is no AAA group server.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to define a RADIUS server group. The created server group is used in the definition of method lists used for authentication, or accounting by using AAA authentication and AAA accounting command. Also use this command to enter the RADIUS group server configuration mode. Use the server command to associate the RADIUS server hosts with the RADIUS server group.

Example

This example shows how to create a RADIUS server group with two entries. The second host entry acts as backup to the first entry.

```
Switch#configure terminal
Switch(config)#aaa group server radius group1
Switch(config-sg-radius)# server 172.19.10.100
Switch(config-sg-radius)# server 172.19.11.20
Switch(config-sg-radius)# exit
Switch(config)#
```

7-3 server (RADIUS)

This command is used to associate a RADIUS server host with a RADIUS server group. Use the **no** form of this command to remove a server host from the server group.

server {*IP-ADDRESS* **|** *IPV6-ADDRESS***}**

no server {*IP-ADDRESS***|** *IPV6-ADDRESS***}**

Parameters

IP-ADDRESS	Specifies the IPv4 address of the authentication server.
IPV6-ADDRESS	Specifies the IPv6 address of the authentication server.

Default

By default, no server is configured.

Command Mode

RADIUS Group Server Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to enter the RADIUS group server configuration mode. Use the server command to associate the RADIUS server hosts with the RADIUS server group. The defined server group can be specified as the method list for authentication, or accounting via the AAA authentication and AAA accounting command. Use the **radius-server host** command to create a server host entry. A host entry is identified by IP Address.

Example

This example shows how to create two RADIUS server hosts with the different IP addresses. A server group is then created with the two server hosts.

```
Switch#configure terminal
Switch(config)#radius-server host 172.19.10.100 auth-port 1500 timeout 8 retransmit 3 key
ABCDE
Switch(config)# radius-server host 172.19.10.101 auth-port 1600 timeout 3 retransmit 1 key
ABCDE
Switch(config)#aaa group server radius group1
Switch(config-sg-radius)# server 172.19.10.100
Switch(config-sg-radius)# server 172.19.10.101
Switch(config-sg-radius)# exit
Switch(config)#
```

7-4 radius-server deadtime

This command is used to specify the default duration of the time to skip the unresponsive server. Use the **no** form of this command to revert to the default setting.

radius-server deadtime *MINUTES*

no radius-server deadtime

Parameters

MINUTES	Specifies the dead time. The valid range is 0 to 1440 (24 hours). When the setting is 0, the unresponsive server will not be marked as dead.

Default

By default, this value is 0.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command can be used to improve the authentication processing time by setting the dead time to skip the unresponsive server host entries.

When the system performs authentication with the authentication server, it attempts one server at a time. If the attempted server does not respond, the system will attempt the next server. When the system finds a server does not respond, it will mark the server as down, start a dead time timer, and skip them in authentication of the following requests until expiration of the dead time.

Example

This example shows how to set the dead time to ten minutes.

```
Switch#configure terminal
Switch(config)# radius-server deadtime 10
Switch(config)#
```

7-5 aaa authentication dot1x

This command is used to configure the default method list used for 802.1X authentication. Use the **no** form of this command to remove the default method list.

aaa authentication dot1x default *METHOD1* **[***METHOD2...***]**

no aaa authentication dot1x default

Parameters

METHOD1 **[***METHOD2...***]**	Specifies the list of methods that the authentication algorithm tries in the given sequence. Enter at least one method or enter up to four methods. The following are keywords that can be used to specify a method. **local** – Specifies to use the local database for authentication. **group radius** – Specifies to use the servers defined by the RADIUS server host command. **group** *GROUP-NAME* – Specifies to use the server groups defined by the AAA group server. **none** - Normally, the method is listed as the last method. The user will no pass authentication.

Default

No AAA authentication method is configured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to configure the default authentication method list for 802.1X authentication. Initially, the default method list is not configured. The authentication of 802.1X requests will be performed based on the local database.

Example

This example shows how to set the default methods list for authenticating dot1X users.

```
Switch#configure terminal
Switch(config)# aaa authentication dot1x default group radius
Switch(config)#
```

7-6 radius-server host

This command is used to create a RADIUS server host. Use the **no** form of this command to delete a server host.

radius-server host {*IP-ADDRESS* | *IPV6-ADDRESS*} [auth-port *PORT*] [timeout *SECONDS*] [retransmit *COUNT*] key [*0* | *7*] *KEY-STRING*

no radius-server host {*IP-ADDRESS* | *IPV6-ADDRESS*}

Parameters

IP-ADDRESS	Specifies the IP address of the RADIUS server.
IPV6-ADDRESS	Specifies the IPv6 address of the RADIUS server.
auth-port *PORT*	(Optional) Specifies the UDP destination port number for sending authentication packets. The range is 0 to 65535. Set the port number to zero if the server host is not for authentication purposes. The default value is 1812.
timeout *SECONDS*	(Optional) Specifies the timeout value (in seconds) for radius

	server.
retransmit *COUNT*	(Optional) Specifies the retransmit value for radius server.
key [*0* | *7*] *KEY-STRING*	Specifies the share key used to communicate with raidus server. Type 0 refers to unencryped string. Type 7 refers to encrypted string. Key-string supports up to 256 characters.

Default

By default, no server is configured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to create RADIUS server hosts before it can be associated with the RADIUS server group using the server command.

Example

This example shows how to create two RADIUS server hosts with the different IP address.

```
Switch#configure terminal
Switch(config)#radius-server host 172.19.10.100 auth-port 1500
Switch(config)# radius-server host 172.19.10.101 auth-port 1600
Switch(config)#
```

7-7 aaa group server tacacs+

This command is used to enter the TACACS+ group server configuration mode to associate server hosts with the group. Use the **no** form of this command to remove a RADIUS server group

aaa group server tacacs+ *GROUP-NAME*

no aaa group server tacacs+ *GROUP-NAME*

Parameters

GROUP-NAME	Specifiesthe name of the server group.This name can be up to 32 characters long. The syntax is a general string that does not allow spaces.

Default

There is no AAA group server.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to define a TACACS+ server group. The created server group is used in the definition of method lists used for authentication, or accounting by using AAA authentication and AAA accounting command. Also use this command to enter the TACACS+ group server configuration mode. Use the server command to associate the TACACS+ server hosts with the TACACS+ server group.

Example

This example shows how to create a TACACS+ server group with two entries. The second host entry acts as backup to the first entry.

```
Switch#configure terminal
Switch(config)# aaa group server tacacs+ tac_group
Switch(config-sg-radius)# server 172.19.10.100
Switch(config-sg-radius)# server 172.19.11.20
Switch(config-sg-radius)# exit
Switch(config)#
```

7-8 server (TACACS+)

This command is used to associate a TACACS+ server with a server group. Use the **no** form of this command to remove a server from the server group.

server {*IP-ADDRESS* **|** *IPV6-ADDRESS***}**

no server {*IP-ADDRESS* **|** *IPV6-ADDRESS***}**

Parameters

IP-ADDRESS	Specifies the IPv4 address of the authentication server.
IPV6-ADDRESS	Specifies the IPv6 address of the authentication server.

Default

By default, no host is in the server group.

Command Mode

TACACS+ Group Server Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use the **aaa group server tacacs+** command to enter the TACACS+ group server configuration mode. Use the **server** command to associate the TACACS+ server hosts with the TACACS+ server group. The defined server group can be specified as the method list for authentication, or accounting via the **aaa authentication** command. The configured servers in the group will be attempted in the configured order. Use the **tacacs-server host** command to create a server host entry. A host entry is identified by the IP Address.

Example

This example shows how to create two TACACS+ server hosts. A server group is then created with the two server hosts.

```
Switch#configure terminal
Switch(config)#tacacs-server host 172.19.10.100 port 1500 timeout 8 key ABCDE
Switch(config)# tacacs-server host 172.19.122.3 port 1600 timeout 3 key ABCDE
Switch(config)#aaa group server tacacs+ group2
Switch(config-sg-tacacs+)# server 172.19.10.100
Switch(config-sg-tacacs+)# server 172.19.122.3
Switch(config-sg-tacacs+)# exit
Switch(config)#
```

7-9 tacacs-server host

This command is used to create a TACACS+ server host. Use the **no** form of this command to delete a server host.

tacacs-server host {*IP-ADDRESS* | *IPV6-ADDRESS*} [port *PORT*] [timeout *SECONDS*] key [0 | 7] *KEY-STRING*

no tacacs-server host {*IP-ADDRESS* | *IPV6-ADDRESS*}

Parameters

IP-ADDRESS	Specifies the IP address of the RADIUS server.
IPV6-ADDRESS	Specifies the IPv6 address of the RADIUS server.
auth-port PORT-NUMBER	(Optional) Specifies the UDP destination port number for sending authentication packets. The range is 0 to 65535. Set the port number to zero if the server host is not for authentication purposes. The default value is 1812.
port *PORT*	(Optional) Specifies the UDP destination port number for sending authentication packets. The range is 0 to 65535. Set the port number to zero if the server host is not for authentication purposes. The default value is 49.
timeout *SECONDS*	(Optional) Specifies the timeout value (in seconds) for tacacs server.
key [*0* | *7*] *KEY-STRING*	Specifies the share key used to communicate with tacacs server. Type 0 refers to unencryped string. Type 7 refers to encrypted string. Key-string supports up to 32 characters.

Default

By default, no server is configured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to create tacacs server hosts before it can be associated with the tacacs server group using the server command.

Example

This example shows how to create two tacacs server hosts with the different IP address.

```
Switch#configure terminal
Switch(config)#tacacs-server host 172.19.10.100 port 1500 timeout 8 key ABCDE
Switch(config)#
```

7-10 show aaa

This command is used to display the AAA global state.

show aaa

Parameters

None.

Default

None.

Command Mode

Privilege EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the AAA global state.

Example

This example shows how to display the AAA global state.

```
Switch# show aaa

AAA is enabled.

Switch#
```

7-11 show radius statistics

This command is used to display RADIUS statistics for accounting and authentication packets.

show radius statistics

Parameters

None.

Default

None.

Command Mode

Privilege EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display statistics counters related to servers.

Example

This example shows how to display the server related statistics counters.

```
Switch#show radius statistics
RADIUS Server: 172.19.192.80: Auth-Port 1645
                                Auth.
Round Trip Time:                10
Access Requests:                 4
Access Accepts:                  0
Access Rejects:                  4
Access Challenges:               0
Acct Request:                   NA
Acct Response:                  NA
Retransmissions:                 0
Malformed Responses:             0
Bad Authenticators:              0
 Pending Requests:               0
 Timeouts:                       0
 Unknown Types:                  0
 Packets Dropped:                0
```

Display Parameters

Auth.	Statistics for authentication packets.
Acct.	Statistics for accounting packets.
Round Trip Time	The time interval (in hundredths of a second) between the most recent Response and the Request that matched it from this RADIUS server.
Access Requests	The number of RADIUS Access-Request packets sent to this server. This does not include retransmissions.
Access Accepts	The number of RADIUS Access-Accept packets (valid or invalid) received from this server.
Access Rejects	The number of RADIUS Access-Reject packets (valid or invalid) received from this server.
Access Challenges	The number of RADIUS Access-Challenge packets (valid or invalid) received from this server.
Acct Request	The number of RADIUS Accounting-Request packets sent. This does not include retransmissions.
Acct Response	The number of RADIUS packets received on the accounting port from this server.
Retransmissions	The number of RADIUS Request packets retransmitted to this RADIUS server. Retransmissions include retries where the Identifier and Acct-Delay have been updated, as well as those in which they remain the same.
Malformed Responses	The number of malformed RADIUS Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators or Signature attributes or unknown types are not included as malformed responses.
Bad Authenticators	The number of RADIUS Response packets containing invalid authenticators or Signature attributes received from this server.
Pending Requests	The number of RADIUS Request packets destined for this server that have not yet timed out or received a response. This variable is incremented when a Request is sent and decremented due to receipt of a Response, a timeout or retransmission.
Timeouts	The number of timeouts to this server. After a timeout the client may retry to the same server, send to a different server, or give up. A retry to the same server is counted as a retransmit as well

	as a timeout. A send to a different server is counted as a Request as well as a timeout.
Unknown Types	The number of RADIUS packets of unknown type which were received from this server.
Packets Dropped	The number of RADIUS packets of which were received from this server and dropped for some other reason.

7-12 show tacacs statistics

This command is used to display tacacs statistics for accounting and authentication packets.

show radius statistics

Parameters

None.

Default

None.

Command Mode

Privilege EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display statistics counters related to servers.

Example

This example shows how to display the server related statistics counters.

```
Switch# show tacacs statistics

 TACACS+ Server: 10.90.90.1/49,  State is up
 Socket Opens:         0
 Socket Closes:        0
 Total Packets Sent:   0
 Total Packets Recv:   0
 Reference Count       0

Switch(config)#
```

Display Parameters

Soecket Opens	Statistics for socket opened for tacacs communication.
Soecket Closes	Statistics for socket closed for tacacs communication.
Totoal Packets Sent	The total packets sent for tacacs communication.
Total Packets Recev	The total packets received for tacacs communication
Reference Count	.

7-13 aaa authentication login

This command is used to specify the particular method for loging

aaa authentication login {*default* **|** *LIST-NAME***}** *METHOD1* **[***METHOD2...***]**

no aaa authentication login {*default* **|** *LIST-NAME***}**

Parameters

default	Default method.
METHOD-LIST	Specific method.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15

Usage Guideline

Use this command to specify the method for login authentication (SSH, console and telent)

Example

This example shows how to configure the method “test” for SSH login.

```
Switch(config)# aaa authentication login test radius
Switch(config)# line ssh
Switch(config-line)# login authentication test
```

7-14 http login authentication method

This command is used to apply the specific method for HTTP session login.

ip http authentication aaa login-authentication {*default* **|** *METHOD-LIST***}**

no ip http authentication aaa login-authentication

Parameters

default	Default method.
METHOD-LIST	Specific method.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15

Usage Guideline

Use this to apply the specific method for HTTP session login.

Example

This example shows how to configure the method “test” for HTTP login.

```
Switch(config)# aaa authentication login test tacacs+
Switch(config)# ip http authentication aaa login-authentication test
Switch(config)# show aaa
```

7-15 client

This command is used to specify a RADIUS client that can accept Change of Authorization (CoA) and disconnect requests. Use the **no** form of this command to delete the client.

client {*IP-ADDRESS* | *HOSTNAME***} server-key [0 | 7]** *STRING*

no client {*IP-ADDRESS* | *HOSTNAME*}

Parameters

IP-ADDRESS	Specifies the IP address of the RADIUS client.
HOSTNAME	Specifies the host name of the RADIUS client.
server-key	Specifies the RADIUS key to be shared between the Switch and a RADIUS client.
0	(Optional) Specifies the key in the clear text form. If neither 0 nor 7 are specified, the default form is clear text.
7	(Optional) Specifies the key in the encrypted form. If neither 0 nor 7 are specified, the default form is clear text.
STRING	Specifies the shared key.

Default

By default, CoA and disconnect request are dropped.

Command Mode

Dynamic Authorization Local Server Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use the command to specify the RADIUS client. The Switch can be configured to allow an external policy server to dynamically send updates to the Switch. This functionality is facilitated by the CoA RADIUS extension. CoA introduces peer-to-peer capability to RADIUS that the switch can act as a server and the external policy server can act as a RADIUS client.

Example

This example shows how to configure a RADIUS client.

```
Switch#configure terminal
Switch(config)#aaa server radius dynamic-author
Switch(config-locsvr-da-radius)#client 10.0.0.1 server-key 12345
Switch(config-locsvr-da-radius)#
```

7-16 aaa server radius dynamic-author

This command is used to configure the Switch as an AAA server to facilitate interaction with an external policy server. Use the no form of this command to disable this function.

aaa server radius dynamic-author

no aaa server radius dynamic-author

Parameters

None

Default

By default, this feature is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Dynamic authorization allows an external policy server to dynamically send updated to a device. Use this command to configure the Switch as an AAA server and enter the Dynamic Authorization Local Server Configuration Mode.

Example

This example shows how to enter the Dynamic Authorization Local Server Configuration Mode.

```
Switch#configure terminal
Switch(config)#aaa server radius dynamic-author
Switch(config-locsvr-da-radius)#
```

7-17 Port

This command is used to configure the port that listens for RADIUS requests from RADIUS clients. Use the no form of this command to revert to the default setting.

port PORT-NUMBER

no port

Parameters

PORT-NUMBER	Specifies the port number

Default

The default port number is 3799.

Command Mode

Dynamic Authorization Local Server Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to configure the port that listens for RADIUS requests from RADIUS clients.

Example

This example shows how to configure the port number as 1650 that listens for RADIUS requests

```
Switch#configure terminal
Switch(config)#aaa server radius dynamic-author
Switch(config-locsvr-da-radius)#port 1650
Switch(config-locsvr-da-radius)#
```

7-18 radius-server attribute 55 include-in-acct-req

This command is used to send the RADIUS attribute 55 (Event-Timestamp) in accounting packets. Use the no form of this command to revert to the default setting.

radius-server attribute 55 include-in-acct-req

no radius-server attribute 55 include-in-acct-req

Parameters

None

Default

By default, the RADIUS attribute 55 is not sent.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to send the RADIUS attribute 55 in accounting packets.

Example

This example shows how to enable the sending of the RADIUS attribute 55.

```
Switch#configure terminal
Switch(config)#radius-server attribute 55 include-in-acct-req
Switch(config)#
```

7-19 radius-server attribute 32 include-in-access-req

This command is used to send the RADIUS attribute 32 (NAS-Identifier) in access-request or accounting-request packets. Use the no form of this command to the system name.

radius-server attribute 32 include-in-access-req STRING

no radius-server attribute 32 include-in-access-req

Parameters

STRING	Specifies the string to be sent in packets.

Default

By default, the system name is used.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to allow a RADIUS server to identify the NAS manufacturer by sending the RADIUS attribute 32 in access-request or accounting-request packets.

Example

This example shows how to configure the RADIUS attribute 32.

```
Switch#configure terminal
Switch(config)#radius-server attribute 32 include-in-access-req 4e90bf25-9b9a-4c5b-be69-4e72fe7ef427
Switch(config)#
```

7-20 radius-server attribute 4

This command is used to specify the IP address for the RADIUS attribute 4 address. Use the no form of this command to delete the IP address.

radius-server attribute 4 IP-ADDRESS

no radius-server attribute 4 IP-ADDRESS

Parameters

IP-ADDRESS	Specifies the IP address for the RADIUS attribute 4 address.

Default

By default, the IP address is the IP address on the interface that connects the NAS to the RADIUS server.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Normally, when the ip radius source-interface command is configured, the specified IP address is used as the IP address in the IP headers of the RADIUS packets, and as the RADIUS attribute 4 address inside the RADIUS packets. However, when the radius-server attribute 4 command is configured, the specified IP address is used as

the RADIUS attribute 4 address inside the RADIUS packets. There is no impact to the IP address in the IP headers of the RADIUS packets.

Example

This example shows how to configure the RADIUS attribute 4 address as 10.0.0.21.

```
Switch#configure terminal
Switch(config)#radius-server attribute 4 10.0.0.21
Switch(config)#
```

7-21 ip radius source-interface

This command is used to specify the interface whose IP address will be used as the source IP address for sending RADIUS packets. Use the no form of this command to revert to the default setting.

ip radius source-interface INTERFACE-ID

no ip radius source-interface

Parameters

INTERFACE-ID	Specifies the interface whose IP address will be used as the source IP address for sending RADIUS packets.

Default

The IP address of the closest interface will be used.

Command Mode

Global Configuration Mode.

Server Group Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command can be used to specify the interface whose IP address will be used as the source IP address for sending RADIUS packets. If the source interface is specified in both the global configuration mode and server group configuration mode, the source interface specified in group server configuration mode take precedence. When the server is located on the Out-Of-Band Management Port, the user should specify the interface ID of Out Of-Band Management Port as the source interface in order to send the request packet to the management port.

Example

This example shows how to set VLAN100, whose IP address will be used as the source IP address, for sending RADIUS packets

```
Switch#configure terminal
Switch(config)# ip radius source-interface vlan100
Switch(config)#
```

7-22 ip tacacs source-interface

This command is used to specify the interface whose IP address will be used as the source IP address for sending TACACS packets. Use the no form of this command to revert to the default setting.

ip tacacs source-interface INTERFACE-ID

no ip tacacs source-interface

Parameters

INTERFACE-ID	Specifies the interface whose IP address will be used as the source IP address for sending TACACS packets.

Default

The IP address of the closest interface will be used.

Command Mode

Global Configuration Mode.

Server Group Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command can be used to specify the interface whose IP address will be used as the source IP address for sending TACACS packets. If the source interface is specified in both the global configuration mode and server group configuration mode, the source interface specified in group server configuration mode take precedence. When the server is located on the Out-Of-Band Management Port, the user should specify the interface ID of Out-Of-Band Management Port as the source interface in order to send the request packet to the management port.

Example

This example shows how to set VLAN100, whose IP address will be used as the source IP address, for sending TACACS packets.

```
Switch#configure terminal
Switch(config)# ip tacacs source-interface vlan100
Switch(config)#
```

7-23 ipv6 radius source-interface

This command is used to specify the interface whose IPv6 address will be used as the source IPv6 address for sending RADIUS packets. Use the no form of this command to revert to the default setting.

ipv6 radius source-interface INTERFACE-ID

no ipv6 radius source-interface

Parameters

INTERFACE-ID	Specifies the interface whose IPv6 address will be used as the source IPv6 address for sending RADIUS packets.

Default

The IPv6 address of the closest interface will be used.

Command Mode

Global Configuration Mode.

Server Group Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command can be used to specify the interface whose IPv6 address will be used as the source IPv6 address for sending RADIUS packets. If the source interface is specified in both the global configuration mode and server group configuration mode, the source interface specified in group server configuration mode take precedence. of Out-Of-Band Management Port as the source interface in order to send the request packet to the management port.

Example

This example shows how to set VLAN100, whose IPv6 address will be used as the source IPv6 address, for sending RADIUS packets.

```
Switch#configure terminal
Switch(config)# ipv6 radius source-interface vlan100
Switch(config)#
```

7-24 ipv6 tacacs source-interface

This command is used to specify the interface whose IPv6 address will be used as the source IPv6 address for sending TACACS packets. Use the no form of this command to revert to the default setting.

ipv6 tacacs source-interface INTERFACE-ID

no ipv6 tacacs source-interface

Parameters

INTERFACE-ID	Specifies the interface whose IPv6 address will be used as the source IPv6 address for sending TACACS packets.

Default

The IPv6 address of the closest interface will be used.

Command Mode

Global Configuration Mode.

Server Group Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command can be used to specify the interface whose IPv6 address will be used as the source IPv6 address for sending TACACS packets. If the source interface is specified in both the global configuration mode and server

group configuration mode, the source interface specified in group server configuration mode take precedence. When the server is located on the Out-Of-Band Management Port, the user should specify the interface ID of Out-Of-Band Management Port as the source interface in order to send the request packet to the management port.

Example

This example shows how to set VLAN100, whose IPv6 address will be used as the source IPv6 address, for sending TACACS packets.

```
Switch#configure terminal
Switch(config)# ipv6 tacacs source-interface vlan100
Switch(config)#
```

7-25 aaa accounting network

This command is used to configure the accounting method list used for all commands at the specified privilege level. Use the no form of this command to remove an accounting method list.

aaa accounting network default {start-stop METHOD1 [METHOD2...] | none}

no aaa accounting network default

Parameters

network	Specifies to perform accounting of network related service requests.
default	Specifies to configure the default method list for network accounting.
start-stop	Specifies to send accounting messages when a process starts and ends. Users are allowed to access the network, whether or not the start accounting message was received by the accounting server.
METHOD1 **[***METHOD2***...]**	Specifies the list of methods that the accounting algorithm tries in the given sequence. Enter at least one method or enter up to four methods. The following are keywords that can be used to specify a method. **group radius** - Specifies to use the servers defined by the RADIUS server host command. **group tacacs+** - Specifies to use the servers defined by the TACACS+ server host command. **group** *GROUP-NAME* - Specifies to use the server groups defined by the AAA group server command.
none	Specifies not to perform accounting.

Default

No AAA accounting method is configured

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to configure the accounting method list for network access fees. For the default method list to take effect, enable AAA first by using the aaa new-model command. The accounting system is disabled if the default method list is not configured.

Example

This example shows how to enable accounting of the network access fees using RADIUS and sends the accounting messages at the start and end time of access.

```
Switch#configure terminal
Switch(config)# aaa accounting network default start-stop group radius
Switch(config)#
```

8. Basic IPv4 Commands

8-1 arp

This command is used to add a static entry in the Address Resolution Protocol (ARP) cache. Use the **no** form of this command to remove a static entry in the ARP cache.

arp *IP-ADDRESS HARDWARE-ADDRESS*

no arp *IP-ADDRESS HARDWARE-ADDRESS*

Parameters

IP-ADDRESS	Specifies the network layer IP address.
HARDWARE-ADDRESS	Specifies the local data-link Media Access (MAC) address (a 48-bit address).

Default

No static entries are installed in the ARP cache.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The ARP table keeps the network layer IP address to local data-link MAC address association. The association is kept so that the addresses will not have to be repeatedly resolved. Use this command to add static ARP entries.

Example

This example shows how to add a static ARP entry for a typical Ethernet host.

```
Switch# configure terminal
Switch(config)# arp 10.31.7.19 0800.0900.1834
Switch(config)#
```

8-2 arp timeout

This command is used to set the ARP aging time for the ARP table. Use the **no** form of this command to revert to the default setting.

arp timeout *MINUTES*

no arp timeout

Parameters

MINUTES	Specifies the dynamic entry that will be aged-out if it has no traffic activity within the timeout period. The valid values are from 0 to 65535.

Default

The default value is 20 minutes.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Used to set the ARP aging time for the ARP table. Use the **no** form of this command to revert to the default setting.

Example

This example shows how to set the ARP timeout to 60 minutes to allow entries to time out more quickly than the default setting.

```
Switch# configure terminal
Switch(config)#interface vlan1
Switch(config-if)# arp timeout 60
Switch(config-if)#
```

8-3 clear arp-cache

This command is used to clear the dynamic ARP entries from the table.

clear arp-cache {all | interface *INTERFACE-ID* **|** *IP-ADDRESS***}**

Parameters

all	Specifies to clear the dynamic ARP cache entries associated with all interfaces.
INTERFACE-ID	Specifies the interface ID.
IP-ADDRESS	Specifies the IP address of the specified dynamic ARP cache entry that will be cleared.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to delete dynamic entries from the ARP table. The user can select to delete all dynamic entries, specific dynamic entries, or all of the dynamic entries that are associated with a specific interface.

Example

This example shows how to remove all dynamic entries from the ARP cache.

```
Switch# clear arp-cache all
Switch#
```

8-4 ip address

This command is used to set a primary or secondary IPv4 address for an interface, or acquire an IP address on an interface from the DHCP. Use the **no** form of this command to remove the configuration of an IP address or disable DHCP on the interface.

ip address {*IP-ADDRESS SUBNET-MASK* **| dhcp}**

no ip address [*IP-ADDRESS SUBNET-MASK* **| dhcp]**

Parameters

IP-ADDRESS	Specifies the IP address.
SUBNET-MASK	Specifies the subnet mask for the associated IP address.
dhcp	Specifies to acquire an IP address configuration on an interface from the DHCP protocol.

Default

The default IP address for VLAN 1 is 10.90.90.90/8. (DGS-1250-28XPL default IP is DHCP mode)

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The IPv4 address of an interface can be either manually assigned by the user or dynamically assigned by the DHCP server. For manual assignment, the user can assign multiple networks to a VLAN, each with an IP address. Among these multiple IP addresses, one of them must be the primary IP address and the rest are secondary IP address. The primary address will be used as the source IP address for SNMP trap messages or SYSLOG messages that are sent out from the interface. Use the **no ip address** command to delete the configured IP address entry.

Example

This example shows how to set 10.108.1.27 is the primary address.

```
Switch# configure terminal
Switch(config)#interface vlan100
Switch(config-if)# ip address 10.108.1.27 255.255.255.0
Switch(config-if)# ip address 192.31.7.17 255.255.255.0
Switch(config-if)# ip address 192.31.8.17 255.255.255.0
Switch(config-if)#
```

NOTE: When user disable Switch VLAN1 DHCP mode from DHCP mode enable, the Switch VLAN 1 IP interface address will be invalid (0.0.0.0) which user cannot log-in via Telnet, Web UI and SNMP Switch control interface.

8-5 show arp

This command is used to display the Address Resolution Protocol (ARP) cache.

show arp [*ARP-TYPE***] [***IP-ADDRESS* **[***MASK***]] [***INTERFACE-ID***] [***HARDWARE-ADDRESS***]**

Parameters

ARP-TYPE	(Optional) Specifies the ARP type. **dynamic** – Specifies to display only dynamic ARP entries. **static** –Specifies to display only static ARP entries.
IP-ADDRESS **[***MASK***]**	(Optional) Specifies to display a specific entry or entries that belong to a specific network.
INTERFACE-ID	(Optional) Specifies to display ARP entries that are associated with a specific network.
HARDWARE-ADDRESS	(Optional) Specifies to display ARP entries whose hardware address equal to this address.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Used to display a specific ARP entry, all ARP entries, dynamic entries, or static entries, or entries associated with an IP interface.

Example

This example shows how to display the ARP cache.

```
Switch#show arp

S - Static Entry

IP Address         Hardware Addr      IP Interface   Age (min)
-----------------  -----------------  -------------  ---------------
S 10.31.7.19       08-00-09-00-18-34  vlan1          forever
  10.90.90.90      00-01-02-03-04-00  vlan1          forever

Total Entries: 2

Switch#
```

8-6 show arp timeout

This command is used to display the aging time of Address Resolution Protocol (ARP) cache.

show arp timeout [interface *INTERFACE-ID***]**

Parameters

INTERFACE-ID	Specifies the interface ID.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the configured ARP aging time.

Example

This example shows how to display the ARP aging time.

```
Switch#show arp timeout

Interface    Timeout (minutes)
------------ -----------------
vlan1        60
------------ -----------------
Total Entries:1

Switch#
```

8-7 show ip interface

This command is used to display the IP interface information.

show ip interface [*INTERFACE-ID***] [brief]**

Parameters

INTERFACE-ID	(Optional) Specifies to display information for the specified IP interface.
brief	(Optional) Specifies to display a summary of the IP interface information.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If no parameter is specified, information for all the interfaces will be displayed.

Example

This example shows how to display the brief information of the IP interface.

```
Switch#show ip interface brief

Interface    IP Address      Link Status
----------  ---------------  -----------
vlan1       10.90.90.90      up

Total Entries: 1

Switch#
```

This example shows how to display the IP interface information for VLAN 1.

```
Switch#show ip interface

Interface vlan1 is enabled, Link status is up
  IP Address is 10.90.90.90/8 (Manual)
  ARP timeout is 20 minutes.

Total Entries: 1

Switch#
```

8-8 shutdown

This command is used to disable IPv4 address for an VLAN interface, or acquire an IP address on an interface from the DHCP. Use the no form of this command to enable VLAN IP interafce or DHCP on the interface.

shutdown

no shutdown

Parameters

None

Default

Enable.

Command Mode

VLAN Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the shutdown command on unused VLAN interfaces. An active but unused SVI can be a security risk as it provides a potential entry point for unauthorized routing or management access. Even if you use no shutdown, the VLAN interface will stay in a "down/down" state if there are no active physical cables plugged into ports belonging to that VLAN.

Example

This example shows how to enable disable ip interface.

```
Switch# configure terminal
Switch(config)# interface vlan 1
Switch(config-if)# no shutdown
Switch(config-if)#
```

NOTE: When user shutdown all Switch VLAN IP interface which user cannot log-in via Telnet, Web UI and SNMP Switch control interface.

9. Basic IPv6 Commands

9-1 clear ipv6 neighbors

This command is used to clear IPv6 neighbor cache dynamic entries.

clear ipv6 neighbors {all | *INTERFACE-ID***}**

Parameters

all	Specifies to clear the dynamic neighbor cache entries associated with all interfaces.
INTERFACE-ID	Specifies to clear dynamic neighbor cache entries associated with the specified interface will be cleared.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command will only clear dynamic neighbor cache entries.

Example

This example shows how to clear IPv6 neighbor cache entries associated with interface VLAN 1:

```
Switch# enable
Switch# clear ipv6 neighbors vlan1
Switch#
```

9-2 ipv6 address

This command is used to manually configure an IPv6 addresses on the interface. Use the **no** form of this command to delete a manually configured IPv6 address.

ipv6 address {*IPV6-ADDRESSIPREFIX-LENGTH* **|** *IPV6-ADDRESS* **link-local}**

no ipv6 address {*IPV6-ADDRESSIPREFIX-LENGTH* **|** *IPV6-ADDRESS* **link-local}**

Parameters

IPV6-ADDRESS	Specifies the IPv6 address and the length of prefix for the subnet.
PREFIX-LENGTH	Specifies the length of the prefix. The prefix of the IPv6 address is also a local subnet on the interface.
link-local	Specifies a link-local address to be configured.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The IPv6 address can directly be specified by the user or configured based on a general prefix. The general prefix can be acquired by the DHCPv6 client. The general prefix does not need to exist before it can be used in the **ipv6 address** command. The IPv6 address will not be configured until the general prefix is acquired. The configured IPv6 address will be removed when the general prefix is timeout or removed. The general prefix IPv6 address is formed by the general prefix in the leading part of bits and the sub-bits excluding the general prefix part in the remaining part of bits.

An interface can have multiple IPv6 addresses assigned using a variety of mechanisms, including manual configuration, stateless address configuration, and stateful address configuration. However, within the same prefix, only one IPv6 address can be configured.

When the IPv6 address is configured on an interface, IPv6 processing is enabled for the interface. The prefix of the configured IPv6 address will automatically be advertised as prefix in the RA messages transmitted on the interface.

Example

This example shows how to configure an IPv6 address.

```
Switch# configure terminal
Switch(config)#interface vlan 2
Switch(config-if)# ipv6 address 3ffe:22:33:44::55/64
```

This example shows how to remove an IPv6 address.

```
Switch# configure terminal
Switch(config)# interface vlan 2
Switch(config-if)# no ipv6 address 3ffe:22:3:44::55/64
```

9-3 ipv6 address dhcp

This command is used to configure an interface using DHCPv6 to get an IPv6 address. Use the **no** form of this command to disable the using of DHCPv6 to get an IPv6 address.

ipv6 address dhcp [rapid-commit]

no ipv6 address dhcp

Parameters

rapid-commit	Specifies to proceed with two-message exchange for address delegation. The rapid-commit option will be filled in the Solicit message to request two messages handshake.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the interface to use DHCPv6 to get an IPv6 address. When the **no ipv6 address dhcp** command is used, the previous DHCPv6 obtained IP address will be removed. If the **rapid commit** keyword is specified for the command, the rapid commit option will be included in the solicit message to request for the two-message exchange for address delegation.

Example

This example shows how to configure VLAN 1 to use DHCPv6 to get an IPv6 address.

```
Switch# configure terminal
Switch(config)#interface vlan 1
Switch(config-if)# ipv6 address dhcp
Switch(config-if)#
```

9-4 ipv6 enable

This command is used to enable IPv6 processing on interfaces that have no IPv6 address explicitly configured. Use the **no** form of this command to disable IPv6 processing on interfaces that have no IPv6 address explicitly configured.

ipv6 enable

no ipv6 enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the IPv6 address is explicitly configured on the interface, the IPv6 link-local address is automatically generated and the IPv6 processing is started. When the interface has no IPv6 address explicitly configured, the IPv6 link-local address is not generated and the IPv6 processing is not started. Use the **ipv6 enable** command to auto-generate the IPv6 link-local address and start the IPv6 processing on the interface.

Example

This example shows how to enable IPv6 on interface VLAN 1, which has no IPv6 address explicitly configured.

```
Switch# configure terminal
Switch(config)#interface vlan 1
Switch(config-if)# ipv6 enable
Switch(config-if)#
```

9-5 ipv6 neighbor

This command is used to create a static ipv6 neighbor entry. Use the **no** form of this command to delete a static IPv6 neighbor entry.

ipv6 neighbor *IPV6-ADDRESS INTERFACE-ID MAC-ADDRESS*

no ipv6 neighbor *IPV6-ADDRESS INTERFACE-ID*

Parameters

IPV6-ADDRESS	Specifies the IPv6 address of the IPv6 neighbor cache entry.
INTERFACE-ID	Specifies the interface for creating the static IPv6 neighbor cache entry.
MAC-ADDRESS	Specifies the MAC address of the IPv6 neighbor cache entry.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to create a static IPv6 neighbor cache entry on an interface. The static entry will be either in the REACHABLE state, if the interface is UP, or in the INCOMPLETE state if the interface is down. The reachable detection process will not be applied to the static entries.

The **clear ipv6 neighbors** command will clear the dynamic neighbor cache entries. Use the **no ipv6 neighbor** command to delete a static neighbor entry.

Example

This example shows how to create a static ipv6 neighbor cache entry.

```
Switch# configure terminal
Switch(config)#ipv6 neighbor fe80::1 vlan1 00-01-80-11-22-99
Switch(config)#
```

9-6 show ipv6 interface

This command is used to display IPv6 interface information.

show ipv6 interface [*INTERFACE-ID***] [brief]**

Parameters

INTERFACE-ID	(Optional) Specifies the interface for display.
brief	(Optional) Specifies to display brief information.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display IPv6 interface related configurations.

Example

This example shows how to display IPv6 interface information.

```
Switch# show ipv6 interface vlan 2

vlan2 is up, Link status is down
  IPv6 is enabled,
  link-local address:
      FE80::201:1FF:FE02:305
  Global unicast address:
      200::2/64 (DHCPv6 PD)
  RA advertised retransmit interval is 0 milliseconds

Switch#
```

This example shows how to display brief IPv6 interface information.

```
Switch# show ipv6 interface brief

vlan1 is up, Link status is up
    FE80::201:1FF:FE02:304

vlan2 is up, Link status is down
    FE80::201:1FF:FE02:305
    200::2

vlan3 is up, Link status is down
    FE80::201:1FF:FE02:306

Total Entries: 3

Switch#
```

9-7 show ipv6 neighbors

This command is used to display IPv6 neighbor information.

show ipv6 neighbors [*INTERFACE-ID***] [***IPV6-ADDRESS***]**

Parameters

IPV6-ADDRESS	Specifies the IPv6 address to display its IPv6 neighbor cache entry.
INTERFACE-ID	Specifies the interface to display IPv6 neighbor cache entry.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the IPv6 neighbor cache entry.

Example

This example shows how to display the IPv6 neighbor cache entry.

```
Switch# show ipv6 neighbors

IPv6 Address                            Link-Layer Addr   Interface Type State
--------------------------------------- ----------------- --------- ---- -----
FE80::200:11FF:FE22:3344                00-00-11-22-33-44 vlan1     D   REACH

Total Entries: 1

Switch#
```

Display Parameters

Type	D – Dynamic learning entry. S – Static neighbor entry.
State	**INCMP:** (Incomplete) Address resolution is being performed on the entry, but the corresponding neighbor advertisement message has not yet been received. **REACH:** (Reachable) Corresponding neighbor advertisement message was received and the reachable time (in milliseconds) has not elapsed yet. It indicates that the neighbor was functioning properly. **STALE:** More than the reachable time (in milliseconds) have elapsed since the last confirmation was received. **PROBE** - Sending the neighbor solicitation message to confirm the reachability.

9-8 ipv6 nd ns-interval

This command is used to set advertised NS retransmission interval.

ipv6 nd ns-interval *INTERVAL*

no ipv6 nd ns-interval

Parameters

INTERVAL	Retransmission interval in milliseconds.

Default

None.

Command Mode

VLAN Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to set advertised NS retransmission interval.

Example

This example shows how to set advertised NS retransmission interval.

```
Switch# configure terminal
Switch(config)# interface vlan 1
Switch(config-if)# ipv6 nd ns-interval 1200
Switch(config-if)#
```

10. Cable Diagnostics Commands

10-1 test cable-diagnostics

This command is used to start the cable diagnostics to test the status and length of copper cables.

test cable-diagnostics interface *INTERFACE-ID* **[,|-]**

Parameters

interface *INTERFACE-ID*	Specifies the interface ID.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space before and after the comma.
-	(Optional) Specifies a range of interfaces. No space before and after the hyphen.

Default

None.

Command Mode

EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

The command is available for physical port configuration. Cable Diagnostics can help users to detect whether the copper Ethernet port has connectivity problems. Use the **test cable-diagnostics** command to start the test. The copper port can be in one of the following status:

- **Open:** The cable in the error pair does not have a connection at the specified position.
- **Short:** The cable in the error pair has a short problem at the specified position.
- **Open or Short:** The cable has an open or short problem, but the PHY has no capability to distinguish between them.
- **Crosstalk:** The cable in the error pair has a crosstalk problem at the specified position.
- **Shutdown:** The remote partner is powered off.
- **Unknown:** The test got an unknown status.
- **OK:** The pair or cable has no error.
- **No cable:** The port does not have any cable connection to the remote partner.

Example

This example shows how to start the cable diagnostics to test the status and length of copper cables.

```
Switch# test cable-diagnostics interface ethernet 1/0/1
Switch#
```

10-2 show cable-diagnostics

This command is used to display the test results for the cable diagnostics.

show cable-diagnostics [interface *INTERFACE-ID* **[,|-]]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies the interface's ID. The acceptable interface will be a physical port.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space before and after the comma.
-	(Optional) Specifies a range of interfaces. No space before and after the hyphen.

Default

None.

Command Mode

EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the test results for the cable diagnostics.

Example

This example shows how to display the test results for the cable diagnostics.

```
Switch# show cable-diagnostics

Port      Type       Link Status    Test Result                    Cable Length (M)
------  ----------  -------------  -------------------------------  -----------------
ethernet1/0/1     1000BASE-T  Link Up        OK                              65
ethernet1/0/2     1000BASE-T  Link Up        OK                               -
ethernet1/0/3     1000BASE-T  Link Down      Shutdown                        25
ethernet1/0/4     1000BASE-T  Link Down      Shutdown                         -
ethernet1/0/5     1000BASE-T  Link Down      Unknown                          -
ethernet1/0/6     1000BASE-T  Link Down      Pair 1 Crosstalk at  30M         -
                                        Pair 2 Crosstalk at  30M
                                        Pair 3 OK         at 110M
                                        Pair 4 OK         at 110M
ethernet1/0/7     1000BASE-T  Link Down      NO Cable                         -
ethernet1/0/8     1000BASE-T  Link Down      Pair 1 Open       at  16M        -
                                        Pair 2 Open       at  16M
                                        Pair 3 OK         at  50M
                                        Pair 4 OK         at  50M

Switch#
```

10-3 clear cable-diagnostics

This command is used to clear the test results for the cable diagnostics.

clear cable-diagnostics {all | interface *INTERFACE-ID* **[,|-]}**

Parameters

all	Specifies to clear cable diagnostics results for all interfaces.
interface *INTERFACE-ID*	Specifies the interface's ID. The acceptable interface will be a physical port.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space before and after the comma.
-	(Optional) Specifies a range of interfaces. No space before and after the hyphen.

Default

None.

Command Mode

EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to clear the test results for the cable diagnostics. If the test is running on the interface, an error message will be displayed.

Example

This example shows how to clear the test results for the cable diagnostics.

```
Switch# clear cable-diagnostics interface ethernet 1/0/1
Switch#
```

11. Dynamic ARP Inspection Commands

11-1 arp access-list

This command is used to create or modify an ARP access list. This command will enter into the ARP access-list configuration mode. Use the no form of this command to remove an ARP access-list.

arp access-list *NAME*

no **arp access-list** *NAME*

Parameters

NAME	Specifies the name of the ARP access-list to be configured. The maximum length is 32 characters..

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The name must be unique among all access-lists. The characters used in the name are case sensitive. There is an implicit deny statement at the end of an access list.

Example

This example shows how to configure an ARP access list with permit entries.

```
Switch# configure terminal
Switch(config)# arp access-list test
Switch(config-arp-nacl)# permit ip 192.168.0.113 255.255.255.0 mac any
```

11-2 clear arp inspection log

This command is used to clear the ARP inspection log buffer.

clear ip arp inspection log

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear the ARP inspection log buffer.

Example

This example shows how to clear the inspection log.

```
Switch# clear ip arp inspection log
Switch#
```

11-3 clear arp inspection statistics

This command is used to clear the dynamic ARP inspection statistics.

clear ip arp inspection statistics {all | vlan VLAN-ID [, | -]}

Parameters

all	Specifies to clear dynamic ARP inspection statistics from all VLANs.
vlan *VLAN-ID*	Specifies the VLAN or range of VLANs.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to clear the Dynamic ARP Inspection (DAI) statistics.

Example

This example shows how to clear the DAI statistics from VLAN 1..

```
Switch# clear ip arp inspection statistics vlan 1
Switch#
```

11-4 ip arp inspection filter vlan

This command is used to specify an ARP access list to be used for ARP inspection checks for the VLAN. Use the no command to remove the specification.

ip arp inspection filter *ARP-ACL-NAME* **vlan** *VLAN-ID* **[, | -] [static]**

no ip arp inspection filter *ARP-ACL-NAME* **vlan** *VLAN-ID* **[, | -] [static]**

Parameters

ARP-ACL-NAME	Specifies the access control list name with a maximum of 32 characters..
vlan *VLAN-ID*	Specifies the VLAN or range of VLANs.

,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.
static	(Optional) Specifies to drop the packet if the IP-to-Ethernet MAC binding pair is not permitted by the ARP ACL

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify an ARP access list to be used for ARP inspection checks for the VLAN. Up to one access list can be specified for a VLAN.

The dynamic ARP inspection checks the ARP packets received on the VLAN to verify that the binding pair of the source IP and source MAC address of the packet is valid. The validation process will match the address binging against the entries of the DHCP snooping database. If the command is configured, the validation process will match the address binging against the access list entries and the DHCP snooping database.

ARP ACLs take precedence over entries in the DHCP snooping binding database. If the packet is explicitly denied by the access control list, the packet is dropped. If the packet is denied due to the implicit deny, the packet will be further matched against the DHCP snooping binding entries if the keyword “static” is not specified. The implicit denied packet is dropped if the keyword “static” is specified.

Example

This example shows how to apply the ARP ACL static ARP list to VLAN 10 for DAI.

```
Switch# configure terminal
Switch(config)# ip arp inspection filter static-arp-list vlan 10
Switch(config)#
```

11-5 ip arp inspection limit

This command is used to limit the rate of incoming ARP requests and responses on an interface. Use the no form of this command to revert to the default settings.

ip arp inspection limit {rate *VALUE* **[burst interval** *SECONDS***] |** *none***}**

no ip arp inspection limit

Parameters

rate *VALUE*	Specifies the maximum number per second of the ARP packets that can be processed. The valid range is from 1 to 150 seconds
burst interval *SECONDS*	(Optional) Specifies the length of the burst duration of the ARP packets that is allowed. The valid range is from 1 to 15. If not specified, the default setting is one second.
none	Specifies that there is no limit on the ARP packet rate

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command takes effect for both trusted and un-trusted interfaces. When the rate of the ARP packet per second exceeds the limitation and the condition sustained for the configured burst duration, the port will be put in the error disable state.

Example

This example shows how to limit the rate of the incoming ARP requests to 30 packets per second and to set the interface monitoring interval to 5 consecutive seconds.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/10
Switch(config-if)# ip arp inspection limit rate 30 burst interval 5
Switch(config-if)#
```

11-6 ip arp inspection trust

This command is used to trust an interface for dynamic ARP inspection. Use the no form of this command to disable the trust state.

ip arp inspection trust

no ip arp inspection trust

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When an interface is in the trust state, the ARP packets arriving at the interface will not be inspected. When an interface is in the untrusted state, ARP packets arriving at the port and belongs to the VLAN that is enabled for inspection will be inspected.

Example

This example shows how to configure port 1/0/10 to be trusted for DAI..

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/10
Switch(config-if)# ip arp inspection trust
Switch(config-if)#
```

11-7 ip arp inspection validate

This command is used to specify the additional checks to be performed during an ARP inspection check. Use the no form of this command to remove specific additional check.

ip arp inspection validate [src-mac] [dst-mac] [ip]

no ip arp inspection validate [src-mac] [dst-mac] [ip]

Parameters

src-mac	(Optional) Specifies to check for ARP requests and response packets and the consistency of the source MAC address in the Ethernet header against the sender MAC address in the ARP payload.
dst-mac	(Optional) Specifies to check for ARP response packets and the consistency of the destination MAC address in the Ethernet header against the target MAC address in the ARP payload.
ip	(Optional) Specifies to check the ARP body for invalid and unexpected IP addresses. Specifies to check the validity of IP address in the ARP payload. The sender IP in both the ARP request and response and target IP in the ARP response are validated. Packets destined for the IP addresses 0.0.0.0, 255.255.255.255, and all IP multicast addresses are dropped. Sender IP addresses are checked in all ARP requests and responses, and target IP addresses are checked only in ARP responses.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the additional checks to be performed during the dynamic ARP inspection check. The specified check will be performed on packets arriving at the untrusted interface and belong to the VLANs that are enabled for IP ARP inspection. If no parameters are specified, all options are enabled or disabled. Use the no form of the command with the specific option to disable the specific type of check.

Example

This example shows how to configure port 1/0/10 to be trusted for DAI.

```
Switch# configure terminal
Switch(config)# ip arp inspection validate src-mac
Switch(config)#
```

11-8 ip arp inspection vlan

This command is used to enable specific VLANs for dynamic ARP inspection. Use the no form of this command to disable dynamic ARP inspection for VLAN.

ip arp inspection vlan vlan *VLAN-ID* **[, | -]**

no ip arp inspection vlan vlan *VLAN-ID* **[, | -]**

Parameters

vlan *VLAN-ID*	Specifies the VLAN or range of VLANs.
,	(Optional) Specifies a series of VLANs, or separate a range of

	VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

By default, ARP inspection is disabled on all VLANs.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a VLAN is enabled for ARP inspection, the ARP packets, including both the ARP request and response packet belonging to the VLAN arriving at the untrusted interface will be validated. If the IP-to-MAC address binding pair of the source MAC address and the source IP address is not permitted by the ARP ACL or the DHCP snooping binding database, the ARP packet will be dropped. In addition to the address binding check, the additional check defined by the IP ARP inspection validate command will also be checke.

Example

This example shows how to enable ARP inspection on VLAN 2.

```
Switch# configure terminal
Switch(config)# ip arp inspection vlan 2
Switch(config)#
```

11-9 ip arp inspection vlan logging

This command is used to control the type of packets that are logged. Use the no form of this command to revert to the default settings.

ip arp inspection vlan *VLAN-ID* **[, | -] logging {acl-match {deny | permit | all | none} | dhcp-bindings {deny | permit | all | none}}**

no ip arp inspection vlan *VLAN-ID* **[, | -] logging {acl-match | dhcp-bindings}**

Parameters

vlan *VLAN-ID*	Specifies the VLAN or range of VLANs.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.
acl-match	Specifies the logging criteria for packets that are dropped or permitted based on ACL matches.
permit	Specifies logging when permitted by the configured ACL
all	Specifies logging when permitted or denied by the configured ACL.
none	Specifies that ACL-matched packets are not logged.
dhcp-bindings	Specifies the logging criteria for packets dropped or permitted based on matches against the DHCP bindings.

permit	Specifies logging when permitted by DHCP bindings
all	Specifies logging when permitted or denied by DHCP bindings.
none	Specifies to prevent the logging of all packets permitted or denied by DHCP bindings

Default

All denied or dropped packets are logged.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the no form of this command to reset some of the logging criteria to their defaults.

Example

This example shows how to configure an ARP inspection on VLAN 1 to add packets to a log that matches the ACLs..

```
Switch# configure terminal
Switch(config)# ip arp inspection vlan 1 logging acl-match all
Switch(config)#
```

11-10 permit | deny (arp access-list)

This command is used to define the ARP permit entry. Use the deny command to define the ARP deny entry. Use the no form of this command to remove an entry.

{permit | deny} ip {any | host SENDER-IP | SENDER-IP SENDER-IP-MASK} mac {any | host SENDER-MAC | SENDER-MAC SENDER-MAC-MASK}

no {permit | deny} ip {any | host SENDER-IP | SENDER-IP SENDER-IP-MASK} mac {any | host SENDER-MAC | SENDER-MAC SENDER-MAC-MASK}

Parameters

ip	Specifies the source IP address.
any	Specifies to match any source IP address.
host SENDER-IP	Specifies to match a single source IP address.
SENDER-IP SENDER-IP-MASK	Specifies to match a group of source IP addresses by using a bitmap mask. The bit corresponding to bit value 1 will be checked. The input format is the same as IP address
mac	Specifies the MAC address.
any	Specifies to match any source MAC address
host SENDER-MAC	Specifies to match a single source MAC address
SENDER-MAC SENDERMAC-MASK	Specifies to match a group of source MAC addresses by using a bitmap mask. The bit corresponding to bit value 1 will be checked. The input format is the same as MAC address.

Default

None.

Command Mode

ARP Access-list Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Using the permit any option will permit the rest of the packets that do not match any previous rule.

Example

This example shows how to configure an ARP access list with permit entries.

```
Switch# configure terminal
Switch(config)# arp access-list test
Switch(config-arp-nacl)# permit ip 192.168.0.113 255.255.255.0 mac any
```

11-11 show ip arp inspection

This command is used to display the status of DAI for a specific range of VLANs.

show ip arp inspection [interfaces [*INTERFACE-ID* **[, | -]] | statistics [vlan** *VLAN-ID* **[, | -]]]}**

Parameters

interface *interface-ID*	Specifies the interface or range of interfaces.
,	(Optional) Specifies a series of interface, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before and after the hyphen.
vlan *VLAN-ID*	Specifies the VLAN or range of VLANs.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

None.

Command Mode

User EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the status of DAI for a specific range of VLANs.

Example

This example shows how to display the configuration and operating state of DAI..

```
Switch# show ip arp inspection

Source MAC Validation     :Enabled
Destination MAC Validation:Disabled
IP Address Validation     :Disabled
VLAN State    ACL Match                        Static ACL
---- -------- -------------------------------- ----------
10   Disabled  static-arp-list                  No
VLAN ACL Logging DHCP Logging
---- ----------- ------------
10   Deny        Deny

Switch#
```

11-12 show arp access-list

This command is used to display the arp access list configured.

show arp access-list

Parameters

None.

Default

None.

Command Mode

User EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the arp acces-list.

Example

This example shows how to display the configuration for arp access-list..

```
Switch(config)# show arp access-list
 ARP Access List Name
 --------------------------------
 test
Total Entries: 1

Switch(config)#
```

11-13 show arp access-list rule

This command is used to display the arp access list rule configured.

show arp access-list rule *NAME*

Parameters

NAME	Specifies arp access list name.

Default

None.

Command Mode

User EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the arp acces-list rules.

Example

This example shows how to display the configuration for arp access-list rules..

```
Switch(config)# show arp access-list rule test
Action IP Type      Sender IP       Sender IP Mask
------ ------------ --------------- ---------------
Permit Any          0.0.0.0         0.0.0.0
Action MAC Type      Sender MAC        Sender MAC Mask
------ ------------- ----------------- -----------------
Permit Any           00-00-00-00-00-00 00-00-00-00-00-00
Total Entries: 1

Switch(config)#
```

12. Debug Commands

12-1 debug show tech-support

This command is used to display the information required by technical support personnel.

debug show tech-support

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display technical support information. The technical support information is used to collect the Switch's information needed by the engineers to troubleshoot or analyze a problem.

Example

This example shows how to display technical support information of all the modules.

```
Switch# debug show tech-support
#------------------------------------------------------------------
# DGS-1250-28XP Gigabit Ethernet PoE Smart Managed Switch
# Technical Support Information
#
# Firmware:  V1.00.006
# Copyright(C) 2025 D-Link Corporation. All rights reserved.
#------------------------------------------------------------------
******************** Basic System Information ********************
Boot Time                           :0 days, 0 hrs, 10 min, 30 secs
RTC Time                            :01/01/2025 00:08:57
Boot PROM Version                   :V1.00.003
Firmware Version                    :V1.00.006
Hardware Version                    :B1
MAC Address                         :88-76-B9-AA-49-30
Serial Number                       :QQABC12345600
SNMP Status                         :Disabled
Safeguard Engine                    :Enabled
IGMP Snooping                       :Disabled
Scheduled Port-shutdown Power Saving :Disabled
Scheduled Hibernation Power Saving   :Disabled
Scheduled Dim-LED Power Saving       :Disabled
Administrative Dim-LED               :Disabled

#------------------------------------------------------------------
# System crash information
#------------------------------------------------------------------
System is stable and robust, don't occur crash until now!

!------------------------------------------------------------------------
! DGS-1250-28XP Gigabit Ethernet PoE Smart Managed Switch Configuration
!
!                       Firmware: Build V1.00.006
!         Copyright(C) 2025 D-Link Corporation. All rights reserved.
!------------------------------------------------------------------------
command-start



!
end
Switch#
```

12-2 debug info

This command is used to display debug information.

debug info

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display debug information.

Example

This example shows debug information.

```
Switch# debug info
ARP table :
    Address     Hardware Address   Type Interface Mapping
--------------- -----------------  ---- --------- -------
10.90.90.12     00-48-54-30-F7-05  ARPA vlan1     Dynamic

MAC table :
 Index VLAN   MAC Address         Type   Ports
 ----  ---- ----------------    -------  -----
   1     1  00-48-54-30-F7-05   Dynamic    23

Total MAC Addresses displayed: 1

Switch#
```

13. DHCP Auto-Configuration Commands

13-1 autoconfig enable

This command is used to enable the auto-configuration function. Use the **no** form of this command to disable the auto-configuration function.

autoconfig enable

no autoconfig enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15

Usage Guideline

When auto-configuration is enabled and the Switch is rebooted, the Switch becomes a DHCP client automatically. The auto-configuration process is as following:

- The Switch will get “configure file path” name and the TFTP server IP address from the DHCP server if the DHCP server has the TFTP server IP address and configuration file name and be configured to deliver this information in the data field of the DHCP reply packet.
- The Switch will then download the configuration file from the TFTP server to configure the system, if the TFTP server is running and have the requested configuration file in its base directory when the request is received from the Switch.

If the Switch is unable to complete the auto-configuration process, the previously saved local configuration file present in

switch memory will be loaded.

Example

This example shows how to enable auto-configuration.

```
Switch#configure terminal
Switch(config)#autoconfig enable


 WARNING:Autoconfig enabled now, but won't take effect until reboot.
```

13-2 show autoconfig

This command is used to display the status of auto-configuration.

show autoconfig

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

This command is used to display the status of the auto-configuration.

Example

This example shows how to display the status of the auto-configuration.

```
Switch# show autoconfig

Autoconfig State: Enabled


Switch#
```

14. DHCP Auto-Image Commands

14-1 autoimage enable

This command is used to enable the auto-image function. Use the **no** form of this command to disable the auto-image function.

autoimage enable

no autoimage enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15

Usage Guideline

During the start-up time of a switch, this function provides the capability of obtaining the image file form an external TFTP server whose IP address and file name is carried in the DHCP OFFER message received from the DHCP server. The system then uses this image file as the boot-up image file. When the system boots up and the auto-image function is enabled, the Switch becomes a DHCP client automatically.

The DHCP client will be activated to get the network setting from the DHCP server and the DHCP server attaches the TFTP server IP address and image filename to the message. The Switch then catches this information and triggers the TFTP downloading function from this specified TFTP server. At this stage, system will display the download configuration parameters on the console and the layout is the same as using the **download firmware** command.

After the firmware download was completed, the Switch will then reboot immediately.

If both the auto-configuration and auto-image features are enabled at the same time, system will download the image file first and then download the configuration. After this, the Switch will then initiate a save configuration and reboot.

The Switch will always check the acquired firmware. If the version is the same as the current running firmware, the Switch will terminate the auto-image process. The download configuration, however, will still be executed if the auto-configuration feature is also enabled.

This function is similar to the auto-configuration function. The TFTP server IP address is still placed in the DHCP siaddr fields Option 66 or Option 150. If Option 66, Option 150 and the siaddr fields exist in the DHCP response message at the same time, the Option 150 will be resolved first. If the system fails to connect to the TFTP server, the system will resolve the Option 66, and if the system still fails to connect the TFTP server, the siaddr field is the last choice.

When Switch uses Option 66 to get the TFTP server name, it will resolve Option 6 first to get the DNS server IP address. If the Switch fails to connect to the DNS server or Option 6 does not exist in the response message, the Switch will try to connect the DNS server already configured in the system manually.

Because the DHCP option fields are not only used in the auto-image feature but also in the auto-configuration feature, both the image file and the configuration file must be placed on the same TFTP server.

When specifying the image file name, the DHCP Option 125 (RFC 3925) must be used. The Switch needs to check the enterprise-number1 field. If the value is not the D-Link vendor ID (171), the Switch will stop the process. If the Option contains more than one data, only the first data *enterprise-number1* will be used.

Example

This example shows how to how to enable auto-image.

```
Switch#configure terminal
Switch(config)#autoimage enable

Switch(config)#
```

14-2 autoimage timeout

This command is used to specify the length of timeout in second for getting the image file through the network.

autoimage timeout *SECONDS*

Parameters

SECONDS	Specifies the length of timeout in second. The value is form 1 to 65535.

Default

By default, the value is 50 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15

Usage Guideline

Use this command to specify the length of timeout in second for getting the image file through the network.

Example

This example shows how to configure the timeout value to 60.

```
Switch#configure terminal
Switch(config)#autoimage timeout 60

Switch(config)#
```

14-3 show autoimage

This command is used to display the status of auto-image.

show autoimage

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

This command is used to display the status of the auto- image.

Example

This example shows how to display the status of the auto- image.

```
Switch#show autoimage


Autoimage State: Disabled
Timeout        : 60
```

15. DHCP Client Commands

15-1 ip dhcp client class-id

This command is used to specify the vendor class identifier used as the value of Option 60 for the DHCP discover message. Use the **no** form of this command to revert the setting to the default.

ip dhcp client class-id {*STRING* **| hex** *HEX-STRING***}**

no ip dhcp client class-id

Parameters

STRING	Specifiesthe vendor class identifier in the string form. The maximum length of the string is 32.
HEX-STRING	Specifies a vendor class identifier in the hexadecimal form. The maximum length of the string is 64.

Default

The device type will be used as the class ID.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify a vendor class identifier (Option 60) to be sent with the DHCP discover message. This specification only applies to the subsequent sending of the DHCP discover messages. The setting only takes effect when the DHCP client is enabled on the interface to acquire the IP address from the DHCP server. The vendor class identifier specifies the type of device that is requesting an IP address.

Example

This example shows how to enable the DHCP client, enable the sending of the Vendor Class Identifier, and specifies its value as VOIP-Device for VLAN 100.

```
Switch# configure terminal
Switch(config)#interface vlan 100
Switch(config-if)# ip address dhcp
Switch(config-if)# ip dhcp client class-id VOIP-Device
Switch(config-if)#
```

15-2 ip dhcp client client-id

This command is used to specify the VLAN interface whose hexadecimal MAC address will be used as the client ID sent with the discover message. Use the **no** form of this command to revert to the default setting

ip dhcp client client-id *INTERFACE-ID*

no ip dhcp client client-id

Parameters

INTERFACE-ID	Specifies the VLAN interface, whose hexadecimal MAC address

	will be used as the client ID to be sent with the discover message.

Default

The MAC address of the VLANwill be used as the client ID.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the hexadecimal MAC address of the specified interface as the client ID sent with the discover message. The specification only applies to the subsequent sending of the DHCP discover messages. The setting only takes effect when the DHCP client is enabled on the interface to acquire the IP address from the DHCP server. One interface can be specified as the client identifier.

Example

This example shows how to configure the MAC address of VLAN 100 as the client ID, sent in the discover message for VLAN 100.

```
Switch# configure terminal
Switch(config)#interface vlan 100
Switch(config-if)# ip dhcp client client-id vlan 100
Switch(config-if)#
```

15-3 ip dhcp client hostname

This command is used to specify the value of the host name option to be sent with the DHCP discover message. Use the **no** form of this command to revert the setting to the default

ip dhcp client hostname *HOST-NAME*

no ip dhcp client hostname

Parameters

HOST-NAME	Specifies the host name. The maximum length is 64 characters. The host name must start with a letter, end with a letter or digit, and only with interior characters letters, digits, and hyphens.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the host name string (Option 12) to be sent with the DHCP discover message. The specification only applies to the subsequent sending of the DHCP discover messages. The setting only takes effect when the DHCP client is enabled on the interface to acquire the IP address from the DHCP server. If this option is not configured, the Switch will be sent messages with no Option 12 configured.

Example

This example shows how to set the host name option value to Site-A-Switch.

```
Switch# configure terminal
Switch(config)#interface vlan 100
Switch(config-if)# ip dhcp client hostname Site-A-Switch
Switch(config-if)#
```

15-4 ip dhcp client lease

This command is used to specify the preferred lease time for the IP address to request from the DHCP server. Use the **no** form of this command to disable sending of the lease option.

ip dhcp client lease *DAYS* **[***HOURS* **[***MINUTES***]]**

no ip dhcp client lease

Parameters

DAYS	Specifies the day duration of the lease. The range is from 0 to 10000 days.
HOURS	(Optional) Specifies the hour duration of the lease. The range is from 0 to 23 hours.
MINUTES	(Optional) Specifies the minute duration of the lease. The range is from 0 to 59 minutes.

Default

The lease option is not sent.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The setting only takes effect when the DHCP client is enabled to request the IP address for the interface.

Example

This example shows how to get a 5 days release of the IP address.

```
Switch# configure terminal
Switch(config)#interface vlan 100
Switch(config-if)# ip address dhcp
Switch(config-if)# ip dhcp client lease 5
Switch(config-if)#
```

15-5 dhcp retry times

This command is used to specify the DHCP retry times. Use the **no** form of this command to set DHCP retry times to defualt value.

dhcp retry times *<(5-120)>*

no dhcp retry times

Parameters

<(5-120)>	Specifies the DHCP retry times.

Default

7.

Command Mode

Global Configuration Mode..

Command Default Level

Level: 12.

Usage Guideline

This command is used to specify the DHCP retry times.

Example

This example shows how to set DHCP retry times.

```
Switch(config)# configure terminal
Switch(config)# dhcp retry times 10
Switch(config)#
```

15-6 show dhcp retry times

This command is used to display DHCP retry times.

show dhcp retry times

Parameters

None

Default

None.

Command Mode

EXEC Mode

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display DHCP retry times.

Example

This example shows how to display DHCP retry times.

```
Switch(config)# show dhcp retry times

  DHCP Retry Times: 10
  Note: DHCP retry interval: 5 seconds

Switch(config)#
```

15-7 show ip dhcp interface

This command is used to display the DHCP related settings on the interface.

show ip dhcp interface [INTERFACE-ID]

Parameters

INTERFACE-ID	Specifies the interface ID.

Default

None.

Command Mode

EXEC Mode

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the DHCP related settings on the interface.

Example

This example shows how to display the DHCP related settings on the interface.

```
Switch(config)# show ip dhcp interface

Interface vlan1
  DHCP Client Client-ID:
  Class ID String:
  Host Name:
  Lease:


 Total Entries: 1

Switch(config)#
```

16. DHCP Relay Commands

16-1 class (DHCP Relay)

This command is used to enter the DHCP pool configuration mode and associate a range of IP addresses with the DHCP class. Use the **no** form of this command to remove the association.

class *NAME*

no class *NAME*

Parameters

NAME	Specifies the DHCP class name with a maximum of 32 characters.

Default

None

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

This command is used to associate a DHCP relay pool with a DHCP pool class. Use the **relay target** command to define the list of relay target addresses for DHCP packet forwarding. If the DHCP client request matches a relay pool, which is configured with classes, the client must match a class configured in the pool in order to be relayed. If no DHCP class is configured, the request will only be matched against the relay pool and will be relayed to the relay destination server specified for the matched relay pool.

Example

This example shows how to configure a DHCP class, “Service-A”, defined with DHCP Option 60 matching pattern 0x112233 and 0x102030, classified to the relay pool, "pool1", and is associated with relay target "10.2.1.2".

```
Switch# configure terminal
Switch(config)# ip dhcp class Service-A

Switch(config-dhcp-class)# option 60 hex 112233

Switch(config-dhcp-class)# option 60 hex 102030
Switch(config-dhcp-class)#  exit
Switch(config)# ip dhcp pool pool1

Switch(config-dhcp-pool)# relay source 172.19.18.0 255.255.255.0
Switch(config-dhcp-pool)# class Service-A

Switch(config-dhcp-pool-class)# relay target 10.2.1.2

Switch(config-dhcp-pool-class)#
```

16-2 ip dhcp class (DHCP Relay)

This command is used to define a DHCP class and enter the DHCP Class Configuration Mode. Use the **no** form of this command to remove a DHCP class.

ip dhcp class *NAME*

no ip dhcp class *NAME*

Parameters

NAME	Specifies the DHCP class name with a maximum of 32 characters.

Default

None

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use this command to enter the DHCP Class Configuration Mode. In the mode, the user can use the **option hex** command to define the option matching pattern for the DHCP class. When a class has no option hex associated, the class will be matched by any packet.

Example

This example shows how to configure a DHCP class “Service-A” and defined with DHCP Option 60 matching pattern 0x112233.

```
Switch# configure terminal
Switch(config)# ip dhcp class Service-A

Switch(config-dhcp-class)# option 60 hex 112233
```

16-3 ip dhcp pool (DHCP Relay)

This command is used to configure a DHCP relay pool on a DHCP relay agent and enter the DHCP pool configuration mode. Use the no form of this command to delete a DHCP relay pool.

ip dhcp pool *NAME*

no ip dhcp pool *NAME*

Parameters

NAME	Specifies the address pool name with a maximum of 32 characters.

Default

None

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

In addition to DHCP relay packets, the relay destination of the DHCP server can be specified in the DHCP relay pool. To do this, use the ip dhcp pool command to enter the DHCP pool configuration, use the relay source command to specify the source subnet of the client requests, and use the relay destination command to specify the relay destination server address.

When receiving a DHCP request packet, if the subnet that the packet comes from matches the relay source of a relay pool, the packet will be relayed based on the matched relay pool. To relay based on the relay pool, if the request packet is a relayed packet, the Gateway IP Address (GIADDR) of the packet is the source of the request. If the GIADDR is zero, the subnet of the received interface is the source of the packet.

In a DHCP relay pool, the user can further use the class command and the relay target command to define the relay target address for the request packets that match the option pattern.

Example

This example shows how to create a DHCP relay pool, called pool1. In the relay pool, the subnet 172.19.18.0/255.255.255.0 is specified as the source subnet. 10.2.1.1 is specified as the relay destination address.

```
Switch# configure terminal
Switch(config)# ip dhcp pool pool1

switch(config-dhcp-pool)# relay source 172.19.18.0 255.255.255.0
switch(config-dhcp-pool)# relay destination 10.2.1.1
```

16-4 ip dhcp relay information check

This command is used to enable the DHCP relay agent to validate and remove the relay agent information option in the received DHCP reply packet. Use the **no** form of this command to globally disable the check for Option 82.

ip dhcp relay information check

no ip dhcp relay information check

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

This command takes effect when the **service dhcp** command is enabled.

The **ip dhcp relay information check** command and the **ip dhcp relay information check-reply** command together determine whether the check function of Option 82 is effective for an interface. If the **ip dhcp relay information check-reply** command is not configured for an interface, the global setting takes effect. If the **ip dhcp relay information check-reply** command is configured for an interface, the interface setting takes effect.

When the check for Option 82 of the reply packet is enabled, the device will check the validity of the Option 82 field in DHCP reply packets it receives from the DHCP server. If the Option 82 field in the received packet is not present or the option is not the original option inserted by the agent (by checking the remote ID sub-option, the relay agent drops the packet. Otherwise, the relay agent removes the Option 82 field and forwards the packet.

If the check is disabled, the packet will be directly forwarded.

Example

This example shows how to enable the global DHCP relay agent check.

```
Switch# configure terminal

Switch(config)# ip dhcp relay information check
switch(config)#
```

16-5 ip dhcp relay information option

This command is used to enable the insertion of relay agent information (Option 82) during the relay of DHCP request packets. Use the **no** form of this command to disable this insert function.

ip dhcp relay information option

no ip dhcp relay information option

Parameters

None

Default

By default, Option 82 is not inserted.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

This command takes effect when the **service dhcp** command is enabled.

When DHCP Option 82 is enabled, the DHCP packet received from the client will be inserted with an Option 82 field before being relayed to the server. The DHCP Option 82 contains two sub-options respectively the circuit ID sub-option and remote ID sub-option.

Use the **ip dhcp relay information option format remote-id** command to specify a user-defined string for the remote ID sub-option.

Example

This example shows how to enable the insertion of Option 82 during the relay of DHCP request packets.

```
Switch# configure terminal

Switch(config)# ip dhcp relay information option
Switch(config)#
```

16-6 ip dhcp relay information option-insert

This command is used to configure the insertion of Option 82 for an interface during the relay of DHCP request packets. Use the **no** form of this command to remove the configuration of the insert function for the interface.

ip dhcp relay information option-insert [none]

no ip dhcp relay information option-insert [none]

Parameters

none	(Optional) Specifies to disable insertion of Option 82 in the relayed packet.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

This command takes effect when the **service dhcp** command is enabled.

Example

This example shows how to enable the insertion of Option 82 during the relay of DHCP request packets and disables the insertion of Option 82 for interface VLAN 100. The insertion of Option 82 is disabled for VLAN 100 but enabled for the remaining interfaces.

```
Switch# configure terminal
Switch(config)# ip dhcp relay information option
Switch(config)# interface vlan 100
Switch(config-if)# ip dhcp relay information option-insert none
switch(config-if)#
```

16-7 ip dhcp relay information policy

This command is used to configure the Option 82 re-forwarding policy for the DHCP relay agent. Use the **no** form of this command to revert to the default setting.

ip dhcp relay information policy {drop | keep | replace}

no ip dhcp relay information policy

Parameters

drop	Specifies to discard the packet that already has the relay option.
keep	Specifies that the DHCP requests packet that already has the relay option is left unchanged and directly relayed to the DHCP server.
replace	Specifies that the DHCP request packet that already has the relay option will be replaced by a new option.

Default

By default, this option is **replace**.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

This command takes effect when the **service dhcp** command is enabled.

Use this command to configure the global policy for the insertion of Option 82 on packets that already have Option 82.

Example

This example shows how to configure the relay agent option re-forwarding policy to keep.

```
Switch# configure terminal

Switch(config)# ip dhcp relay information policy keep
Switch(config)#
```

16-8 ip dhcp relay information policy-action

This command is used to configure the information re-forwarding policy for the DHCP relay agent for an interface. Use the **no** form of this command to remove the configuration for the interface.

ip dhcp relay information policy-action {drop | keep | replace}

no ip dhcp relay information policy-action

Parameters

drop	Specifies to discard the packet that already has the relay option.
keep	Specifies that the DHCP request packet that already has the relay option is left unchanged and directly relayed to the DHCP server.
replace	Specifies that the DHCP request packet that already has the relay option will be replaced by a new option.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

This command takes effect when the **service dhcp** command is enabled.

Use this command to configure the global policy for the insertion of Option 82 on packets that already have Option 82.

Example

This example shows how to configure the relay agent option re-forwarding policy to keep and set the policy to drop for VLAN 100. The effective relay agent option re-forwarding policy for VLAN 100 is drop and for the remaining interfaces are set as keep.

```
Switch# configure terminal
Switch(config)# ip dhcp relay information policy keep
Switch(config)# interface vlan 100
Switch(config-if)# ip dhcp relay information policy-action drop
Switch(config-if)#
```

16-9 ip dhcp relay information option format remote-id

This command is used to configure the DHCP information remote ID sub-option. Use the **no** form of this command to configure the default remote ID sub-option.

ip dhcp relay information option format remote-id {default| string *STRING* **| vendor2 | expert-udf}**

no ip dhcp relay information option format remote-id

Parameters

default	Specifies to use the Switch's system MAC address as the remote ID.
string *STRING*	Specifies to use a user-defined string as the remote ID. Space characters are allowed in the string.
vendor2	Specifies to use vendor 2.
expert-udf	Specifies to use expert-udf.

Default

The Switch's system MAC address is used as the remote ID string.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use this command to select different vendor’s remote ID format or configures a user-defined string of ASCII characters to be the remote ID.

Example

This example shows how to use vendor2 as the remote ID.

```
Switch# configure terminal
Switch(config)# ip dhcp relay information option
Switch(config)# ip dhcp relay information option format remote-id vendor2
Switch(config)#
```

This example shows how to configure a user-defined string “switch1” as the remote ID.

```
Switch# configure terminal
Switch(config)# ip dhcp relay information option
Switch(config)# ip dhcp relay information option format remote-id string
switch1 Switch(config)#
```

16-10 ip dhcp relay information option format circuit-id

This command is used to configure the DHCP information circuit ID sub-option. Use the **no** form of this command to configure the default circuit ID sub-option.

ip dhcp relay information option format circuit-id {default | string *STRING* **| vendor1 | expert-udf }**

no ip dhcp relay information option format circuit-id

Parameters

default	Specifies to use the default circuit ID sub-option.
STRING	Specifies to use a user-defined string as the circuit ID. Space characters are allowed in the string.
vendor1	Specifies to use vender1.
expert-udf	Specifies to use expert-udf. If configures, use the user-defined string as the circuit ID: | | | | | a. | b. | c. | | | | | | 1 | n | User defined | | | | | | 1 byte | 1 byte | Max. 251 bytes | | | | | **a.** Sub-option type: The number 1 indicates that this is the circuit ID. **b.** Length: Total length of user-defined string. By default, Length is 0 and no value field. **c.** Value: Flexible user-defined string that configured through this command and the **ip dhcp relay information profile** command. The maximum length is 251.

Default

The circuit ID format is VLAN ID, module number and port number.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

This command is used to select different vendor’s circuit ID format or configures a user-defined string of ASCII characters to be the circuit ID.

Example

This example shows how to use vendor1 as the circuit ID.

```
Switch# configure terminal
Switch(config)# ip dhcp relay information option
Switch(config)# ip dhcp relay information option format circuit-id vendor1
Switch(config)#
```

This example shows how to configure a user-defined string “abcd” as the circuit ID.

```
Switch# configure terminal
Switch(config)# ip dhcp relay information option
Switch(config)# ip dhcp relay information option format circuit-id string abcd
Switch(config)#
```

16-11 ip dhcp relay information option format-type circuit-id

This command is used to configure the DHCP information circuit ID sub-option of the user-defined string.

ip dhcp relay information option format-type circuit-id {expert-udf }

no ip dhcp relay information option format-type circuit-id

Parameters

expert-udf	Specifies the circuit ID of the specific ports to bind with the specific Option 82 profile with a maximum of 32 characters.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

This command is only available for physical port and port channel interface configuration.

Use this command to configure each interface’s vendor defined string for Option 82 information circuit ID sub-option.

Example

This example shows how to define expert-udf circuit-id of “abc” on port 1.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# ip dhcp relay information option format-type circuit-id
expert-udf abc
Switch(config-if)#
```

16-12 ip dhcp relay information trust-all

This command is used to enable the DHCP relay agent to trust the IP DHCP relay information for all interfaces. Use the **no** form of this command to disable the trusting on all interfaces.

ip dhcp relay information trust-all

no ip dhcp relay information trust-all

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

When IP DHCP relay information trust is enabled on an interface, the arriving packets with a GIADDR of 0 (this relay agent is the first relay of this DHCP request packet) but with relay agent information option present will be accepted. If it is not trusted, these packets will be dropped.

When this command is enabled, IP DHCP relay information is trusted for all interfaces. When this command is disabled, the trust state is determined by the **ip dhcp relay information trusted** command in the Interface Configuration Mode.

Use the **show ip dhcp relay information trusted-sources** command to see the settings.

Example

This example shows how to enable the DHCP relay agent to trust IP DHCP relay information for all interfaces.

```
Switch# configure terminal

Switch(config)# ip dhcp relay information trust-all
Switch(config)#
```

16-13 ip dhcp relay information trusted

This command is used to enable the DHCP relay agent to trust the relay information for the interface. Use the **no** form of this command to disable the trusting of relay information for the interface.

ip dhcp relay information trusted

no ip dhcp relay information trusted

Parameters

None.

Default

By default, information is not trusted.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

When IP DHCP relay information trust is enabled on an interface, the arriving packets with a GIADDR of 0 (this relay agent is the first relay of this DHCP request packet) but with relay agent information option present will be accepted. If it is not trusted, these packets will be dropped.

When the **ip dhcp relay information trust-all** command is enabled, IP DHCP relay information is trusted for all interfaces. When the **ip dhcp relay information trust-all** command is disabled, the trust state is determined by this command.

Use the show **ip dhcp relay information trusted-sources** command to see the settings.

Example

This example shows how to disable the DHCP relay agent to trust all interface settings and enable trust for VLAN 100.

```
Switch# configure terminal
Switch(config)# no ip dhcp relay information trust-all
Switch(config)# interface vlan 100
Switch(config-if)# ip dhcp relay information trusted
Switch(config-if)#
```

16-14 ip dhcp local-relay vlan

This command is used to enable local relay on a VLAN or a group of VLANs. Use the **no** form of this command to disable the local relay function.

ip dhcp local-relay vlan *VLAN-ID* **[, | -]**

no ip dhcp local-relay vlan *VLAN-ID* **[, | -]**

Parameters

VLAN-ID	Specifies the VLAN used.
,	(Optional) Specifies a series of VLANs or separates a range of VLANs from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

The local relay relays the DHCP message to all local VLAN member ports based on the relay option setting. The local relay does not change the destination IP, destination MAC, and the gateway field of the packet.

Example

This example shows how to enable the local relay function on VLAN 100.

```
Switch# configure terminal

Switch(config)# ip dhcp local-relay vlan 100
Switch(config)#
```

16-15 option hex (DHCP Relay)

This command is used to specify a DHCP option matching pattern for a DHCP class. Use the **no** form of this command to delete the specified matching pattern for a DHCP class.

option *CODE* hex *WORD*

no option *CODE* hex *WORD*

Parameters

CODE	Specifies the DHCP option number. (1~254)
WORD	The Hexadecimal value

Default

None.

Command Mode

DHCP Class Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use the **ip dhcp class** command with this command to define a DHCP class. The classes in a pool are matched in the sequence of the class configuration in a pool.

With the **option hex** command, the user can specify the DHCP option code number with its matching pattern for a DHCP class. Multiple option patterns can be specified for a DHCP class. If the packet matches any of the specified pattern of a DHCP class, the packet will be classified to the DHCP class and forwarded based on the specified target.

The following are some common used option codes:

- Option 60: vendor class identifier.
- Option 61: client identifier.
- Option 77: user class.
- Option 124: vendor-identifying vendor class.
- Option 125: vendor-identifying vendor-specific information.

Example

This example shows how to configure a DHCP class “Service-A” to define with DHCP Option 60 matching pattern 0x112233 and 0x102030.

```
Switch# configure terminal
Switch(config)# ip dhcp class Service-A

Switch(config-dhcp-class)# option 60 hex 112233

Switch(config-dhcp-class)# option 60 hex 102030
Switch(config-dhcp-class)#
```

16-16 relay destination

This command is used to specify the DHCP relay destination IP address associated with a relay pool. Use the **no** form of this command to delete a DHCP relay destination from the DHCP relay pool.

relay destination *IP-ADDRESS*

no relay destination *IP-ADDRESS*

Parameters

IP-ADDRESS	Specifies the relay destination DHCP server IP address.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

The relay destination of the DHCP server can be specified in the DHCP relay pool. To do this, use the ip dhcp pool command to enter the DHCP Pool Configuration Mode and then use the relay source command to specify the source subnet of the client requests. Use the relay destination command to specify the relay destination server address. Multiple relay sources and multiple relay destinations can be specified in a pool. If a packet matches any of the relay sources, the packet will be forwarded to all of the relay destinations.
When receiving a DHCP request packet, if the subnet of the received packet matches the relay source of a relay pool, the packet will be relayed based on this relay pool. To relay a packet based on the relay pool, if the request packet is a relayed packet, the GIADDR of the packet is the source of the request. If the request packet is not a relayed packet, the subnet of the received interface is the source of the packet.
In a DHCP relay pool, administrators can further use the class command and the relay target command to associate a list of relay target addresses with a DHCP class.

Example

This example shows how to create a DHCP relay pool, called pool1. In the relay pool, the subnet 172.19.10.0/255.255.255.0 is specified as the source subnet. 10.2.1.1 is specified as the relay destination address.

```
Switch# configure terminal
Switch(config)# ip dhcp pool pool1

Switch(config-dhcp-pool)# relay source 172.19.10.0 255.255.255.0
Switch(config-dhcp-pool)# relay destination 10.2.1.1

Switch(config-dhcp-pool)#
```

16-17 relay source

This command is used to specify the source subnet of client packets. Use the **no** form of this command to to remove the source subnet.

relay source *IP-ADDRESS SUBNET-MASK*

no relay source *IP-ADDRESS SUBNET-MASK*

Parameters

IP-ADDRESS	Specifies the source subnet of client packets.
SUBNET-MASK	Specifies the network mask of the source subnet.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

The relay destination of the DHCP server can be specified in the DHCP relay pool. To do this, use the **ip dhcp pool** command to enter the DHCP Pool Configuration Mode and then use the **relay source** command to specify the source subnet of the client requests. Use the **relay destination** command to specify the relay destination server address. Multiple relay sources and multiple relay destinations can be specified in a pool. If a packet matches any of the relay sources, the packet will be forwarded to all of the relay destinations.

When receiving a DHCP request packet, if the subnet of the received packet matches the relay source of a relay pool, the packet will be relayed based on this relay pool. To relay a packet based on the relay pool, if the request packet is a relayed packet, the GIADDR of the packet is the source of the request. If the request packet is not a relayed packet, the subnet of the received interface is the source of the packet.

In a DHCP relay pool, administrators can further use the **class** command and the **relay target** command to associate a list of relay target addresses with a DHCP class. The DHCP packet will not be relayed when the interface that receives the packet has no IP address configured.

Example

This example shows how to create a DHCP relay pool, called pool2. In the relay pool, the subnet 172.19.18.0/255.255.255.0 is specified as the source subnet and 10.2.1.10 is specified as the relay destination address.

```
Switch# configure terminal
Switch(config)# ip dhcp pool pool2

Switch(config-dhcp-pool)# relay source 172.19.18.0 255.255.255.0
Switch(config-dhcp-pool)# relay destination 10.2.1.10

Switch(config-dhcp-pool)#
```

16-18 relay target

This command is used to specify a DHCP relay target for relaying packets that matches the value pattern of the option defined in the class. Use the **no** form of this command to delete a relay target.

relay target *IP-ADDRESS*

no relay target *IP-ADDRESS*

Parameters

IP-ADDRESS	Specifies the relay target server IP address for the class.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

In a DHCP relay pool, administrators can further use the **class** command and the **relay target** command to associate a list of relay target addresses with a DHCP class. When the client request matches a relay pool and the DHCP relay pool is defined with classes, the client request must match a class specified in the pool in order to be relayed. If the packet does not match any class in the pool, the packet will not be replayed. If the matched relay pool has no class defined, then the request will be relayed to the relay destination of the matched relay pool. Multiple relay target commands can be specified for a class. If a packet matches the class, the packet will be forwarded to all of the relay targets.

If the **relay target** command is not configured for a class, the relay target follows the relay destination specified for the pool. The DHCP packet will not be relayed when the interface that receives the packet has no IP address configured.

Example

This example shows how to configure a DHCP relay target for relaying packets that matches the value pattern of the option defined in the class.

```
Switch# configure terminal
Switch(config)# ip dhcp class Service-A
Switch(config-dhcp-class)# option 60 hex 112233
Switch(config-dhcp-class)# option 60 hex 102030
Switch(config-dhcp-class)#exit
Switch(config)# ip dhcp pool pool1
Switch(config-dhcp-pool)# relay source 172.19.18.0 255.255.255.0
Switch(config-dhcp-pool)# class Service-A
```

16-19 service dhcp (DHCP Relay)

This command is used to enable the DHCP relay service on the Switch. Use the **no** form of this command to disable the DHCP relay service.

service dhcp

no service dhcp

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use this command to enable or disable the DHCP relay service on the switch.

Example

This example shows how to disable the DHCP relay service.

```
Switch#configure terminal
Switch(config)#no service dhcp
Switch(config)#
```

16-20 show ip dhcp relay information trusted-sources

This command is used to display all interfaces configured as trusted sources for the DHCP relay information option.

show ip dhcp relay information trusted-sources

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

Use this command to display the effective setting of the trust relay information option function.

Example

This example shows how to display the effective setting of the trust relay information option function when the **ip dhcp relay information trust-all** command is disabled.

```
Switch# show ip dhcp relay information trusted-sources
↵
List of trusted sources of relay agent information option:
vlan100             vlan200             vlan300             vlan400
vlan500

Total Entries: 5
↵
Switch#
```

This example shows how to display the effective setting of the trust relay information option function when the **ip dhcp relay information trust-all** command is enabled.

```
Switch# show ip dhcp relay information trusted-sources

All interfaces are trusted source of relay agent information option

Switch#
```

16-21 show ip dhcp relay information option-insert

This command is used to display the relay option insert configuration.

show ip dhcp relay information option-insert

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

Use this command to display relay information options with insert configuration information.

Example

This example shows how to display relay information Option 82 option and insert configuration information for all VLANs.

```
Switch# show ip dhcp relay information option-insert

Interface      Option-Insert
---------------- ------------
vlan1          Enabled
vlan2          Disabled
vlan3          Not Configured

Total Entries: 3

Switch#
```

16-22 show ip dhcp relay information option format-type

This command is used to display the interface option format configuration.

show ip dhcp relay information option format-type [interface *INTERFACE-ID* **[, | -]]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies to display information related to the interface specified here.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

Use this command to display relay information options with insert configuration information. If no parameter is specified, information of all interfaces will be displayed.

Example

This example shows how to display the interface option format configuration.

```
Switch# show ip dhcp relay information option format-type


eth1/0/1
Remote ID vendor string: string1
eth1/0/2
Circuit ID vendor string: string1
eth1/0/3
Remote ID vendor string: string3
Circuit ID vendor string: string4


Total Entries: 3


Switch#
```

16-23 show ip dhcp relay information policy-action

This command is used to display the relay option policy action configuration.

show ip dhcp relay information option format-type [interface *INTERFACE-ID* **[, | -]]**

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

Use this command to display the relay information option policy action configuration information.

Example

This example shows how to display relay information Option 82 policy action configuration information for all VLANs.

```
Switch# show ip dhcp relay             policy-action
information


Interface       Policy
---------------------
vlan1           Keep
vlan2           Drop
vlan3           Replace
vlan4           Not configured
```

```
Total           4
Entries:

Switch#
```

17. DHCPv6 Client Commands

17-1 show ipv6 dhcp

This command is used to display the DHCPv6 related settings on the interface.

show ipv6 dhcp interface [*INTERFACE-ID***]**

Parameters

INTERFACE-ID	(Optional) Specifies the VLAN interface to display the DHCPv6 related settings.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the device's DHCPv6 DUID or use the **show ipv6 dhcp interface** command to display DHCPv6 related setting for interfaces. If the interface ID is not specified, all interfaces with the DHCPv6 function will be displayed.

Example

This example shows how to display the DHCPv6 setting for interface VLAN 1, when VLAN 1 is DHCPv6 disabled.

```
Switch# show ipv6 dhcp interface vlan1

vlan1 is not in DHCPv6 mode.

Switch#
```

This example shows how to display the DHCPv6 setting for all VLANs. Only VLANs that are DHCPv6 enabled are displayed.

```
Switch# show ipv6 dhcp interface

vlan1 is in client mode
  Rapid-Commit: disabled

Switch#
```

18. DHCPv6 Guard Commands

18-1 ipv6 dhcp guard policy

This command is used to create or modify a DHCPv6 guard policy, and enter the DHCPv6 Guard Policy Configuration Mode.. Use the no form of this command to remove the DHCPv6 guard policy.

ipv6 dhcp guard policy *POLICY-NAME*

no ipv6 dhcp guard policy *POLICY-NAME*

Parameters

POLICY-NAME	Specifies the DHCPv6 guard policy name.

Default

None.

Command Mode

Global Configuration Mode.

Usage Guideline

Use this command to create or modify the DHCPv6 guard policy, and enter the DHCPv6 Guard Policy Configuration Mode.. DHCPv6 guard policies can be used to block DHCPv6 reply and advertisement messages that come from unauthorized servers. Client messages are not blocked.

After the DHCPv6 guard policy was created, use the **ipv6 dhcp guard attach-policy** command to apply the policy on a specific interface.

Example

This example shows how to create a DHCPv6 guard policy.

```
Switch# configure terminal
Switch(config)# ipv6 dhcp guard policy policy1
Switch(config-dhcp-guard)#
```

18-2 device-role

This command is used to specify the role of the attached device. Use the **no** form of this command to revert to the default setting.

device-role {client | server}

no device-role

Parameters

client	Specifies that the attached device is a DHCPv6 client. All DHCPv6 server messages are dropped on this port.
server	Specifies that the attached device is a DHCPv6 server. DHCPv6 server messages are allowed on this port.

Default

By default, this option is **client**.

Command Mode

DHCPv6 Guard Policy Configuration Mode.

Usage Guideline

Use this command to specify the role of the attached device. By default, the device role is client, and all DHCPv6 server messages that came from this port will be dropped. If the device role is set to server, DHCPv6 server messages are allowed on this port.

Example

This example shows how to create a DHCPv6 guard policy and set the device role as the server.

```
Switch# configure terminal
Switch(config)# ipv6 dhcp guard policy dhcpguard1
Switch(config-dhcp-guard)# device-role server
Switch(config-dhcp-guard)#
```

18-3 match ipv6 access-list

This command is used to verify the sender's IPv6 address in server messages. Use the no form of this command to disable the verification.

match ipv6 access-list *IPV6-ACCESS-LIST-NAME*

no match ipv6 access-list

Parameters

IPV6-ACCESS-LIST-NAME	Specifies the IPv6 access list to be matched.

Default

By default, this option is disabled.

Command Mode

DHCPv6 Guard Policy Configuration Mode.

Usage Guideline

Use this command to filter DHCPv6 server message based on sender's IP address. If the **match ipv6 access-list** command is not configured, all server messages are bypassed. An access list is configured by the **ipv6 access- list** command.

Example

This example shows how to create a DHCPv6 guard policy and matches the IPv6 addresses in the access list named list1.

```
Switch# configure terminal
Switch(config)# ipv6 dhcp guard policy dhcp_filter1
Switch(config-dhcp-guard)# match ipv6 access-list list1
Switch(config-dhcp-guard)#
```

18-4 ipv6 dhcp guard attach-policy

This command is used to apply a DHCPv6 guard policy on the specified interface. Use the **no** form of this command to remove the binding.

ipv6 dhcp guard attach-policy [POLICY-NAME]

no ipv6 dhcp guard attach-policy

Parameters

POLICY-NAME	(Optional) Specifies the DHCPv6 guard policy name.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Usage Guideline

Use this command to apply a DHCPv6 policy to an interface. DHCPv6 guard policies can be used to block DHCPv6 server messages or filter server messages based on sender IP address. If the policy name is not specified, the default policy will set the device's role to client.

Example

This example shows how to apply the DHCPv6 guard policy "pol1" to port 3.

```
Switch# configure terminal
Switch(config)# interface eth 1/0/3

Switch(config-if)# ipv6 dhcp guard attach-policy pol1

Switch(config-if)#
```

18-5 show ipv6 dhcp guard policy

This command is used to display DHCPv6 guard information.

show ipv6 dhcp guard policy [POLICY-NAME]

Parameters

POLICY-NAME	(Optional) Specifies the DHCPv6 guard policy name.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Usage Guideline

If no parameter is specified, information of all policies is displayed.

Example

This example shows how to displayed information of all policies.

```
Switch# show ipv6 dhcp guard policy
DHCP guard policy: dhcpguard1
    Device Role: DHCP server
    Source Address Match Access List: list1
Switch#
```

19. DHCPv6 Relay Commands

19-1 ipv6 dhcp relay destination

This command is used to enable the DHCP for IPv6 relay service on the interface and specify a destination address to which client messages are forwarded to. Use the **no** form of this command to remove a relay destination.

ipv6 dhcp relay destination *IPV6-ADDRESS* **[***INTERFACE-ID***]**

no ipv6 dhcp relay destination *IPV6-ADDRESS* **[***INTERFACE-ID***]**

Parameters

IPV6-ADDRESS	Specifies the DHCPv6 relay destination address.
INTERFACE-ID	(Optional) Specifies the output interface for the relay destination.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

To enable the DHCPv6 relay function on an interface, use the **ipv6 dhcp relay destination** command to configure the relay destination address on an interface. Use the **no ipv6 dhcp relay destination** command to remove the relay address. If all relay addresses are removed, the relay function is disabled.

The incoming DHCPv6 messages, being relayed can come from a client, may be already relayed by a relay agent. The destination address to be relayed can be a DHCPv6 server or another DHCPv6 relay agent,

The destination address can be a unicast or a multicast address, both can be a link scoped address or a global scoped address. For link scoped addresses, the interface where the destination address is located must be specified. For global scoped addresses, the user can optional specify the output interface. If the output interface is not specified, the output interface is resolved via the routing table.

Multiple relay destination addresses can be specified for an interface. When the DHCPv6 message is relayed to the multicast address, the hop limit field in the IPv6 packet header will be set to 32.

Example

This example shows how to configure the relay destination address on VLAN 1 and VLAN 2.

```
Switch# configure terminal
Switch(config)# interface vlan1

Switch(config-if)# ipv6 dhcp relay destination FE80::250:A2FF:FEBF:A056 vlan1

Switch(config-if)# ipv6 dhcp relay destination FE80::22:33 vlan2
Switch(config-if)#
```

19-2 ipv6 dhcp relay remote-id format

This command is used to configure the sub-type of the remote ID. Use the **no** form of this command to revert to the default settings.

ipv6 dhcp relay remote-id format {default | expert-udf **|** user-define**}**

no ipv6 dhcp relay remote-id format

Parameters

default	Specifies to use the Switch's system MAC address as the remote ID. The remote ID is formed in the following format:
	`|                                                              |`
	`| F01      | F02      | F03      | F04      | F05      |`
	`|          |          |          |          |          |`
	`| Sub Type | VLAN ID  | Module ID | Port ID  | MAC      |`
	`|          |          |          |          |          Address  |`
	`|          |          |          |          |          |`
	`| 1 byte   | 2 bytes  | 1 byte   | 1 byte   | 6 bytes  |`
	`|                                                              |`
	
	F01. *Sub Type:* The number 1 indicates that this is the remote ID.
	F02. *VLAN ID:* The incoming VLAN ID of the DHCP client packet.
	F03. *Module ID:* For a standalone switch, the module ID is always
	0. For a stacked switch, the module ID is the unit ID.
	F04. *Port ID*: The incoming port number of the DHCP client packet. The port number starts from 1.
	F05. *MAC Address*: The system MAC address of the Switch.

Expert-udf	Specifies to use a flexible user-defined string as the remote ID

user-define	Specifies to use a user-defined string as the remote ID. The remote ID option is formed in the following format: | | | | | F01 | F02 | | | | | | Sub Type | User Defined | | | | | | 1 byte | Max. 256 bytes | | | **F01.** *Sub Type:* The number 3 indicates that this is the remote ID. **F02.** *User Defined*: The user-defined string configured in the **ipv6 dhcp relay remote-id udf** command.

Default

By default, the format for the DHCPv6 replay remote ID is **default**.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

The command is used to configure the sub-type of the Remote ID option.

Example

This example shows how to configure the sub-type of the remote ID to “default”.

```
Switch# configure terminal

Switch(config)# ipv6 dhcp relay remote-id format default

Switch(config)#
```

19-3 ipv6 dhcp relay remote-id option

This command is used to enable the insertion of the relay agent remote ID Option 37 during the relay of DHCP for IPv6 request packets. Use the **no** form of this command to disable the insert function.

ipv6 dhcp relay remote-id option

no ipv6 dhcp relay remote-id option

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

The command is used to enable or disable the insertion of the DHCPv6 relay agent Remote ID option function.

Example

This example shows how to enable the insertion of the DHCPv6 relay agent remote ID option.

```
Switch# configure terminal

Switch(config)# ipv6 dhcp relay remote-id option
Switch(config)#
```

19-4 ipv6 dhcp relay remote-id policy

This command is used to configure the Option 37 forwarding policy for the DHCPv6 relay agent. Use the **no** form of this command to revert to the default setting.

ipv6 dhcp relay remote-id policy {drop | keep}

no ipv6 dhcp relay remote-id policy

Parameters

drop	Specifies to discard the packet that already has the relay agent Remote-ID Option 37.
keep	Specifies that the DHCPv6 request packet that already has the relay agent Remote-ID option is left unchanged and directly relayed to the DHCPv6 server.

Default

By default, this option is **keep**.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use this command to configure the global policy for packets that already have Option 37. If the **drop** parameter is used, relay agent's Remote ID option that has already been presented in the received packet from client, the packet will be dropped. If the **keep** parameter is used, the Switch does not check if there is a relay agent Remote-ID option in the received packet.

Example

This example shows how to configure the policy of the DHCPv6 relay agent Remote ID option to dropping the packet if it has a relay agent Remote-ID option.

```
Switch# configure terminal

Switch(config)# ipv6 dhcp relay remote-id policy drop
Switch(config)#
```

19-5 ipv6 dhcp relay remote-id udf

This command is used to configure the User Define Field (UDF) for remote ID.

ipv6 dhcp relay remote-id udf {ascii *STRING* **| hex** *HEX-STRING***}**

Parameters

ascii *STRING*	Specifies the ASCII string (a maximum of 128 characters) for the UDF of the Remote ID.
hex *HEX-STRING*	Specifies the hexadecimal string (a maximum of 256 digits) for the UDF of the Remote ID.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

This command is used to configure the UDF for the Remote ID.

Example

This example shows how to configure the UDF to the ASCII string “PARADISE001”.

```
Switch# configure terminal

Switch(config)# ipv6 dhcp relay remote-id udf ascii PARADISE001
Switch(config)#
```

This example shows how to configure the UDF to the hexadecimal string “010c08”.

```
Switch# configure terminal
Switch(config)# ipv6 dhcp relay remote-id udf hex 010c08
Switch(config)#
```

19-6 show ipv6 dhcp

This command is used to display the DHCPv6 related settings on the interface.

show ipv6 dhcp [interface [*INTERFACE-ID*]]

Parameters

INTERFACE-ID	(Optional) Specifies the VLAN interface ID to display.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

Use the **show ipv6 dhcp** command to display the device's DHCPv6 DUID.

Use the **show ipv6 dhcp interface** command to display DHCPv6 related settings and information for the specified VLAN interface. If the interface ID is not specified, all interfaces that are enabled for the DHCPv6 function will be displayed.

Example

This example shows how to display the DHCPv6 settings for VLAN 1, which is in the DHCPv6 relay mode.

```
Switch # show ipv6 dhcp interface vlan1


vlan1 is in relay mode
    Relay destinations:

      FE80::20A:BBFF:FECC:102 via vlan2
```

This example shows how to display DHCPv6 information for the interface VLAN 1 when VLAN 1 is not in the DHCPv6 mode.

```
Switch# show ipv6 dhcp interface vlan1

Vlan1 is not in DHCPv6 mode


Switch#
```

19-7 show ipv6 dhcp relay information option

This command is used to display settings of the DHCPv6 relay information options.

show ipv6 dhcp relay information option

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

Use this command to display the settings of the DHCPv6 relay information options.

Example

This example shows how to display the DHCPv6 relay remote ID setting.

```
Switch# show ipv6 dhcp relay information option


IPv6 DHCP relay remote-id
 Policy : drop
 Format : user-define
 UDF is ascii string “userstring”
```

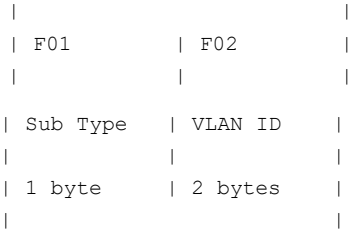
19-8 ipv6 dhcp relay interface-id format

This command is used to configure the sub-type of the interface ID. Use the **no** form of this command to revert to the default setting.

ipv6 dhcp relay interface-id format {default | cid | vendor1 | expert-udf} no

ipv6 dhcp relay interface-id format

Parameters

default	Specifies to use the VLAN ID as the interface ID. The interface ID is formed in the following format:  **F01.** *Sub Type:* The number 1 indicates that this is the interface ID. **F02.** *VLAN ID:* The incoming VLAN ID of the DHCP client packet.
cid	Specifies to use the CID as the interface ID. The interface ID option is formed in the following format:

F01	F02	F03	F04
Sub Type	VLAN ID	Module ID	Port ID
1 byte	2 bytes	1 byte	1 byte

F01. *Sub Type:* The number 2 indicates that this is the interface ID.

F02. *VLAN ID:* The incoming VLAN ID of the DHCP client packet.

F03. *Module ID:* For a standalone switch, the module ID is always 0. For a stacked switch, the module ID is the unit ID.

F04. *Port ID*: The incoming port number of the DHCP client packet. The port number starts from 1.

vendor1 Specifies to use vendor 1. If configures, the interface ID option is formed in the following format:

F01	F02	F03	F04	F05
E	t	h	e	r
(0x45)	(0x74)	(0x68)	(0x65)	(0x72)
1 byte	1 byte	1 byte	1 byte	1 byte

F06	F07	F08	F09	F10
n	e	t	Chassis ID	/
(0x6E)	(0x65)	(0x74)		(0x2F)
1 byte	1 byte	1 byte	1~2 byte	1 byte

F11	F12	F13	F14	F15
0	/	Port	:	cvlan
(0x30)	(0x2F)	Number	(0x3A)	
1 byte	1 byte	1~2 byte	1 byte	1~4 byte

F16	F17	F18	F19	F20
.	0	Space	System	/
(0x2E)	(0x30)	(0x20)	Name	(0x2F)
1 byte	1 byte	1 byte	1~128 byte	1 byte

```
|                                                                  |

|                                                                  |
| F21         | F22         | F23         | F24         | F25         |
|             |             |             |             |             |
| 0           | /           | 0           | /           | Chassis ID |
| (0x30)      | (0x2F)      | (0x30)      |  (0x2F)     |             |
|             |             |             |             |             |
| 1 byte      | 1 byte      | 1 byte      | 1 byte      | 1~2 byte    |
|                                                                  |

|                                                       |
| F26         | F27         | F28         | F29         |
|             |             |             |             |
| /           | 0           | /           | Port        |
| (0x2F)      | (0x30)      | (0x2F)      | Number      |
|             |             |             |             |
| 1 byte      | 1 bytes     | 1 byte      | 1~2 byte    |
|                                                       |
```

F01. *E:* The ASCII code is 0x45.

F02. *t:* The ASCII code is 0x74.

F03. *h:* The ASCII code is 0x68.

F04. *e*: The ASCII code is 0x65.

F05. *r:* The ASCII code is 0x72.

F06. *n:* The ASCII code is 0x6E

F07. *e:* The ASCII code is 0x65.

F08. *t*: The ASCII code is 0x74.

F09. *Chassis ID:* The number of the chassis. For a standalone switch, the chassis ID is always 0. For a stacked switch, the chassis ID is the unit ID.

F10. *Slash (/):* The ASCII code is 0x2F.

F11. *0:* The ASCII code is 0x30.

F12. *Slash (/):* The ASCII code is 0x2F.

F13. *Port Number:* The incoming port number of the DHCP client packet.

F14. *Colon (:):*The ASCII code is 0x3A.

F15. *cvlan:* The VLAN ID of the client. The value is from 1 to 4094.

F16. *Dot (.):*The ASCII code is 0x2E.

F17. *0:* The ASCII code is 0x30.

F18. *Space:* The ASCII code is 0x20.

F19. *System Name:* The system name of the Switch.

F20. *Slash (/):* The ASCII code is 0x2F.

F21. *0:* The ASCII code is 0x30.

F22. *Slash (/):* The ASCII code is 0x2F.

F23. *0:* The ASCII code is 0x30.

F24. *Slash (/):* The ASCII code is 0x2F.

F25. *Chassis ID:* The number of the chassis. For a standalone switch, the chassis ID is always 0. For a stacked switch, the chassis ID is the unit ID.

F26. *Slash (/):* The ASCII code is 0x2F.

F27. *0:* The ASCII code is 0x30.

F28. *Slash (/):* The ASCII code is 0x2F.

F29. *Port Number*: The incoming port number of the DHCP client packet.

expert-udf

Specifies to use a flexible user-defined string as the interface ID. The interface ID option is formed in the following format:

```
|                 |
| F01             |
```

```
|----------------------|
| User Defined         |
|----------------------|
| Max. 255 bytes       |
|----------------------|
```

F01. *User Defined*: The flexible user-defined string configured in the **ipv6 dhcp relay interface-id format-type expert-udf**, **ipv6 dhcp relay interface-id profile**, and **format string** commands. By default, the field is empty.

Default

By default, the format for the DHCPv6 replay interface ID is **default**.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

The command is used to configure the sub-type of the interface ID option.

Example

This example shows how to configure the sub-type of the remote ID to “cid”.

```
Switch# configure terminal

Switch(config)# ipv6 dhcp relay interface-id format cid
Switch(config)#
```

19-9 ipv6 dhcp relay interface-id option

This command is used to enable the insertion of the relay agent interface ID Option 18 during the relay of DHCP for IPv6 request packets. Use the **no** form of this command to disable the insert function.

ipv6 dhcp relay interface-id option

no ipv6 dhcp relay interface-id option

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

The command is used to enable the insertion of the DHCPv6 relay agent interface ID option function.

Example

This example shows how to enable the insertion of the DHCPv6 relay agent interface ID option.

```
Switch# configure terminal

Switch(config)# ipv6 dhcp relay interface-id option
Switch(config)#
```

19-10 ipv6 dhcp relay interface-id policy

This command is used to configure the Option 18 re-forwarding policy for the DHCPv6 relay agent. Use the no form of this command to revert to the default setting.

ipv6 dhcp relay interface-id option

no ipv6 dhcp relay interface-id option

Parameters

drop	Specifies to discard the packet that already has the relay agent Interface-ID Option 18.
keep	Specifies that the DHCPv6 request packet that already has the relay agent Interface-ID option is left unchanged and directly relayed to the DHCPv6 server.

Default

By default, this option is **keep**.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use this command to configure the global policy for packets that already have Option 18. If the **drop** policy is selected, relay agent's Interface ID option that has already been presented in the received packet from client, the packet will be dropped. If the **keep** policy is selected, the Switch doesn't check if there is a relay agent Interface-ID option in the received packet.

Example

This example shows how to configure the policy of the DHCPv6 relay agent Interface ID option to drop the packet if it has a relay agent Interface-ID option.

```
Switch# configure terminal

Switch(config)# ipv6 dhcp relay interface-id policy drop

Switch(config)#
```

19-11 ipv6 dhcp local-relay vlan

This command is used to enable DHCPv6 local relay on a VLAN or a group of VLANs. Use the **no** form of this command to disable the function.

ipv6 dhcp local-relay vlan *VLAN-ID* **[, | -]**

no ipv6 dhcp local-relay vlan *VLAN-ID* **[, | -]**

Parameters

VLAN-ID	Specifies the VLAN ID to be configured.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use this command to configure the DHCPv6 local relay function.

When DHCPv6 local relay is enabled, the Switch will add Option 37 and Option 18 to the request packets from the client.

If the Option 37 check state is enabled, the Switch will check the request packet from the client and drop the packet if it contains Option 37 as specified in the DHCPv6 relay function.

If the Option 37 check state is disabled, the local relay function will always add Option 37 to the request packet, regardless whether the state of Option 37 is enabled or disabled.

The DHCPv6 local relay function will directly forward the packet from the server to the client after which no more processing is done.

NOTE: When the **ipv6 dhcp relay enable** command is disabled on an interface, the interface will not relay or local relay received DHCPv6 packets.

Example

This example shows how to enable the DHCPv6 local relay function on VLAN 100.

```
Switch#configure terminal

Switch(config)#ipv6 dhcp local-relay vlan 100
Switch(config)#
```

19-12 ipv6 dhcp relay enable

This command is used to enable the DHCPv6 relay function per port. Use the **no** form of this command to disable the function.

ipv6 dhcp relay enable

no ipv6 dhcp relay enable

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use this command to configure the state of the DHCPv6 relay function for each port.

Example

This example shows how to disable the DHCPv6 relay function on port ethernet 1/0/1.

```
Switch#configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)#no ipv6 dhcp relay enable

Switch(config-if)#
```

19-13 ipv6 dhcp relay remote-id format-type expert-udf

This command is used to configure the Option 37 expert UDF string per port. Use the no form of this command to revert to the default setting.

ipv6 dhcp relay remote-id format-type expert-udf *STRING*

no ipv6 dhcp relay remote-id format-type expert-udf

Parameters

STRING	Specifies the profile name of Option 37.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use this command to configure the Option 37 expert UDF string per port.

Example

This example shows how to configure the Option 37 on port ethernet 1/0/1 to use “profile1”.

```
Switch#configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)#ipv6 dhcp relay remote-id format-type expert-udf profile1
Switch(config-if)#
```

19-14 ipv6 dhcp relay interface-id format-type expert-udf

This command is used to configure the Option 18 expert UDF string per port. Use the no form of this command to revert to the default setting.

ipv6 dhcp relay interface-id format-type expert-udf *STRING*

no ipv6 dhcp relay interface-id format-type expert-udf

Parameters

STRING	Specifies the profile name of Option 18.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use this command to configure the Option 18 expert UDF string per port.

Example

This example shows how to configure the Option 18 on port ethernet 1/0/1 to use “profile2”..

```
Switch#configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)#ipv6 dhcp relay interface-id format-type expert-udf profile2
Switch(config-if)#
```

20. Digital Diagnostics Monitoring (DDM) Commands

20-1 show interfaces transceiver

This command is used to display the current SFP/SFP+ module operating parameters..

show interfaces transceiver [detail]

Parameters

detail	(Optional) Specifies to display more detailed information..

Default

None.

Command Mode

Global Configuration Mode.

Interface Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the current SFP/SFP+ module operating transceiver monitoring parameters values for specified ports.

Example

This example shows how to display current operating parameters for all ports valid for transceiver monitoring.

```
Switch# show interfaces transceiver

 ++ : high alarm, +  : high warning, -  : low warning, -- : low alarm
 mA: milliamperes, mW: milliwatts

Transceiver Monitoring traps  :Alarm and warning
Port       Temperature     Voltag     Bias Current    TX Power    RX Power
           (Celsius)        (V)           (mA)           (mW)        (mW)
----       -----------     ------     ------------    --------    --------
13         57.352          3.10       65.0            0.6290      0.0000

 Total Entries: 1
```

This example shows transceiver monitoring detail.

```
Switch# show interfaces transceiver detail

 ++ : high alarm, +  : high warning, -  : low warning, -- : low alarm
 mA: milliamperes, mW: milliwatts
 A: The threshold is administratively configured.

eth1/0/13
 Transceiver Monitoring is enable
 Transceiver Monitoring shutdown action: None

                 Current    High-Alarm    High-Warning  Low-Warning   Low-Alarm

Temperature(C)   +57.352    +90.000       +85.000       -5.000        -10.000

Voltage(V)       3.10       3.60          3.50          3.00          2.90

Bias Current(mA) 65.0       115.0         110.0         10.0          5.0

TX Power(mW)     0.6289     1.5849        1.4125        0.4467        0.3981

RX Power(mW)     0.0000     1.5849        1.4125        0.0200        0.0178
```

20-2 snmp-server enable traps transceiver-monitoring

This command is used to enable the sending of all or individual optical transceiver monitoring SNMP notifications. Use the **no** form of this command to disable the sending of all or individual optical transceiver monitoring SNMP notifications.

snmp-server enable traps transceiver-monitoring [alarm | warning]

no snmp-server enable traps transceiver-monitoring [alarm | warning]

Parameters

alarm	(Optional) Specifies to enable or disable the sending of alarm level notifications..
warning	(Optional) Specifies to enable or disable the sending of warning level notifications.

Default

By default, this feature is disable d.

Command Mode

Global Configuration Mode

Interface Configuration Mode

Command Default Level

Level: 12.

Usage Guideline

If no optional parameter is specified, it will enable or disable all transceiver-monitoring SNMP notifications.

Example

This example shows how to enable the sending of warning level notifications.

```
Switch#configure terminal
Switch(config)# snmp-server enable traps transceiver-monitoring
Switch(config)#
```

20-3 transceiver-monitoring action shutdown

This command is used to shut down a port from an alarm or a warning of an abnormal status. Use the form of this command to disable the shutdown action.

transceiver-monitoring action shutdown {alarm | warning}

no transceiver-monitoring action shutdown {alarm | warning}

Parameters

alarm	Specifies to shut down a port when alarm events occur.
warning	Specifies to shut down a port when warning events occur.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port interface configuration. The configuration can select to shut down a port on an alarm event or warning event or not to shut down on either of them. When the monitoring function is enabled, an alarm event occurs when the parameters, being monitored, go higher than the high alarm threshold or go lower than the low alarm threshold. A warning event occurs when the parameters being monitored go higher than the high warning threshold or go lower than the low warning threshold.

The port shutdown feature is controlled by the Error Disable module without a recover timer. Users can manually recover the port by using the shutdown command and then the no shutdown command.

Example

This example shows how to configure shutdown Ethernet 1/0/30 when alarm event occurred.

```
Switch(config)#interface ethernet 1/0/30

Switch(config-if)#transceiver-monitoring action shutdown alarm

Switch(config-if)#
```

20-4 transceiver-monitoring bias-current

This command is used to configure the thresholds of the bias current for a specified port. Use the **no** form of this command to remove the configuration.

transceiver-monitoring bias-current INTERFACE-ID {high | low} {alarm | warning} VALUE <0-131>

no transceiver-monitoring bias-current INTERFACE-ID {high | low} {alarm | warning} VALUE

Parameters

INTERFACE-ID	Specifies the interface to modify.
high	Specifies the high threshold, when the operating parameter rises above this value. It indicates an abnormal status.
low	Specifies the low threshold, when the operating parameter falls below this value, It indicates an abnormal status.
alarm	Specifies the threshold for high alarm or low alarm conditions.
warning	Specifies the threshold for high warning or low warning conditions.
Value <0-131>	Specifies the value of the threshold. This value is from 0 to 131 mA.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This configuration is only suitable for SFP+ port interfaces with optical modules with transceiver-monitoring.

This command configures the bias-current thresholds on the specified ports.

The value will be stored both in the system and in the SFP/SFP+ transceivers and be converted to the 16-bit format and then rewritten into the SFP/SFP+ module. If the SFP/SFP+ module being configured does not support the threshold change, the user-configured threshold is stored in the system and the displayed value will be the user-configured threshold. If no user-configured threshold exists, the displayed value will always reflect the factory preset value defined by vendors.

The **no** form of this command has the effect to clear the configured threshold stored in the system. It does not change the threshold stored in the SFP/SFP+ transceivers. Use the no form of the command to prevent threshold values on newly inserted SFP/SFP+ transceivers from being altered

Example

This example shows how to configure the bias current high warning threshold as 10.237 on ethernet 1/0/30.

```
Switch(config)#transceiver-monitoring bias-current ethernet 1/0/30 high warning 10.123

WARNING: A closest value 10.122 is chosen according to the transceiver-monitoring
precision definition.
Switch(config)#
```

20-5 transceiver-monitoring enable

This command is used to enable the optical transceiver monitoring function for an SFP+ port. Use the **no** form of this command to remove disable optical transceiver monitoring.

transceiver-monitoring enable

no transceiver-monitoring enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for the physical port interface configuration.

A user can use this command to enable or disable optical transceiver monitoring functions for an SFP+ port. When the monitoring function is enabled, an alarm event occurs when the parameters being monitored go higher than the high alarm threshold or go lower than the low alarm threshold. A warning event occurs when the parameters being monitored go higher than the high warning threshold or go lower than the low warning threshold.

When an SFP/SFP+ with transceiver monitoring capability is plugged into a port but the transceiver monitoring function of the port is disabled, the system will not detect the SFP/SFP+ transceiver's abnormal status but the user can still check the current status by showing the interface transceiver command.

Example

This example shows how to enable transceiver monitor in ethernet 1/0/30.

```
Switch(config)#interface ethernet 1/0/30

Switch(config-if)#transceiver-monitoring enable

Switch(config-if)#
```

20-6 transceiver-monitoring rx-power

This command is used to configure the thresholds of the input power for the specified port. Use the **no** form of the command to remove the configuration.

transceiver-monitoring rx-power INTERFACE-ID {high | low} {alarm | warning} {mwatt VALUE< 0-6.5535> | dbm VALUE< -40-8.1647>}

no transceiver-monitoring rx-power INTERFACE-ID {high | low} {alarm | warning}

Parameters

INTERFACE-ID	Specifies the interface to modify.
high	Specifies the high threshold, when the operating parameter rises above this value. It indicates an abnormal status.
low	Specifies the low threshold, when the operating parameter falls below this value, It indicates an abnormal status.
alarm	Specifies the threshold for high alarm or low alarm conditions.
warning	Specifies the threshold for high warning or low warning conditions.
mwatt VALUE	Specifies the power threshold value in milliwatts. This value must be between 0 to 6.5535.
dbm VALUE	Specifies the power threshold value in dBm. This value must be between -40 to 8.1647.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only SFP+ port interfaces with optical modules, with transceiver monitoring capability, are valid for this configuration.

This command configures the RX power thresholds on the specified port. This value will be stored both in the system and in the SFP/SFP+ transceivers and be converted to the 16-bit format and then written into the SFP/SFP+ module.

If the SFP/SFP+ module configured does not support the threshold change, the user-configured threshold is just stored in the system and the displayed value will be the user-configured threshold. If there is no user-configured threshold, the displayed value will always reflect the factory preset value defined by the vendor. The no form of this command has the effect to clear the configured threshold stored in system. It does not change the threshold stored in the SFP/SFP+ transceivers.

Use no form of the command to prevent threshold values in newly inserted SFP/SFP+ transceivers from being altered

Example

This example shows how to configure the RX power low warning threshold as 0.123 mW on ethernet 1/0/30.

```
Switch#configure terminal

Switch(config)#transceiver-monitoring rx-power ethernet 1/0/30 low warning mwatt 0.123

Switch(config)#
```

20-7 transceiver-monitoring temperature

This command is used to configure the temperature thresholds for the specified port. Use the **no** form of this command to remove the configuration.

transceiver-monitoring temperature INTERFACE-ID {high | low} {alarm | warning} VALUE< -128-127.996>

no transceiver-monitoring transceiver-monitoring temperature INTERFACE-ID {high | low} {alarm | warning}

Parameters

INTERFACE-ID	Specifies the interface to modify.
high	Specifies the high threshold, when the operating parameter rises above this value. It indicates an abnormal status.
low	Specifies the low threshold, when the operating parameter falls below this value, It indicates an abnormal status.
alarm	Specifies the threshold for high alarm or low alarm conditions.
warning	Specifies the threshold for high warning or low warning conditions.
VALUE<-128-127.996>	Specifies the threshold value. This value must be between -128 to 127.996 °C.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only SFP+ port interfaces with optical modules, with transceiver monitoring capability, are valid for this configuration.

This command configures the temperature thresholds on the specified port. This value will be stored both in the system and in the SFP/SFP+ transceivers and be converted to the 16-bit format and then written into the SFP/SFP+ module. If the SFP/SFP+ module configured does not support the threshold change, the user-configured threshold is just stored in the system and the displayed value will be the user-configured threshold. If there is no user-configured threshold, the displayed value will always reflect the factory preset value defined by the vendor.

The **no** form of this command has the effect to clear the configured threshold stored in system. It does not change the threshold stored in the SFP/SFP+ transceivers. Use the no form of the command to prevent threshold values in newly inserted SFP/SFP+ transceivers from being altered.

Example

This example shows how to configure the temperature high alarm threshold as 123.123 on ethernet 1/0/30.

```
Switch#configure terminal

Switch(config)#transceiver-monitoring temperature ethernet 1/0/30 high alarm 123.123

WARNING: A closest value 123.121 is chosen according to the transceiver-monitoring
precision definition.
Switch(config)#
```

20-8 transceiver-monitoring tx-power

This command is used to configure the thresholds of the output power for the specified port. Use the **no** form of the command to remove the configuration.

transceiver-monitoring tx-power INTERFACE-ID {high | low} {alarm | warning} {mwatt VALUE< 0-6.5535> | dbm VALUE< -40-8.1647>}

no transceiver-monitoring tx-power INTERFACE-ID {high | low} {alarm | warning}

Parameters

INTERFACE-ID	Specifies the interface to modify.
high	Specifies the high threshold, when the operating parameter rises above this value. It indicates an abnormal status.
low	Specifies the low threshold, when the operating parameter falls below this value, It indicates an abnormal status.
alarm	Specifies the threshold for high alarm or low alarm conditions.
warning	Specifies the threshold for high warning or low warning conditions.
mwatt VALUE	Specifies the power threshold value in milliwatts. This value must be between 0 and 6.5535.
dbm VALUE	Specifies the power threshold value in dBm. This value must be between -40 to 8.1647.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only SFP+ port interfaces with optical modules, with transceiver monitoring capability, are valid for this configuration.

This command configures the TX power thresholds on the specified port. This value will be stored both in the system and in the SFP/SFP+ transceivers and be converted to the 16-bit format and then written into the SFP/SFP+ module.

If the SFP/SFP+ module configured does not support the threshold change, the user-configured threshold is just stored in the system and the displayed value will be the user-configured threshold. If there is no user-configured threshold, the displayed value will always reflect the factory preset value defined by the vendor. The no form of this command has the effect to clear the configured threshold stored in system. It does not change the threshold stored in the SFP/SFP+ transceivers.

Use no form of the command to prevent threshold values in newly inserted SFP/SFP+ transceivers from being altered

Example

This example shows how to configure the TX power low warning threshold as 0.123 mW on ethernet 1/0/30.

```
Switch#configure terminal

Switch(config)#transceiver-monitoring tx-power ethernet 1/0/30 low warning mwatt 0.123

Switch(config)#
```

20-9 transceiver-monitoring voltage

This command is used to configure the voltage thresholds for the specified port. Use the **no** form of this command to remove the configuration.

transceiver-monitoring voltage INTERFACE-ID {high | low} {alarm | warning} VALUE< 0-6.5535>

no transceiver-monitoring transceiver-monitoring voltage INTERFACE-ID {high | low} {alarm | warning}

Parameters

INTERFACE-ID	Specifies the interface to modify.
high	Specifies the high threshold, when the operating parameter rises above this value. It indicates an abnormal status.
low	Specifies the low threshold, when the operating parameter falls below this value, It indicates an abnormal status.
alarm	Specifies the threshold for high alarm or low alarm conditions.
warning	Specifies the threshold for high warning or low warning conditions.
VALUE<0-6.5535>	Specifies the threshold value. This value must be between 0 to 6.5535 Volt.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only SFP+ port interfaces with optical modules, with transceiver monitoring capability, are valid for this configuration.

This command configures the voltage thresholds on the specified port. This value will be stored both in the system and in the SFP/SFP+ transceivers and be converted to the 16-bit format and then written into the SFP/SFP+ module. If the SFP/SFP+ module configured does not support the threshold change, the user-configured threshold is just stored in the system and the displayed value will be the user-configured threshold. If there is no user-configured threshold, the displayed value will always reflect the factory preset value defined by the vendor.

The **no** form of this command has the effect to clear the configured threshold stored in system. It does not change the threshold stored in the SFP/SFP+ transceivers. Use the no form of the command to prevent threshold values in newly inserted SFP/SFP+ transceivers from being altered.

Example

This example shows how to configure the temperature high alarm threshold as 6.123 on ethernet 1/0/30.

```
Switch#configure terminal

Switch(config)#transceiver-monitoring voltage ethernet 1/0/30 high alarm 6.123

Switch(config)#
```

21. D-Link Discovery Protocol (DDP) Client Commands

21-1 ddp

This command is used to enable DDP client function globally or on the specified ports. Use the **no** form of this command to disable DDP client.

ddp

no ddp

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable or disable DDP client function globally or per physical port based.

When DDP is disabled on a port, the port will neither process nor generate DDP message. DDP messages received by the port are flooded in VLAN.

Example

This example shows how to enable DDP globally.

```
Switch# configure terminal
Switch(config)# ddp
Switch(config)#
```

This example shows how to enable DDP on port 1/0/1.

```
Switch#configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)#ddp
Switch(config-if)#
```

21-2 ddp report-timer

This command is used to configure interval between two consecutive DDP report messages. Use the **no** form of this command to revert to the default setting.

ddp report-timer {30| 60| 90|120 |Never}

no ddp report-timer

Parameters

30	Specifies the report interval to 30 seconds.
60	Specifies the report interval to 60 seconds.
90	Specifies the report interval to 90 seconds.
120	Specifies the report interval to 120 seconds.
Never	Specifies to stop sending report message.

Default

By default, this option is Never.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure interval between two consecutive DDP report messages.

Example

This example shows how to configure interval to 60 seconds.

```
Switch#configure terminal
Switch(config)#ddp report-timer 60
Switch(config)#
```

21-3 show ddp

This command is used to display the switch DDP configurations.

show ddp [interfaces {*INTERFACE-ID* **[,|-] }]**

Parameters

INTERFACE-ID	Specifies to the interface ID.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the switch DDP configuration information.

Example

This example shows how to display DDP global information.

```
Switch# show ddp

D-Link Discovery Protocol state: Enabled
Report timer: 60 seconds

Switch#
```

This example shows how to display DDP on port 1/0/1.

```
Switch# show ddp interface ethernet 1/0/1

Interface         State
--------------    ----------
ethernet1/0/1          Enabled

Switch#
```

22. DoS Prevention Commands

22-1 dos-prevention

This command is used to enable and configure the DoS prevention mechanism. Use the **no** form of this command to reset DoS prevention to the default setting.

dos-prevention *DOS-ATTACK-TYPE*

no dos-prevention *DOS-ATTACK-TYPE*

Parameters

DOS-ATTACK-TYPE	Specifies the string that identifies the DoS type to be configured.

Default

By default all supported DoS types are disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enabled and configure the DoS prevention mechanism for a specific DoS attack type or for all supported types. The DoS prevention mechanisms (matching and taking action) are hardware-based features.

When DoS prevention is enabled, the Switch will log the event if any attack packet was received.

The command **no dos-prevention**with the **all** keyword is used to disable the DoS prevention mechanism for all supported types. All the related settings will be reverted back to the default for the specified attack types.

The following well-known DoS types which can be detected by most switches:

- **Blat:** This type of attack will send packets with TCP/UDP source port equals to destination port to the target device. It may cause the target device respond to itself.
- **Land:** A LAND attack involves with IP packets where the source and destination address are set to address of the target device. It may cause the target device reply to itself continuously.
- **TCP-NULL-scan:** Port scanning by using specific packets, which contain a sequence number of 0 and no flags.
- **TCP-SYN-fin:** Port scanning by using specific packets, which contain SYN and FIN flags.
- **TCP-SYN-SRCport-less-1024:** Port scanning by using specific packets, which contain source port 0-1023 and SYN flag.
- **TCP-xmas-scan**: Port scanning by using specific packets, which contain a sequence number of 0 and the Urgent (URG), Push (PSH), and FIN flags.
- **Ping-death:** A ping of death is a type of attack on a computer that involves sending a malformed or otherwise malicious ping to a computer. A ping is normally 64 bytes in size; many computers cannot handle a ping larger than the maximum IP packet size, which is 65,535 bytes. Sending a ping of this size can crash the target computer. Traditionally, this bug has been relatively easy to exploit. Generally, sending a 65536 byte ping packet is illegal according to networking protocol, but a packet of such a size can be sent if it is fragmented; when the target computer reassembles the packet, a buffer overflow can occur, which often cause a system crash.

- **TCP-tiny-frag:** Tiny TCP Fragment attacker uses the IP fragmentation to create extremely small fragments and force the TCP header information into a separate packet fragment to pass through the check function of the router and issue an attack.
- **All:** All of above types.

Example

This example shows how to enable the DoS prevention mechanism for land attack.

```
Switch# configure terminal
Switch(config)# dos-prevention land
Switch(config)#
```

This example shows how to enable the DoS prevention mechanism on all supported types.

```
Switch# configure terminal
Switch(config)# dos-prevention all
Switch(config)#
```

This example shows how to disable the DoS prevention mechanism for all supported types.

```
Switch# configure terminal
Switch(config)# no dos-prevention all
Switch(config)#
```

22-2 show dos-prevention

This command is used to display the DoS prevention status and related drop counters.

show dos-prevention [*DOS-ATTACK-TYPE***]**

Parameters

DOS-ATTACK-TYPE	(Optional) Specifies the DoS type to be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information about DoS prevention.

Example

This example shows how to display the configuration information of the DoS prevention.

```
Switch# show dos-prevention

DoS Prevention Information
DoS Type                                 State
---------------------------------------- --------------
Land Attack                          Enabled
Blat Attack                          Enabled
TCP Null                             Disabled
TCP Xmas                             Disabled
TCP SYN-FIN                          Disabled
TCP SYN SrcPort Less 1024            Disabled
Ping of Death Attack                 Disabled
TCP Tiny Fragment Attack             Disabled

Switch#
```

This example shows how to display the specified type configuration information of theDoS prevention.

```
Switch# show dos-prevention land

DoS Type    : Land Attack
State        : Enabled

Switch#
```

23. DHCP Server Screening Commands

23-1 based-on hardware-address

This command is used to add an entry of the DHCP server screen profile. Use the no form of this command to delete the specified entry.

based-on hardware-address *CLIENT-HARDWARE-ADDRESS*

no based-on hardware-address *CLIENT-HARDWARE-ADDRESS*

Parameters

CLIENT-HARDWARE-ADDRESS	Specifies the MAC address of the client.

Default

None.

Command Mode

Configure DHCP Server Screen Mode.

Command Default Level

Level: 12.

Usage Guideline

The server message with the specified server IP address and client address in the payload will be permitted. These binding entries restrict that only specific servers are allowed to offer addresses to service specific clients.

Example

This example shows how to set the recovery timer to 200 seconds for port security violation.

```
Switch# configure terminal
Switch(config)# dhcp-server-screen profile test-profile
Switch(config-dhcp-server-screen)# based-on hardware-address 00-00-00-00-00-01
Switch(config-dhcp-server-screen)#
```

23-2 clear ip dhcp snooping server-screen log

This command is used to clear the server screen log buffer.

clear ip dhcp snooping server-screen log

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear the server screen log buffer. The DHCP server screen log buffer keeps tracks the information of packet that does not pass the screening. The first packet that violates the check will be sent to log module and recorded in the server screen log buffer. The subsequent packets belonging to the same session will not be sent to log module unless its record in the log buffer is cleared.

Example

This example shows how to clear the server screen log.

```
Switch# clear ip dhcp snooping server-screen log
```

23-3 dhcp-server-screen profile

This command is used to define a server screen profile and enter the server screen configure mode. Use the no form of this command to delete the specified server screen profile.

dhcp-server-screen profile *PROFILE-NAME*

no dhcp-server-screen profile *PROFILE-NAME*

Parameters

None.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to enter the DHCP server screen configuration mode to define a server screen profile. The profile can be used to define the DHCP server screen entry.

Example

This example shows how to enter the DHCP server screen configure mode to define the profile “test-profile”.

```
Switch# configure terminal
Switch(config)# dhcp-server-screen profile test-profile
Switch(config-dhcp-server-screen)# based-on hardware-address 00-00-00-00-00-01
Switch(config-dhcp-server-screen)#
```

23-4 ip dhcp snooping server-screen

This command is used to enable DHCP server screening. Use the no form of this command to disable it.

ip dhcp snooping server-screen [*SERVER-IP-ADDRESS* **profile** *PROFILE-NAME]*

no ip dhcp snooping server-screen *SERVER-IP-ADDRESS*

Parameters

SERVER-IP-ADDRESS	(Optional) Specifies the trust DHCP sever IP address.
profile *PROFILE-NAME*	(Optional) Specifies the profile with the client MAC address list for the DHCP sever.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for physical port and port channel. The DHCP server screening function is used to filter the DHCP server packets on the specific interface and receive the trust packets from the specific source. This feature can make a protected network usable when a malicious host sends DHCP server packets. If the server IP address is not specified, it will enabled or disabled the DHCP server screen on the interface. By default, the DHCP server screen is disabled on all interfaces. If enabled, the DHCP server screen, on a specific interface, will filter all DHCP server packets from the interface and only forward trusted server packets. If a server screen entry is defined with a profile that contains a client MAC address, then the server message with the server IP address and the client addresses contained in the profile is forwarded. If an entry is defined without the client's MAC address, then the server message with the specified server IP address will be forwarded. Each server can only have one corresponding entry in the table. If the entry is defined with a profile but the entry does not exist, then messages with the server IP specified by the entry are not forwarded.

Example

This example shows how to enter the DHCP server screen profile named "test-profile" and binding with entry on Ethernet .

```
Switch# configure terminal
Switch(config)# dhcp-server-screen profile test-profile
Switch(config-dhcp-server-screen)# based-on hardware-address 00-00-00-00-00-01
Switch(config-dhcp-server-screen)# exit
Switch(config)# interface ethernet 1/0/3
Switch(config-if)# ip dhcp snooping server-screen 10.1.1.2 profile test-profile
Switch(config-if)#
```

23-5 ip dhcp snooping server-screen log-buffer

This command is used to configure the DHCP server screen log buffer parameter. Use the no form of this command to revert to the default setting.

ip dhcp snooping server-screen log-buffer entries *NUMBER*

no ip dhcp snooping server-screen log-buffer entries

Parameters

NUMBER	(Specifies the buffer entry number. The maximum number is 1024.

Default

Default value is 32.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the maximum entry number of the log buffer. The DHCP server screen log buffer keeps tracks of the information of packets that did not pass the screening. The first packet that violates the check will be sent to the log module and recorded in the server screen log buffer. The subsequent packets belonging to the same session will not be sent to log module unless its record in the log buffer is cleared.

If the log buffer is full but more violation events occur, packets will be discarded but the event will not be sent to the syslog module. If the user specifies a buffer size less than the current entry number, then the log buffer will automatically be cleared.

Example

This example shows how to change the maximum buffer number to 68. .

```
Switch# configure terminal
Switch(config)# ip dhcp snooping server-screen log-buffer entries 68
```

23-6 show ip dhcp snooping server-screen

This command is used to display the server screen information.

show ip dhcp snooping server-screen { log | profile | [interface {<*INTERFACE-ID***> | *port-channel <1-8>*}]**

Parameters

Log	Display the logging event for DHCP server screen.
profile	(Optional) Dsplay the DHCP server screen profile configuration.
interface *<INTERFACE-ID> | port-channel <1-8>*	(Optional) Specified the DHCP server screen information in interface basis.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the content of the DHCP server screen log buffer and the configuration..

Example

This example shows how to display the log of DHCP server screen.

```
Switch# show ip dhcp server-screen log

Total log buffer size:32

VLAN  Server IP                       Client MAC         Occurrence
----- ------------------------------- ------------------ ------------------
100    10.20.1.1                 00-20-30-40-50-60 06:30:37, 2022-02-07
100    10.58.2.30                10-22-33-44-50-60 06:31:42, 2022-02-07

Total Entries: 2
Switch#
```

23-7 snmp-server enable traps dhcp-server-screen

This command is used to enable the sending of SNMP notifications for forged DHCP server attacking. Use the no form of this command to disable the sending of SNMP notifications.

snmp-server enable traps dhcp-server-screen

no snmp-server enable traps dhcp-server-screen

Parameters

None.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When DHCP server screening is enabled and if the Switch received a forged DHCP server packet, the Switch will log the event if any attack packet is received. Use this command to enable or disable the sending of SNMP notifications for such events.

Example

This example shows how to enable the sending of traps for DHCP server screening .

```
Switch# configure terminal
Switch(config)# snmp-server enable traps dhcp-server-screen
```

24. DHCP Snooping Commands

24-1 ip dhcp snooping

This command is used to globally enable DHCP snooping. Use the no form of this command to disable DHCP snooping.

ip dhcp snooping

no ip dhcp snooping

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The DHCP snooping function snoops the DHCP packets arriving at the untrusted interface on the VLAN that is enabled for DHCP snooping. With this function, the DHCP packets that come from the untrusted interface can be validated and a DHCP binding database will be constructed for the DHCP snooping enabled VLAN. The binding database provides IP and MAC binding information that can be further used by the IP source guard and dynamic ARP inspection process.

Example

This example shows how to enable DHCP snooping.

```
Switch# configure terminal
Switch(config)# ip dhcp snooping
Switch(config)#
```

24-2 ip dhcp snooping information option allow-untrusted

This command is used to globally allow DHCP packets with the relay Option 82 on the untrusted interface. Use the no form of this command to not allow packets with the relay Option 82.

ip dhcp snooping information option allow-untrusted

no ip dhcp snooping information option allow-untrusted

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The DHCP snooping function validates the DHCP packets when it arrives at the port on the VLAN that is enabled for DHCP snooping. By default, the validation process will drop the packet if the gateway address is not equal to 0 or Option 82 is present.

Use this command to allow packets with the relay Option 82 arriving at the untrusted interface.

Example

This example shows how to enable DHCP snooping for Option 82 to allow untrusted ports.

```
Switch# configure terminal
Switch(config)# ip dhcp snooping information option allow-untrusted
Switch(config)#
```

24-3 ip dhcp snooping database

This command is used to configure the storing of DHCP snooping binding entries to the local flash or a remote site. Use the no form of this command to disable the storing or reset the parameters to the default setting.

ip dhcp snooping database {*<tftp_url>* **| write-delay** *SECONDS***}**

no ip dhcp snooping database [write-delay]

Parameters

<tftp_url>	Specifies the URL by the following forms: tftp://location/filename
write-delay SECONDS	Specifies the time delay to write the entries after a change is seen in the binding entry. The default is 300 seconds. The range is from 60 to 86400.

.

Default

By default, the URL for the database agent is not defined.

The write delay value is set to 300 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to store the DHCP binding entry to remote server.

Example

This example shows how to store the binding entry to a file in the file system.

```
Switch# configure terminal
Switch(config)# ip dhcp snooping database tftp://10.1.1.1/test
Switch(config)#
```

24-4 clear ip dhcp snooping database statistics

This command is used to clear the DHCP binding database statistics.

clear ip dhcp snooping database statistics

Parameters

None..

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

When you enter this command, the Switch will clear the database statistics.

Example

This example shows how to clear the snooping database statistics.

```
Switch# clear ip dhcp snooping database statistics
```

24-5 clear ip dhcp snooping binding

This command is used to clear the DHCP binding entry.

clear ip dhcp snooping binding [*MAC-ADDR***] [***IP-ADDRESS***] [vlan** *VLAN-ID***] [interface {<***INTERFACE-ID***> | port-channel <***1-8***>}]**

Parameters

MAC-ADDR	(Optional) Specifies the MAC address to clear.
IP-ADDRESS	(Optional) Specifies the IP address to clear.
vlan *VLAN-ID*	(Optional) Specifies the VLAN ID to clear
interface *<INTERFACE-ID>*	(Optional) Specifies the interface to clear
port-channel *<1-8>*	(Optional) Specifies the channel group to clear

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear the DHCP binding entry, including the manually configured binding entry.

Example

This example shows how to clear all snooping binding entries.

```
Switch# clear ip dhcp snooping binding
```

24-6 renew ip dhcp snooping database

This command is used to renew the DHCP binding database.

renew ip dhcp snooping database *<tftp_url>*

Parameters

<tftp_url>	Specifies the URL by the following forms: tftp://location/filename

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to renew the DHCP binding entry to remote server..

Example

This example shows how to renew the DHCP snooping binding database.

```
Switch# configure terminal
Switch(config)# renew ip dhcp snooping database tftp://10.1.1.1/test
Switch(config)#
```

24-7 ip dhcp snooping binding

This command is used to manually configure a DHCP snooping entry.

ip dhcp snooping binding *MAC-ADDR* **vlan** *VLAN-ID IP-ADDRESS* **interface {<***INTERFACE-ID***> | port-channel <***1-8***>} expiry** *SECONDS*

Parameters

MAC-ADDR	(Optional) Specifies the MAC address
IP-ADDRESS	(Optional) Specifies the IP address
vlan *VLAN-ID*	(Optional) Specifies the VLAN ID
interface *<INTERFACE-ID>*	(Optional) Specifies the interface
port-channel *<1-8>*	(Optional) Specifies the channel group
expiry *SECONDS*	Specifies the interval after which bindings are no longer valid. This value must be between 60 and 4294967295 seconds.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to renew the DHCP binding entry to remote server..

Example

This example shows how to configure a DHCP snooping entry with IP address 10.2.2.2 and MAC address 00-01-02-03-04-05 at VLAN 2 and port Ethernet 1/0/12 with an expiry time of 100 seconds.

```
Switch# ip dhcp snooping binding 00-01-02-03-04-05 vlan 2 10.2.2.1 interface ethernet 1/0/12 expiry 100
Switch(config)#
```

24-8 ip dhcp snooping trust

This command is used to configure a port as a trusted interface for DHCP snooping. Use the no form of this command to revert to the default setting.

ip dhcp snooping trust

no dhcp snooping trust

Parameters

None.

Default

Default is enabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port and port-channel interface configuration. Ports connected to the DHCP server or to other switches should be configured as trusted interfaces. The ports connected to DHCP clients should be configured as untrusted interfaces. DHCP snooping acts as a firewall between untrusted interfaces and DHCP servers.

When a port is configured as a untrusted interface, the DHCP message arrives at the port on a VLAN that is enabled for DHCP snooping. The Switch forwards the DHCP packet unless any of the following conditions occur (in which case the packet is dropped):

The Switch port receives a packet (such as a DHCPOFFER, DHCPACK, DHCPNAK, or DHCPLEASEQUERY packet) from a DHCP server outside the firewall.

If the ip dhcp snooping verify mac-address command is enabled, the source MAC in the Ethernet header must be the same as the DHCP client hardware address to pass the validation.

The untrusted interface receives a DHCP packet that includes a relay agent IP address that is not 0.0.0.0 or the relay agent forward a packet that includes Option 82 to an untrusted interface.

The router receives a DHCPRELEASE or DHCPDECLINE message from an untrusted host with an entry in the DHCP snooping binding table, and the interface information in the binding table does not match the interface on which the message was received.

In addition to doing the validation, DHCP snooping also create a binding entry based on the IP address assigned to client by the server in DHCP snooping binding database. The binding entry contains information including MAC address, IP address, the VLAN ID and port ID where the client is located, and the expiry of the lease time.

Example

This example shows how to enable DHCP snooping trust for port 1/0/3.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/3
Switch(config-if)# ip dhcp snooping trust
Switch(config-if)#
```

24-9 ip dhcp snooping limit entries

This command is used to configure the number of the DHCP snooping binding entries that an interface can learn. Use the no form of this command to reset the DHCP message entry limit.

ip dhcp snooping limit entries *NUMBER*

no ip dhcp snooping limit entries

Parameters

NUMBER	Specifies the entry number from 0-1024.

Default

By default, this option is no-limit.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port and port-channel interface configuration. This command only takes effect on untrusted interfaces. The system will stop learning binding entries associated with the port if the maximums number is exceeded.

Example

This example shows how to configure the limit on binding entries allowed on ethernet 1/0/3 to 10.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/3
Switch(config-if)# ip dhcp snooping limit entries 10
Switch(config-if)#
```

24-10 ip dhcp snooping limit rate

This command is used to configure the number of the DHCP messages that an interface can receive per second. Use the no form of this command to reset the DHCP message rate limiting.

ip dhcp snooping limit rate *VALUE*

no ip dhcp snooping limit rate

Parameters

VALUE	Specifies the rate from 0-300.

Default

By default, this option is no-limit.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the rate of the DHCP packet exceeds the limitation, the port will be changed to the error disable state.

Example

This example shows how to configure number of DHCP messages that a switch can receive per second on port 1/0/3.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/3
Switch(config-if)# ip dhcp snooping limit rate 100
Switch(config-if)#
```

24-11 ip dhcp snooping station-move deny

This command is used to disable the DHCP snooping station move state. Use the no form of this command to enable the DHCP snooping roaming state.

ip dhcp snooping station-move deny

no ip dhcp snooping station-move deny

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When DHCP snooping station move is enabled, the dynamic DHCP snooping binding entry with the same VLAN ID and MAC address on the specific port can move to another port if it detects that a new DHCP process belong to the same VLAN ID and MAC address.

Example

This example shows how to disable the roaming state.

```
Switch# configure terminal
Switch(config)# ip dhcp snooping
Switch(config)# ip dhcp snooping vlan 10
Switch(config)# ip dhcp snooping station-move deny
Switch(config)#
```

24-12 ip dhcp snooping verify mac-address

This command is used to enable the verification that the source MAC address in a DHCP packet matches the client hardware address. Use the no form of this command to disable the verification of the MAC address.

ip dhcp snooping verify mac-address

no ip dhcp snooping verify mac-address

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The DHCP snooping function validates the DHCP packets when they arrive at the port on the VLAN that is enabled for DHCP snooping. By default, DHCP snooping will verify that the source MAC address in the Ethernet header is the same as the DHCP client hardware address to pass the validation.

Example

This example shows how to enable the verification that the source MAC address in a DHCP packet matches the client hardware address..

```
Switch# configure terminal
Switch(config)# ip dhcp snooping verify mac-address
Switch(config)#
```

24-13 ip dhcp snooping vlan

This command is used to enable DHCP snooping on a VLAN or a group of VLANs. Use the no command to disable DHCP snooping on a VLAN or a group of VLANs.

ip dhcp snooping vlan *VLAN-ID* **[, | -]**

no ip dhcp snooping vlan *VLAN-ID* **[, | -]**

Parameters

VLAN-ID	Specified the VLAN IDs protected by the ERPSmechanism. The range is 1 to 4094.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No spacesare required before and after the comma.
-	(Optional) Specifies a range of VLANs. No spacesare required before and after the hyphen.

Default

By default, DHCP snooping is disabled on all VLANs.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to globally enable DHCP snooping and use the ip dhcp snooping vlan command to enable DHCP snooping for a VLAN. The DHCP snooping function snoops the DHCP packets arriving at the untrusted interface on VLAN that is enabled for DHCP snooping. With this function, the DHCP packets come from the untrusted interface can be validated and a DHCP binding database will be constructed for the DHCP snooping enabled VLAN. The binding database provides IP and MAC binding information that can be further used by the IP source guard and dynamic ARP inspection process.

Example

This example shows how to enable DHCP snooping on VLAN 10.

```
Switch# configure terminal
Switch(config)# ip dhcp snooping vlan 10
Switch(config)#
```

24-14 show ip dhcp snooping

This command is used to display the DHCP snooping configuration.

show ip dhcp snooping

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display DHCP snooping configuration settings.

Example

This example shows how to display DHCP snooping configuration settings.

```
Switch# show ip dhcp snooping

DHCP Snooping is enabled
DHCP Snooping is enabled on VLANs:

Verification of MAC address is enabled
Information option of allowed on un-trusted interface is disabled
Station Move Deny is disabled

Interface      Trusted   Rate Limit  Entry Limit
-------------- --------- ----------- -----------
eth1/0/1       yes       no_limit    10
eth1/0/2       yes       no_limit    no_limit
eth1/0/3       yes       no_limit    no_limit
eth1/0/4       yes       no_limit    no_limit
eth1/0/5       yes       no_limit    no_limit
eth1/0/6       yes       no_limit    no_limit
eth1/0/7       yes       no_limit    no_limit
eth1/0/8       yes       no_limit    no_limit
eth1/0/9       yes       no_limit    no_limit
eth1/0/10      yes       no_limit    no_limit
eth1/0/11      yes       no_limit    no_limit
eth1/0/12      yes       no_limit    no_limit
eth1/0/13      yes       no_limit    no_limit
eth1/0/14      yes       no_limit    no_limit
eth1/0/15      yes       no_limit    no_limit
eth1/0/16      yes       no_limit    no_limit
```

25. Error Recovery Commands

25-1 errdisable recovery

This command is used to enable the error recovery for causes and to configure the recovery interval. Use the **no** form of this command to disable the auto-recovery option or to return interval to the default setting for causes.

errdisable recovery cause {all | psecure-violation | storm-control | bpdu-protect | arp-rate | dhcp-rate | loopback-detect} [interval *SECONDS***]**

no errdisable recovery cause {all | psecure-violation | storm-control | bpdu-protect | arp-rate | dhcp-rate | loopback-detect} [interval]

Parameters

All	Specifies to enable the auto-recovery option for all causes.
psecure-violation	Specifies to enable the auto-recovery option foran error port caused by port security violation.
storm-control	Specifies to enable the auto-recovery option foran error port caused by storm control.
bpdu-protect	
arp-rate	Specifies to enable the auto-recovery option foran error port caused by ARP rate limiting.
dhcp-rate	Specifies to enable the auto-recovery option foran error port caused by DHCP rate limiting.
loopback-detect	Specifies to enable the auto-recovery option foran error port caused by loop detection.
interval *SECONDS*	Specifies the time, in seconds, to recover the port from the error state caused by the specified module. The valid value is 5 to 86400. The default value is 300 seconds.

Default

Auto recovery is disabled for all causes.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A port can be put in an error disabled state by causes such as port security violations, storm control, and so on. When a port enters the error disabled state, the port is shutdown although the setting running the configuration remains in the no shutdown state.

There are two ways to recover an error disabled port. Administrators can use the **errdisable recovery cause** command to enable the auto-recovery of error ports disabled by each cause. Alternatively, administrators can manually recover the port by entering the **shutdown** command first and then the **no shutdown** command for the port.

Example

This example shows how to set the recovery timer to 200 seconds for port security violation.

```
Switch# configure terminal
Switch(config)#errdisable recovery cause psecure-violation interval 200
Switch(config)#
```

This example shows how to enable the auto-recovery option for port security violations.

```
Switch# configure terminal
Switch(config)#errdisable recovery cause psecurity-violation
Switch(config)#
```

25-2 show errdisable recovery

This command is used to display the error-disable recovery timer related settings.

show errdisable recovery

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to verify the settings of the error disable recovery timer.

Example

This example shows how to display the settings of the error disable recovery timer.

```
Switch(config)#show errdisable recovery

ErrDisable Cause         State        Interval
-----------------------  ----------   ------------
Port Security            disabled     120 seconds
Storm Control            disabled     120 seconds
ARP Rate                 disabled     120 seconds
BPDU Attack Protection   disabled     120 seconds
DHCP Rate                disabled     120 seconds
Loopback Detect          enabled      120 seconds

Interfaces that will be recovered at the next timeout:
Interface    vlan    ErrDisable Cause         Time left
----------   ------  -----------------------   ------------
ethernet1/0/1     -       Loopback Detect          105 seconds
ethernet1/0/2     -       Loopback Detect          105 seconds

Switch#
```

25-3 snmp-server enable traps errdisable

This command is used to enable sending SNMP notifications for error disabled state. Use the **no** form of this command to disable sending SNMP notifications.

snmp-server enable traps errdisable [asserted] [cleared] [notification-rate *TRAP-RATE***]**

no snmp-server enable traps errdisable [asserted] [cleared] [notification-rate]

Parameters

asserted	(Optional) Specifies to control the notifications when entering into the error disabled state.
cleared	(Optional) Specifies to control the notifications when exiting from the error disabled state.
notification-rate*TRAP-RATE*	(Optional) Specifies to configure the number of traps per minute. The packets that exceed the rate will be dropped. The range is from 0 to 1000. The default value of 0 indicates that an SNMP trap will be generated for every change of the error disabled state.

Default

By default, all notification types are disabled, and there is no limit for the notification rate.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command with the parameters **asserted** and **cleared** enables or disables the notifications for the state change of the error disabled state. If you enter the command with one of the parameters, only the specified notification type is enabled or disabled. The state or value of the other notification type will not be affected.

The **snmp-server enable traps errdisable notification-rate** and **no snmp-server enable traps errdisable notification-rate**commands only affect the setting of notification-rate, but not the state of the sending notifications for the error disabled state.

Example

This example shows how to enable sending traps for entering into and exiting from the error disabled state and set the maximum number of traps per second to 3.

```
Switch# configure terminal
Switch(config)#snmp-server enable traps errdisable asserted cleared notification-rate 3
Switch(config)#
```

25-4 show snmp-server traps error-disable

This command is used to display the SNMP notifications for error disabled state.

show snmp-server traps error-disable

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to verify the settings of the SNMP notifications for error disabled state.

Example

This example shows how to display the settings of the SNMP notifications for error disabled state.

```
Switch# show snmp-server traps error-disable

Error Disable Trap:
    Asserted: disabled
    Cleared: disabled
    Notification Rate: 0
```

26. Ethernet Ring Protection Switching (ERPS) Commands

For more information, refer to **Appendix E - ERPS Information**.

26-1 description

This command is used to specify a string that serves as a description for a G.8032 Ethernet ring instance.

description *DESCRIPTION*

no description DESCRIPTION

Parameters

None.

Default

None.

Command Mode

ERPS Instance Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the description for the ERPS instances.

Example

This example shows how to configure the description for the ERPS instances.

```
Switch#configure terminal
Switch(config)# erps instance 1
Switch(config-erps-instance)#description custom-description
Switch(config-erps-instance)#
```

26-2 ring

This command is used to create a G.8032 physical ring and enter the ERPS configuration mode. Use the no form of this command to delete the G.8032 physical ring.

ring *RING-NAME*

no ring *RING -NAME*

Parameters

RING-NAME	Specifies the name of the ERPS ring with the maximum of 32 characters.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to create, modify or delete an ITU-T G.8032 ERPS physical ring and enter the ERPS configuration mode.

Example

This example shows how to create an ERPS ring named “campus”.

```
Switch#configure terminal
Switch(config)# erps instance 1
Switch(config-erps-instance)#ring campus
```

26-3 ethernet ring g8032 profile

This command is used to create or modify a G.8032 profile and enter the ERPS profile configuration mode. Use the **no** form of this command to delete the specified profile.

erps profile *PROFILE-NAME*

no erps profile *PROFILE-NAME*

Parameters

PROFILE-NAME	Specifies the name of the G.8032 profile with the maximum of 32 characters.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to create, modify or delete a G.8032 profile and enter the ERPS profile configuration mode.

Example

This example shows how to create a G.8032 profile named “campus”.

```
Switch#configure terminal
Switch(config)# erps profile campus
Switch (config-erps-profile)#
```

26-4 r-aps channel-vlan

This command is used to specify the APS channel VLAN for an ERPS instance.Use the **no** form of this command to delete the configuration.

r-aps channel-vlan *VLAN-ID*

Parameters

VLAN-ID	Specifies the VLAN ID. The valid values are from 1 to 4094.

Default

None.

Command Mode

ERPS Instance Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to assign the APS channel VLAN for an ERPS instance. The APS channel VLAN needs to be assigned before an ERPS instance can be set to the operation state.

The specified APS channel VLAN does not need to exist to configure the command. But it needs to exist before the instance can be set to the operation state.

If the APS channel VLAN is removed when the ERPS instance is in operation, the ERPS instance will enter the operational disabled state.

Each ERPS instances should have distinct APS channel VLAN.

Example

This example shows how toconfigure the APS channel VLAN “2” for the ERPS instance “1”.

```
Switch(config)# erps instance 1
Switch(config-erps-instance)#r-aps channel-vlan 2
Switch(config-erps-instance)#
```

26-5 inclusion-list vlan-ids

This command is used to configure VLAN IDs protected by the ERPS mechanism.Use the **no** form of this command to delete the VLAN IDs.

inclusion-list vlan-ids *VLAN-ID* **[, | -]**

no inclusion-list vlan-ids *VLAN-ID* **[, | -]**

Parameters

VLAN-ID	Specified the VLAN IDs protected by the ERPS mechanism. The range is 1 to 4094.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No spacesare required before and after the comma.
-	(Optional) Specifies a range of VLANs. No spacesare required before and after the hyphen.

Default

None.

Command Mode

ERPS Instance Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to add or delete VLAN IDs protected by the ERPS mechanism.

Example

This example shows how toconfigure service protected VLAN as 100-200 for ERPS instance 1.

```
Switch#configure terminal
Switch(config)# erps instance 1
Switch(config-erps-instance)#inclusion-list vlan-ids 100-200
Switch(config-erps-instance)#
```

26-6 instance

This command is used to create an ERPS instance and enter ERPS instance configuration mode.Use the **no** form of this command to remove an ERPS instance.

erps instance *INSTANCE-ID*

no erps instance *INSTANCE-ID*

Parameters

INSTANCE-ID	Specifies an ERPS instance number. The valid values are from 1 to 32.

Default

None.

Command Mode

ERPS Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to create or remove an ERPS instance and enter ERPS instance configuration mode.

Example

This example shows how to create the ERPS instance “1” in the physical ring named “ring2”.

```
Switch#configure terminal
Switch(config)# erps instance 1
Switch(config-erps-instance)#
```

26-7 level

This command is used to configure ring MEL value of an ERPS instance.Use the **no** form of this command to revert to the default setting.

level *MEL-VALUE*

no level

Parameters

MEL-VALUE	Specifies the ring MEL of the specified ERPS instance. The valid values are from 0 to 7.

Default

By default, the value is 1.

Command Mode

ERPS Instance Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure ring MEL value of an ERPS instance. The configured MEL value of all ring nodes participate in the same ERPS instance should be identical.

Example

This example shows how toconfigure the ring MEL value of ERPS instance 1 as 6.

```
Switch#configure terminal
Switch(config)# erps instance 1
Switch(config-erps-instance)#level 6
Switch(config-erps-instance)#
```

26-8 profile

This command is used to associate an ERPS instance with a G.8032 profile.Use the **no** form of this command to remove the association

profile *PROFILE-NAME*

Parameters

PROFILE-NAME	Specifies the profile name to be associated with the ERPS instance.

Default

None.

Command Mode

ERPS Instance Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to associate an ERPS instance with a G.8032 profile. Multiple ERPS instances can be associated with the same G.8032 profile. The instances associated with the same profile protect the same set of VLANs, or the VLANs protected by one instance is a subset of LANs protected by another instance.

Example

This example shows how to associate the profile “campus” with instance 1.

```
Switch#configure terminal
Switch(config)# erps instance 1
Switch(config-erps-instance)#profile campus
Switch(config-erps-instance)#
```

26-9 port0

This command is used to specify the first ring port of a physical ring. Use the **no** form of this command to remove the settings.

port0 interface {*INTERFACE-ID* | *port-channel* <*1-8*>}

no port0 interface {*INTERFACE-ID* | *port-channel* <*1-8*>}

Parameters

INTERFACE-ID	Specifies the interface ID of the first ring port.
Port-channel	Specifies the channel group of the first ring port.

Default

None.

Command Mode

ERPS Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to specify or remove the first ring port of a physical ring.

Example

This example shows how to configure the interface “ethernet1/0/1” as the first ring port of the G.8032 ring “ring1”.

```
Switch#configure terminal
Switch(config)# erps instance 1
Switch(config-erps-instance)# port0 interface ethernet 1/0/1
Switch(config-erps-instance)#
```

26-10 port1

This command is used to specify the second ring port of a physical ring. Use the **no** form of this command to remove the settings.

port1 {interface *INTERFACE_ID* **}**

Parameters

INTERFACE_ID	Specifies the interface ID of the second ring port. The interface(s) can be a physical interface or a port-channel.

Default

None.

Command Mode

ERPS Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to specify or remove the first ring port of a physical ring.

Example

This example shows how to configure the inter-connect node as a local end node of the G.8032 ring “ring2”.

```
Switch#configure terminal
Switch(config)# erps instance 1
Switch(config-erps-instance)# port1 interface ethernet 1/0/1
Switch(config-erps-instance)#
```

26-11 revertive

This command is used to revert back to the working transport entity, for example, when the RPL was blocked. Use the **no** form of this command to continue using the RPL, if it has not failed and if the ‘switch link defect’ condition was cleared.

revertive

no revertive

Parameters

None.

Default

By default, this option is **revertive**.

Command Mode

G.8032 Profile Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a defect was cleared, the traffic channel will revert after the WTR timer has expired, which is used to avoid toggling protection states caused by intermitted defects.

In the non-revertive operation, the traffic channel continues to use the RPL if it did not fail after a ‘switch link defect’ condition was cleared. Since in Ethernet ring protection the working transport entity resources may be more optimized and in some cases it is more desirable to revert to this working transport entity once all ring links are available. This is performed at the expense of an additional traffic interruption. In some cases there may be no advantage to revert back to the working transport entity immediately and in some cases a second traffic interruption is even avoided by not reverting protect switching.

Example

This example shows how to configure rings in the profile “campus” to operate in non-revertive mode.

```
Switch#configure terminal
Switch(config)# erps profile campus
Switch (config-erps-profile)# no revertive
Switch (config-erps-profile)#
```

26-12 rpl

This command is used to configure the node as the RPL owner, or assign the port as the RPL port.Use the **no** form of this command to remove the settings.

rpl {port0 | port1} [owner]

no rpl

Parameters

port0	Specified port0 as the RPL port.
port1	Specified port1 as the RPL port.
owner	(Optional) Specifies the ring node as the RPL owner node.

Default

None.

Command Mode

ERPS Instance Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the node as the RPL owner or RPL neighbor, or assign the port as the RPL port.

Example

This example shows how to configure port0 as the RPL port of the ERPS instance “1”.

```
Switch#configure terminal
Switch(config)# erps instance 1
Switch(config-erps-instance)#rpl port0
Switch(config-erps-instance)#
```

26-13 show ethernet ring g8032

This command is used to display information of the ERPS instances.

show ethernet ring g8032 {status | brief}

Parameters

status	Specifies to display the status of the ERPS instances.
brief	Specifies to display the brief information of the ERPS instances.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display information of the ERPS instances.

Example

This example shows how to display the detailed information of the ERPS instances.

```
Switch#show ethernet ring g8032 status

 Ethernet ring ring2,instance 0
 ---------------------------------------
     Description:
     MEL: 1
     R-APS Channel: invalid r-aps vlan,Protected VLAN:
     Profile:
     Guard timer: 500 milliseconds
     Hold-Off timer: 0 milliseconds
     WTR timer: 5 minutes
     Revertive
     Instance State: Deactivated
     Admin RPL: -
     Operational RPL: -
     Admin Port0: ethernet1/0/1
     Operational Port0: ethernet1/0/1
     Port0 State: Forwarding
     Admin Port1: ethernet1/0/2
     Operational Port1: ethernet1/0/2
     Port1 State: Forwarding
     Admin RPL Port: -
     Operational RPL Port: -


 Ethernet ring campus,instance 0
 ---------------------------------------
     Description:
     MEL: 1
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

This example shows how to display the brief information of the ERPS instances.

```
Switch#show ethernet ring g8032 brief

Profile                          Inst Status      Port-State
                                 .ID
-------------------------------- ---  ----------- ------------------
                                 0    Deactivated p0:-,Forwarding
                                                  p1:-,Forwarding
                                 0    Deactivated p0:-,Forwarding
                                                  p1:-,Forwarding
campus                           1    Deactivated p0:ethernet1/0/1,Forwarding(RPL)
                                                  p1:-,Forwarding
                                 0    Deactivated p0:-,Forwarding
                                                  p1:-,Forwarding

 Total Entries: 4

Switch#
```

Display Parameters

MEL	Ring MEL value of ERPS instance.
R-APS Channel	APS channel of ERPS instance.
Protected VLANs	Service protected VLANs of ERPS instance.
Profile	The profile associated with the ERPS instance.
Guard timer	Time value for guard timer of the profile.
Hold-Off timer	Time value for hold-off timer of the profile.
WTR timer	Time value for WTR timer of the profile
TC Propagation/No TC Propagation	TC is propagated or not propagated in the profile
Revertive / Non-Revertive	Ring instances is operated in revertively or non revertively in the profile.
Instance State	Current ring node status of ERPS instance. Deactivated / Init / Idle / Protection
Admin/Operational RPL	Current config/running config ring node role of ERPS instance. (Owner/None)
Admin/Operational Port0/port1	Current config/running config ring port role.(Interface_id /none)
Admin/Operational RPL Port	Current config/running RPL.(port0/port1 /none)
Ring port0/port1 state	State for ring ports of ERPS instance. (- / Forwarding / Blocked l)
Profile	The profile associated with the ring instances.
Inst ID	Instance identifier of ERPS instance.
RingType	Indicates either major ring or sub ring.
Node Type	RPL Owner.
Status	Current status of ERPS instance. It can be one of the following values: **Deactivated:** The ERPS instance is deactivated. **Init:** The instance is initializing. **Idle:** The instance is in normal state. The RPL port is blocked. **Protection:** The instance detects failure at some ring port. The

	RPL port is restored to protect the port.
Port-State	Current ring ports state. (- / Forwarding / Blocked)

26-14 activate

This command is used to activate the specified ERPS instance.Use the **no** form of this command to deactivate the specified ERPS instance.

activate

no activate

Parameters

None.

Default

By default, this option is **no activate**.

Command Mode

ERPS Instance Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to activate or deactivate the specified ERPS instance. The ring ports, APS channel, and ERPS profile must be configured before activating the ERPS instance.

The activated ERPS instance will be in non-operational state, if the specified APS channel does not exist, or the specified ports are not the tagged member port of the APS channel VLAN.

Example

This example shows how to activate the instance 1.

```
Switch#configure terminal
Switch(config)# erps instance 1
Switch(config-erps-instance)#activate
Switch(config-erps-instance)#
```

26-15 timer

This command is used to configure timers for an ERPS domain.Use the **no** form of this command to revert to the default settings.

timer {guard *MILLI-SECONDS* **| hold-off** *SECONDS* **| wtr** *MINUTES***}**

no timer {guard | hold-off | wtr}

Parameters

guard *MILLI-SECONDS*	(Optional) Specifies the guard timer in milliseconds. The value is range from 10 to 2000.
hold-off *SECONDS*	(Optional) Specifies the hold-off timer in seconds. The value is range from 0 to 10.

wtr *MINUTES*	(Optional) Specifies the WTR timer in minutes. The value is range from 1 to 12.

Default

The default guard timer is 500 milliseconds.

The default hold-off timer is 0 second.

The default WTR timer is 5 minutes.

Command Mode

G.8032 Profile Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure timers for an ERPS domain.

Example

This example shows how to configure guard timer to 700 for the profile campus.

```
Switch#configure terminal
Switch(config)# erps profile campus
Switch (config-erps-profile)# timer guard 700
```

27. Filter Database (FDB) Commands

27-1 clear mac-address-table

This command is used to delete a specific dynamic MAC address, all dynamic MAC addresses on a particular interface, all dynamic MAC addresses on a particular VLAN, or all dynamic MAC addresses from the MAC address table.

clear mac-address-table dynamic {all | address *MAC-ADDR* **| interface** *INTERFACE-ID* **| vlan** *VLAN-ID***}**

Parameters

all	Specifies to clear all dynamic MAC addresses.
address *MAC-ADDR*	Specifies to delete the specified dynamic MAC address.
interface *INTERFACE-ID*	Specifies the interface that the MAC address will be deleted from. The specified interface can be a physical port or a port-channel.
vlan *VLAN-ID*	Specifies the VLAN ID. The valid values are from 1 to 4094.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Using this command only clears dynamic MAC address entries. Only the dynamic unicast address entry will be cleared.

Example

This example shows how to remove the MAC address 00:08:00:70:00:07 from the dynamic MAC address table.

```
Switch# clear mac-address-table dynamic address 00:08:00:70:00:07
Switch#
```

27-2 mac-address-table aging-time

This command is used to configure the MAC address table aging time. Use the **no** form of this command to revert to the default setting.

mac-address-table aging-time *SECONDS*

no mac-address-table aging-time

Parameters

SECONDS	Specifies the aging time in seconds. The valid range is 0 or 10 to 1000000 seconds. Setting the agingtime to 0 will disable the MAC address table aging out function.

Default

By default, this value is 300 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Setting the aging time to 0 will disable the MAC address table aging out function.

Example

This example shows how to set the aging time value to 200 seconds.

```
Switch# configure terminal
Switch(config)#mac-address-table aging-time 200
Switch(config)#
```

27-3 mac-address-table learning

This command is used to enable MACaddress learning on the physical port. Use the **no** form of this command to disable learning.

mac-address-table learning interface *INTERFACE-ID* **[, | -]**

no mac-address-table learning interface *INTERFACE-ID* **[, | -]**

Parameters

INTERFACE-ID	(Optional) Specifies the physical port interface to be configured.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No spaces before and after the comma.
-	(Optional) Specifies a range of interfaces. No spaces before and after the hyphen.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this commands to enable or disable MACaddress learning on a physical port.

Example

This example shows how to enable the MAC address learning option.

```
Switch# configure terminal
Switch(config)#mac-address-table learning interface ethernet1/0/5
Switch(config)#
```

27-4 mac-address-table notification change

This command is used to enable or configure the MAC address notification function. Use the no form of this command to disable the function or set the optional configuration to default.

mac-address-table notification change [interval SECONDS | history-size VALUE]

no mac-address-table notification change [interval | history-size]

Parameters

interval SECONDS	(Optional) Specifies the interval of sending the MAC address trap message. The range is 1 to 2147483647 and the default value is 1 second.
history-size VALUE	(Optional) Specifies the maximum number of the entries in the MAC history notification table. The range is 0 to 500 and the default value is 1 entry.

Default

MAC address notification is disabled.

The default number of entries in the history table is 1.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the Switch learns or removes a MAC address, a notification can be sent to the notification history table. The MAC notification history table stores the MAC address learned or deleted on each interface. Events are not generated for multicast addresses.

Example

This example shows how to enable MAC address change notification and set the interval to 10 seconds and set the history size value to 500 entries.

```
Switch# configure terminal
Switch(config)# mac-address-table notification change
Switch(config)# mac-address-table notification change interval 10
Switch(config)# mac-address-table notification change history-size 500
Switch(config)#
```

27-5 mac-address-table static

This command is used to add a static address to the MAC address table. Use the **no** form of this command to remove a static MAC address entry from the table.

mac-address-table static *MAC-ADDR* **vlan** *VLAN-ID* **{interface** *INTERFACE-ID* **[, | -] | drop}**

no mac-address-table static {all | *MAC-ADDR* **vlan** *VLAN-ID* **[interface** *INTERFACE-ID***] [, | -]}**

Parameters

MAC-ADDR	Specifies the MAC address of the entry. The address can be a unicast or a multicast entry. Packets with a destination address that match this MAC address received by the specified VLAN are forwarded to the specified interface.
vlan *VLAN-ID*	Specifies the VLAN of the entry. The range is 1 to 4094.
interface *INTERFACE-ID*	Specifies the forwarding ports.
,	(Optional)Specifies a series of interfaces, or separate a range of interfaces from a previous range. No spacesare allowed before and after the comma.
-	(Optional)Specifies a range of interfaces. No spacesare allowed before and after the hyphen.
drop	Specifies to drop the frames that are sent by or sent to the specified MAC address on the specified VLAN.
all	Specifies to remove all static MAC address entries.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

For a unicast MAC address entry, only one interface can be specified. For a multicast MAC address entry, multiple interfaces can be specified. To delete a unicast MAC address entry, there is no need to specify the interface ID. To delete a multicast MAC address entry, if an interface ID is specified, only this interface will be removed. Otherwise, the entire multicast MAC entry will be removed. The option **drop** can only be specified for a unicast MAC address entry.

Example

This example shows how to add the static address C2:F3:22:0A:12:F4 to the MAC address table. It also specifies that when any packet received on VLAN 4 that has a destination MAC address of C2:F3:22:0A:12:F4 will be forwarded to the Ethernet interface 1/0/1.

```
Switch# configure terminal
Switch(config)#mac-address-table static C2:F3:22:0A:12:F4 vlan 4 interface ethernet1/0/1
Switch(config)#
```

This example shows how to add the static address C2:F3:22:0A:22:33 to the MAC address table. It also specifies that when any packet received on VLAN 4 that has a destination MAC address of C2:F3:22:0A:22:33 will be forwarded to port-channel 2.

```
Switch# configure terminal
Switch(config)#interface range ethernet1/0/5-6
Switch(config-if-range)# channel-group 2 mode on
Switch(config-if-range)# exit
Switch(config)# mac-address-table static C2:F3:22:0A:22:33 vlan 4 interface port-channel2
Switch(config)#
```

27-6 multicast filtering-mode

This command is used to configure the handling method for multicast packets for a VLAN. Use the **no** form of this command to revert to the default setting.

multicast filtering-mode {forward-all | forward-unregistered | filter-unregistered}

no multicast filtering-mode

Parameters

forward-all	Specifies to flood all multicast packets based on the VLAN domain.
forward-unregistered	Specifies to forward registered multicast packets based on the forwarding table and flood all unregistered multicast packets based on the VLAN domain.
filter-unregistered	Specifies to forward registered packets based on the forwarding table and filter all unregistered multicast packets.

Default

By default, the **forward-unregistered** option is enabled.

Command Mode

VLAN Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This filtering mode is only applied to multicast packets that are destined for addresses other than those reserved for multicast addresses.

Example

This example shows how to set the multicast filtering mode on VLAN 100 to filter unregistered.

```
Switch# configure terminal
Switch(config)#vlan 100
Switch(config-vlan)# multicast filtering-mode filter-unregistered
Switch(config-vlan)#
```

27-7 show mac-address-table

This command is used to display a specific MAC address entry or the MAC address entries for a specific interface or VLAN.

show mac-address-table [dynamic | static] [address *MAC-ADDR* **| interface** *INTERFACE-ID* **| vlan** *VLAN-ID***]**

Parameters

dynamic	(Optional) Specifies to display dynamic MAC address table entries only.
static	(Optional) Specifies to display static MAC address table entries only.
address *MAC-ADDR*	(Optional)Specifies the 48-bit MAC address.
interface *INTERFACE-ID*	(Optional) Specifies to display information for a specific interface. Valid interfaces include physical ports and port-channels.

vlan *VLAN-ID*	(Optional) Specifies the VLAN ID. The valid values are from 1 to 4094.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If the option **interface** is specified, the unicast entry that has the forwarding interface matches the specified interface will be displayed

Example

This example shows how to display all the MAC address table entries for the MAC address 00-02-4b-28-c4-82.

```
Switch# show mac-address-table address 00:02:4B:28:C4:82

VLAN    MAC Address        Type    Ports
------ ----------------- -------- --------
1      00-02-4B-28-C4-82   Dynamic  ethernet1/0/1

Total Entries: 1

Switch#
```

This example shows how to display all the static MAC address table entries.

```
Switch# show mac-address-table static
VLAN    MAC Address          Type     Ports
----------------------------------------
4     00-01-00-02-00-04     Static    ethernet1/0/2
4     C2-F3-22-0A-12-F4     Static    port-channel2
6     00-01-00-02-00-07     Static    ethernet1/0/1
6     00-01-00-02-00-10     Static    Drop

Total Entries : 6

Switch#
```

This example shows how to display all the MAC address table entries for VLAN 1.

```
Switch# show mac-address-table vlan 1

VLAN   MAC Address          Type         Ports
------------------------------------------------
1     00-03-40-11-22-33    Dynamic        ethernet1/0/2

Total Entries: 2

Switch#
```

27-8 show mac-address-table aging-time

This command is used to display the MAC address table's aging time.

show mac-address-table aging-time

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the MAC address table's aging time.

Example

This example shows how to display the MAC address table's aging time.

```
Switch# show mac-address-table aging-time

Aging Time is 300 seconds.
Aging Destination Hit is disabled.

Switch#
```

27-9 show mac-address-table learning

This command is used to display the MAC-address learning state.

show mac-address-table learning [interface *INTERFACE-ID* **[, | -]]**

Parameters

INTERFACE-ID	(Optional) Specifies the interface to be display.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No spaces before and after the comma.
-	(Optional) Specifies a range of interfaces. No spaces before and after the hyphen.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If the interface is not specified, all existing interfaces will be displayed.

Example

This example shows how to display the MACaddress learning status on all physical ports 1 to 10.

```
Switch# show mac-address-table learning interface ethernet 1/0/1-10

Port                        State
-------------------------   --------
ethernet1/0/1                    Enabled
ethernet1/0/2                    Enabled
ethernet1/0/3                    Enabled
ethernet1/0/4                    Enabled
ethernet1/0/5                    Enabled
ethernet1/0/6                    Enabled
ethernet1/0/7                    Enabled
ethernet1/0/8                    Enabled
ethernet1/0/9                    Enabled
ethernet1/0/10                   Enabled

Switch#
```

27-10 show multicast filtering-mode

This command is used to display the filtering mode for handling multicast packets that are received on an interface.

show multicast filtering-mode [interface *VLAN-ID***]**

Parameters

interface*VLAN-ID*	(Optional) Specifies the VLAN to display.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Example

This example shows how to display the multicast filtering mode configuration for all VLANs.

```
Switch#show multicast filtering-mode

Interface                        Layer 2 Multicast Filtering Mode
-------------------------------  -------------------------------
default                          forward-unregistered

Total Entries: 1

Switch#
```

28. GARP VLAN Registration Protocol (GVRP) Commands

28-1 clear gvrp statistics

This command is used to clear the statistics for a GVRP port.

clear gvrp statistics {all | interface INTERFACE-ID [, | -] | port-channel *<1-8>***}**

Parameters

INTERFACE-ID	Specifies the physical port interface.
,	(Optional)Specifies the interface range by delimiting a list of interface IDs with commas. No spacesare allowed before and after the comma.
-	(Optional) Specifies an interface range by delimiting the start and the ending interface numbers with a hyphen. No spacesare allowed before and after the hyphen.
port-channel *<1-8>*	Speicifes the channel group for clearing counter

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear the GVRP counters.

Example

This example shows how to clear statistics for all interfaces.

```
Switch# clear gvrp statistics all
Switch#
```

28-2 gvrp global

This command is used to enable the GVRP function globally. Use the no form of this command to disable the GVRP function globally.

gvrp global

no gvrp global

Parameters

None.

Default

Default is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Administrators can enable the global GVRP state and individual port's GVRP state to start GVRP on the port.

Example

This example shows how to enable the GVRP protocol global state.

```
Switch# configure terminal
Switch(config)# gvrp global
Switch(config)#
```

28-3 gvrp enable

This command is used to enable the GVRP function on a port. Use the no form of this command to disable the GVRP function on a port.

gvrp enable

no gvrp enable

Parameters

None.

Default

Default is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for both physical ports and port-channel interface configuration. This command only takes effect for hybrid mode and trunk mode. This command does not take effect if the Layer 2 protocol tunnel is enabled for GVRP.

Example

This example shows how to enable the GVRP on Ethernet 1/0/4.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/4
Switch(config-if)# gvrp enable
Switch(config-if)#
```

28-4 gvrp advertise

This command is used to specify the VLAN that are allowed to be advertised by the GVRP protocol. Use the no form of this command to disable the VLAN advertisement function.

gvrp advertise {all | [add | remove] *VLAN-ID* **[, | -]}**

no gvrp advertise

Parameters

all	Specifies that all VLANs are advertised on the interface.
add	(Optional) Specifies a VLAN or a list VLANs to be added to advertise the VLAN list.
remove	(Optional) Specifies a VLAN or a list VLANs to be removed from the advertised VLAN list
VLAN-ID	Specified the VLAN ID to be added to or removed from the advertise VLAN list. If the add or remove parameter is not specified, the specified VLAN list overwrites the advertise VLAN list. The range is 1 to 4094
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen

Default

By default, no VLANs are advertised.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for both physical ports and port-channel interface configuration. Administrators can use the gvrp advertise command to enable the specified VLANs' GVRP advertise function on the specified interface. The command only takes effect when GVRP is enabled. The command only takes effect for hybrid mode and trunk mode.

Example

This example shows how to advertise VLAN 100 on Ethernet 1/0/4.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/4
Switch(config-if)# gvrp advertise 1000
Switch(config-if)#
```

28-5 gvrp vlan create

This command is used to enable dynamic VLAN creation. Use the no form of this command to disable the dynamic VLAN creation function.

gvrp vlan create

no gvrp vlan create

Parameters

None.

Default

By default, dynamic VLAN creation is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When dynamic VLAN creation is enabled, if a port has learned a new VLAN membership and the VLAN does not exist, the VLAN will be created automatically. Otherwise, the newly learned VLAN will not be created.

Example

This example shows how to enable dynamic VLAN registeration via GVRP.

```
Switch# configure terminal
Switch(config)# gvrp vlan create
Switch(config)#
```

28-6 gvrp forbidden

This command is used to specify a port as being a forbidden member of the specified VLAN. Use the no form of this command to remove the port as a forbidden member of all VLANs.

gvrp forbidden {all | [add | remove] *VLAN-ID* **[, | -]}**

no gvrp forbidden

Parameters

all	Specifies that all VLANs are forbidden on the interface.
add	(Optional) Specifies a VLAN or a list VLANs to be added to forbidden the VLAN list.
remove	(Optional) Specifies a VLAN or a list VLANs to be removed from the forbidden VLAN list
VLAN-ID	Specified the VLAN ID to be added to or removed from the forbidden VLAN list. If the add or remove parameter is not specified, the specified VLAN list overwrites the forbidden VLAN list. The range is 1 to 4094
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen

.

Default

No VLANs are forbidden.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for both physical ports and port-channel interface configuration. As a forbidden port of a VLAN, a port is forbidden from becoming a member port of the VLAN via the GVRP operation. The VLAN specified by the command does not need to exist. This command only affects the GVRP operation. The setting only takes effect when GVRP is enabled. The command only takes effect for hybrid mode and trunk mode.

Example

This example shows how to configure the ethernet 1/0/3 as a forbidden port of VLAN 100 via the GVRP operation.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/4
Switch(config-if)# gvrp forbidden 100
Switch(config-if)#
```

28-7 gvrp timer

This command is used to configure the GVRP timer value on a port. Use the no form of the command to revert the timer to the default setting.

gvrp timer [join *TIMER-VALUE***] [leave** *TIMER-VALUE***] [leave-all** *TIMER-VALUE***]**

no gvrp timer [join] [leave] [leave-all]

Parameters

join *TIMER-VALUE*	(Optional) Specifies to set the timer for joining a group. The unit is in a hundredth of a second. Timer value in a hundredth of a second. The valid range is 10 to 10000.
leave *TIMER-VALUE*	(Optional) Specifies to set the timer for leaving a group. The unit is in a hundredth of a second. Timer value in a hundredth of a second. The valid range is 10 to 10000.
leave-all *TIMER-VALUE*	Specifies to set the timer for leaving all groups. The unit is in a hundredth of a second. Timer value in a hundredth of a second. The valid range is 10 to 10000.

.

Default

Join: 20.

Leave: 60.

Leave-all: 1000.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the GVRP timer value on a port..

Example

This example shows how to configure the leave-all timer to 500 hundredths of a second on ethernet 1/0/1.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# gvrp timer leave-all 500
Switch(config-if)#
```

28-8 show gvrp configuration

This command is used to display the GVRP settings.

show gvrp configuration {all | interface INTERFACE-ID [, | -] | port-channel *<1-8>***}**

Parameters

INTERFACE-ID	Specifies the physical port interface.
,	(Optional)Specifies the interface range by delimiting a list of interface IDs with commas. No spacesare allowed before and after the comma.
-	(Optional) Specifies an interface range by delimiting the start and the ending interface numbers with a hyphen. No spacesare allowed before and after the hyphen.
port-channel *<1-8>*	Speicifes the channel group for clearing counter

.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command only displays GVRP related configurations. If no parameter is specified, the GVRP global configuration is displayed.

Example

This example shows how to display the GVRP configuration for the global configuration.

```
Switch(config-if)# show gvrp configuration interface ethernet 1/0/4

eth1/0/4
 GVRP Status:     Enabled
 Join Time:       20              centiseconds
 Leave Time:      60              centiseconds
 Leave-All Time:  1000            centiseconds
 Advertise VLAN:
 Forbidden VLAN:  100
Switch(config-if)#
```

28-9 show gvrp statistics

This command is used to display the GVRP settings.

show gvrp statistics {all | interface INTERFACE-ID [, | -] | port-channel *<1-8>***}**

Parameters

INTERFACE-ID	Specifies the physical port interface.
,	(Optional)Specifies the interface range by delimiting a list of interface IDs with commas. No spacesare allowed before and after the comma.
-	(Optional) Specifies an interface range by delimiting the start and the ending interface numbers with a hyphen. No spacesare allowed before and after the hyphen.
port-channel *<1-8>*	Speicifes the channel group for clearing counter

.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command only displays the ports which have the GVRP state enabled..

Example

This example shows how to display statistics for GVRP interfaces Ethernet 1/0/4.

```
Switch# show gvrp statistics interface ethernet 1/0/4
 Interface       JoinEmpty  JoinIn     LeaveEmpty LeaveIn    LeaveAll   Empty

---------------------------------------------------------------------------
 eth1/0/4      RX 0          0          0          0          0          0

               TX 0          0          0          0          0          0

Switch#
```

29. IP Source Guard Commands

29-1 show ip verify source

This command is used to display the hardware port ACL entry on a particular interface.

show ip verify source [interface {<cmport_type> <cmport_list> | port-channel <integer (1-8)>}]

Parameters

Interface	(Optional) Specifies a port or range of ports to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Usage Guideline

Use this command to display the hardware port ACL entries for a port in the hardware table. It indicates the hardware filter behavior that IP source guard is verified upon.

Example

This example shows how to display when DHCP snooping is enabled on VLANs 1.

```
Switch# show ip verify source interface eth 1/0/1

Interface      Filter-type Filter-mode  IP address      MAC address       VLAN
-------------- ----------- -----------  --------------- ----------------- ------

eth1/0/1       active      ip-mac       10.90.90.21     00-00-00-00-22-11 1
eth1/0/1       active      ip-mac       10.90.90.19     00-00-00-00-00-01 1

Total Entries        : 2
Switch#
```

29-2 show ip source binding

This command is used to display an IP-source guard binding entry.

show ip source binding [<ucast_addr>] [<mac_addr>] [{dhcp-snooping | static}] [vlan <vlan_vfi_id>] [interface {<cmport_type> <cmport_list> | port-channel <integer (1-8)>}]

Parameters

IP-ADDRESS	(Optional) Specifies to display the IP-source guard binding entry based on IP address.
MAC-ADDRESS	(Optional) Specifies to display the IP-source guard binding entry based on MAC address.
dhcp-snooping	(Optional) Specifies to display the IP-source guard binding entry learned by DHCP binding snooping.
static	(Optional) Specifies to display the IP-source guard binding entry that is manually configured.
vlan *VLAN-ID*	(Optional) Specifies to display the IP-source guard binding entry based on VLAN.
Interface *INTERFACE-ID*	(Optional) Specifies to display the IP-source guard binding entry based on ports.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Usage Guideline

IP source guard binding entries are either manually configured or automatically learned by DHCP snooping to guard IP traffic.

Example

This example shows how to display all IP Source Guard binding entries.

```
Switch# show ip source binding interface ethernet 1/0/1
MAC Address       IP Address      Lease(seconds) Type          VLAN Interface
```

```
  ----------------- --------------- -------------- ------------- ---- --------------
00-00-00-00-22-11 10.90.90.21     298712         dhcp-snooping 1    eth1/0/1
00-00-00-00-00-01 10.90.90.19     infinite       Static        1    eth1/0/1

Total Entries        : 2

Switch#
```

29-3 ip source binding

This command is used to create a static entry used for IP source guard. Use the **no** form of this command to delete a static binding entry.

ip source binding MAC-ADDRESS vlan VLAN-ID IP-ADDRESS interface INTERFACE-ID [, | -]

no ip source binding MAC-ADDRESS vlan VLAN-ID IP-ADDRESS interface INTERFACE-ID [, | -]

Parameters

MAC-ADDRESS	Specifies the MAC address of the IP-to-MAC address binding entry.
vlan *VLAN-ID*	Specifies the VLAN that the valid host belongs to.
IP-ADDRESS	Specifies the IP address of the IP-to-MAC address binding entry.
Interface *INTERFACE-ID*	Specifies the interfaces that the valid host is connected. Only physical port and port-channel interfaces are allowed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

None.

Command Mode

Global Configuration Mode

Usage Guideline

Use this command to add or delete a static binding entry used for IP source guard checking. The parameters specified for the command must exactly match the entry to be deleted.

If the MAC address and the VLAN for the configured entry already exist, the existing binding entry is updated.

Example

This example shows how to configure an IP Source Guard entry with the IP address 10.1.1.1 and MAC address 00-01-02-03-04-05 at VLAN 2 on port 10.

```
Switch# configure terminal
Switch(config)# ip source binding 00-01-02-03-04-05 vlan 2 10.1.1.1 interface eth 1/0/10
Switch(config)#
```

This example shows how to delete an IP Source Guard entry with the IP address 10.1.1.1 and MAC address 00- 01-02-03-04-05 at VLAN 2 on port 10.

```
Switch# configure terminal
Switch(config)# no ip source binding 00-01-02-03-04-05 vlan 2 10.1.1.1 interface eth 1/0/10
Switch(config)#
```

29-4 ip verify source vlan dhcp-snooping

This command is used to enable IP source guard for a port. Use the **no** form of this command to disable IP source guard.

ip verify source vlan dhcp-snooping [ip-mac]

no ip verify source vlan dhcp-snooping [ip-mac]

Parameters

ip-mac	(Optional) Specifies to check both IP address and MAC address of the received

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Usage Guideline

This command is only available for physical port interface configuration.

Use this command to enable the IP source guard on the configured port.

When a port is enabled for IP source guard, the IP packet that arrives at the port will be validated via the port ACL. Port ACL is a hardware mechanism and its entry can come from either a manual configured entry or the DHCP snooping binding database. The packet that fails to pass the validation will be dropped.

There are two types of validations.

- If the **ip-mac** parameter is not specified, the validation is based on the source IP address and VLAN check only.
- If the **ip-mac** parameter is specified, the validation is based on the source MAC address, VLAN and IP address.

Example

This example shows how to enable IP Source Guard on port 1.

```
Switch# configure terminal
Switch(config)# interface eth
1/0/1
Switch(config-if)# ip verify source vlan dhcp-snooping
Switch(config-if)#
```

30. P-MAC-Port Binding (IMPB) Commands

30-1 clear ip ip-mac-port-binding violation

This command is used to clear IMPB blocked entries.

clear ip ip-mac-port-binding violation {all | interface *INTERFACE-ID* **|** *MAC-ADDRESS***}**

Parameters

all	Specifies to clear all of the violation entries.
interface *INTERFACE-ID*	Specifies to clear the violation entries created by the specified interface.
MAC-ADDRESS	Specifies to clear the violation entries of the specified MAC address.

Default

None.

Command Mode

Privileged EXEC Mode.

Usage Guideline

Use this command to delete the IMPB violation entry from the filtering database.

Example

This example shows how to clear the entry blocked on port 4.

```
Switch# clear ip ip-mac-port-binding violation interface eth 1/0/4
Switch#
```

31. IPv6 Snooping Commands

31-1 ipv6 snooping policy

This command is used to create or modify an IPv6 snooping policy. This command will enter the IPv6 snooping configuration mode. Use the **no** form of this command to delete an IPv6 snooping policy.

ipv6 snooping policy *POLICY-NAME*

no ipv6 snooping policy *POLICY-NAME*

Parameters

POLICY-NAME	Specifies the name of the snooping policy.

Default

No IPv6 snooping policy is created.

Command Mode

Global Configuration Mode.

Usage Guideline

Use this command to create an IPv6 snooping policy. After an IPv6 snooping policy has been created, use the **ipv6 snooping attach-policy** command to apply the policy on a specific interface.

Example

This example shows how to create an IPv6 snooping policy named policy1.

```
Switch# configure terminal
Switch(config)#ipv6 snooping policy policy1

Switch(config-ipv6-snooping)#
```

31-2 protocol

This command is used to specify that addresses should be snooped with DHCPv6 or NDP. Use the **no** form of this command to indicate that a protocol will not to be used for snooping.

protocol {dhcp | ndp}

no protocol {dhcp | ndp}

Parameters

dhcp	Specifies that addresses should be snooped in DHCPv6
ndp	Specifies that addresses should be snooped in NDP packets.

Default

By default, both DHCPv6 and ND snooping are disabled.

Command Mode

IPv6 Snooping Configuration Mode.

Usage Guideline

ND Snooping is designed for a stateless auto-configuration assigned IPv6 address and manually configured IPv6 address. Before assigning an IPv6 address, the host must perform Duplicate Address Detection first. ND snooping detects DAD messages (DAD NS and DAD NA) to build its binding database. The NDP packet (NS and NA) is also used to detect whether a host is still reachable and determine whether to delete a binding or not.

DHCPv6 Snooping sniffs the DHCPv6 packets sent between the DHCPv6 client and server in the address assigning procedure. When a DHCPv6 client successfully got a valid IPv6 address, DHCPv6 snooping creates its binding database.

Example

This example shows how to enable DHCPv6 snooping.

```
Switch# configure terminal
Switch(config)# ipv6 snooping policy policy1
Switch(config-ipv6-snooping)# protocol dhcp
Switch(config-ipv6-snooping)#
```

31-3 limit address-count

This command is used to limit the maximum number of IPv6 snooping binding entries. Use the **no** form of this command to revert to the default setting.

limit address-count *MAXIMUM*

no limit address-count

Parameters

MAXIMUM	Specifies the maximum number of IPv6 snooping binding entries. The range is from 0 to 511.

Default

By default, there is no limit configured.

Command Mode

IPv6 Snooping Configuration Mode.

Usage Guideline

Use this command to limit the number of IPv6 binding entries on which the IPv6 snooping policy is applied. This command helps to limit the binding table size.

Example

This example shows how to limit the number of IPv6 snooping binding entries to 25.

```
Switch# configure terminal
Switch(config)# ipv6 snooping policy policy1
Switch(config-ipv6-snooping)# limit address-count 25
Switch(config-ipv6-snooping)#
```

31-4 ipv6 snooping attach-policy

This command is used to apply an IPv6 snooping policy to a specified VLAN. Use the no form of this command to remove the binding.

ipv6 snooping policy attach-policy *POLICY-NAME*

no ipv6 snooping policy attach-policy

Parameters

POLICY-NAME	Specifies the name of the snooping policy.

Default

None.

Command Mode

VLAN Configuration Mode.

Usage Guideline

Use this command to apply the policy on a specific VLAN after an IPv6 snooping policy has been created.

Example

This example shows how to enable IPv6 snooping on VLAN 200.

```
Switch# configure terminal
Switch(config)# vlan 200
Switch(config-vlan)# ipv6 snooping attach-policy policy1
Switch(config-vlan)#
```

31-5 ipv6 snooping station-move deny

This command is used to deny the station move function for IPv6 snooping entries. Use the **no** form of this command to revert to the default setting.

ipv6 snooping station-move deny

no ipv6 snooping station-move deny

Parameters

None.

Default

IPv6 snooping is permitting station moves.

Command Mode

Global Configuration Mode.

Usage Guideline

When station move is permitted, the dynamic snooping binding entry with same VLAN ID and MAC address on the specific port can move to another port if it detects the following conditions:

- A DHCPv6 snooping binding entry starts a new DHCP process on a new interface.
- An ND snooping binding entry starts a new DAD process on a new interface.

Example

This example shows how to deny the station move function.

```
Switch# configure terminal
Switch(config)# ipv6 snooping station-move deny
Switch(config)#
```

31-6 show ipv6 snooping policy

This command is used to display DHCPv6 guard information.

show ipv6 snooping policy [*POLICY-NAME***]**

Parameters

POLICY-NAME	(Optional) Specifies the DHCPv6 guard policy name.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Usage Guideline

Use this command to display DHCPv6 guard information. If no parameter is specified, information of all policies will be displayed.

Example

This example shows how to display DHCPv6 guard information.

```
Switch#show ipv6 snooping policy

Snooping policy: policy1
    Protocol: DHCP
    Limit Address Count: 25
    Target VLAN: 200

Switch#
```

32. IPv6 Source Guard Commands

32-1 ipv6 source binding

This command is used to add a static entry to the binding table. Use the **no** form of this command to remove the static binding entry.

ipv6 source binding MAC_ADDR vlan VLANID IPV6_ADDR interface {CMPORT_TYPE CMPORT_LIST | port-channel <integer (1-8)>}

no ipv6 source binding MAC_ADDR vlan VLANID IPV6_ADDR interface {CMPORT_TYPE CMPORT_LIST | port-channel <integer (1-8)>}

Parameters

MAC-ADDRESS	Specifies the MAC address of the manual binding entry.
vlan *VLAN-ID*	Specifies the binding VLAN of the manual binding entry.
IPV6-ADDRESS	Specifies the IPv6 address of the manual binding entry.
interface *INTERFACE-ID*	Specifies the interface number of the manual binding

Default

None.

Command Mode

Global Configuration Mode.

Usage Guideline

Use this command to set the static manual binding entry of the binding table.

Example

This example shows how to configure an IPv6 Source Guard entry with the IPv6 address of 2000::1 and MAC address of 00-01-02-03-04-05 at VLAN 2 on port 1.

```
Switch# configure terminal
Switch(config)# ipv6 source binding 00-01-02-03-04-05 vlan 2 2000::1 interface eth 1/0/1
Switch(config)#
```

32-2 ipv6 source-guard policy

This command is used to create an IPv6 source guard policy and enter into the Source-guard Policy Configuration Mode. Use the **no** form of this command to remove an IPv6 source guard policy.

ipv6 source-guard policy *POLICY-NAME*

no ipv6 source-guard policy *POLICY-NAME*

Parameters

POLICY-NAME	Specifies the name of the source guard policy.

Default

None.

Command Mode

Global Configuration Mode.

Usage Guideline

Use this command to create or remove a source guard policy name. This command will enter into the Source- guard Policy Configuration Mode.

Example

This example shows how to create an IPv6 source guard policy.

```
Switch# configure terminal
Switch(config)# ipv6 source-guard policy policy1
Switch(config-source-guard)#
```

32-3 deny global-autoconfig

This command is used to deny auto-configured traffic. Use the **no** form of this command to disable this function.

deny global-autoconfig

no deny global-autoconfig

Parameters

None.

Default

By default, this option is permitted.

Command Mode

Source-guard Policy Configuration Mode.

Usage Guideline

Use this command to deny data traffic from auto-configured global address. It is useful when all global addresses on a link are assigned by DHCP and the administrator that wants to block hosts with self-configured addresses from sending traffic.

Example

This example shows how to deny auto-configured traffic.

```
Switch# configure terminal
Switch(config)# ipv6 source-guard policy policy1
Switch(config-source-guard)# deny global-autoconfig
Switch(config-source-guard)#
```

32-4 ipv6 source-guard attach-policy

This command is used to apply IPv6 source guard on an interface. Use the **no** form of this command to remove the source guard from the interface.

ipv6 source-guard attach-policy [*POLICY-NAME***]**

no ipv6 source-guard attach-policy

Parameters

POLICY-NAME	(Optional) Specifies the name of the source guard policy.

Default

None.

Command Mode

Interface Configuration Mode.

Usage Guideline

When the command is applied to a port, the received IPv6 packet except ND, RA, RS and DHCP messages will perform the address binding check. The packet is allowed when it matches any of the address binding table's entries. The binding table includes the dynamic table (created by IPv6 snooping) and the static table (created by the ipv6 neighbor binding vlan command)

If the policy name is not specified, the default source guard policy will permit packets sent by the auto-configured address and deny packets sent by the link-local address.

Example

This example shows how to apply the IPv6 source guard policy "pol1" to port 3.

```
Switch# configure terminal
Switch(config)# interface eth
1/0/3
Switch(config-if)# ipv6 source-guard attach-policy pol1
Switch(config-if)#
```

32-5 show ipv6 source-guard policy

This command is used to display the IPv6 source guard policy configuration.

show ipv6 source-guard policy [*POLICY-NAME***]**

Parameters

POLICY-NAME	(Optional) Specifies the name of the source guard policy.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Usage Guideline

Use this command to display the IPv6 source guard policy configuration. If no parameter is specified, all IPv6 source guard polices will be display.

Example

This example shows how to display the IPv6 source guard policy configuration.

```
Switch# show ipv6 dhcp guard policy
DHCP guard policy: Policy1
    Device Role: DHCP client
    Source Address Match Access List: test
    Target: eth1/0/1
Switch#
```

32-6 show ipv6 neighbor binding

This command is used to display the IPv6 binding table.

show ipv6 neighbor binding [vlan <vlan_vfi_id>] [interface {<cmport_type> <cmport_list> | port-channel <integer (1-8)>}] [ipv6 <ip6_addr>] [mac <mac_addr>]

Parameters

vlan *VLAN-ID*	(Optional) Specifies to displays the binding entries that match the specified VLAN.
interface *INTERFACE-ID*	(Optional) Specifies to displays the binding entries that match the specified interface number.
ipv6 *IPV6-ADDRESS*	(Optional) Specifies to displays the binding entries that match the specified IPv6 address.
mac *MAC-ADDRESS*	(Optional) Specifies to displays the binding entries that match the specified MAC address.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Usage Guideline

Use this command to display the entries of the binding table.

Example

This example shows how to display the entries of the binding table.

```
Switch# show ipv6 neighbor binding
Codes: D - DHCPv6 Snooping, S - Static, N - ND Snooping, P - DHCP-PD Snooping
  IPv6 address                  MAC address         Interface       VLAN Time le
ft
S 2000::1                       00-01-02-03-04-05   eth1/0/1        2    N/A


Total Entries        : 1

Switch#
```

Display Parameters

Codes	The codes for the IPv6 snooping owner. • **D** - DHCPv6 Snooping. • **S** - Static. • **N** - ND Snooping.
IPv6 address	The IPv6 address of the binding entry.
MAC address	The MAC address of the binding entry.
Interface	The interface number of the binding entry.
VLAN	The VLAN of the binding entry.
Time left	The rest time for aging the binding entry. It is the inactivity for the static binding entry.

33. IGMP Snooping Commands

33-1 clear ip igmp snooping statistics

This command is used to clear the IGMP snooping related statistics.

clear ip igmp snooping statistics {all | vlan *VLAN-ID***}**

Parameters

all	Specifies to clear IP IGMP snooping statistics for all VLANs and all ports.
vlan *VLAN-ID*	Specifies a VLAN to clear the IP IGMP snooping statistics.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to clear the IGMP snooping related statistics.

Example

This example shows how to clear all IGMP Snooping statistics.

```
Switch# clear ip igmp snooping statistics all
Switch#
```

33-2 ip igmp snooping

This command is used to enable the IGMP snooping function on the Switch. Use the **no** form of this command to disable the IGMP snooping function.

ip igmp snooping

no ip igmp snooping

Parameters

None.

Default

IGMP snooping is disabled on all VLAN interfaces.

The IGMP snooping global state is disabled by default.

Command Mode

Interface Configuration Mode.

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

In the interface configuration mode, the command is only available for VLAN interface configuration. For a VLAN to operate with IGMP snooping, both the global state and per interface state must be enabled. On a VLAN, the setting of IGMP snooping and MLD snooping are independent. IGMP snooping and MLD snooping can be simultaneously enabled on the same VLAN.

Example

This example shows how to disable the IGMP snooping globally.

```
Switch# configure terminal
Switch(config)#no ip igmp snooping
Switch(config)#
```

This example shows how to enable the IGMP snooping globally.

```
Switch# configure terminal
Switch(config)# ip igmp snooping
Switch(config)#
```

This example shows how to disable IGMP snooping on VLAN1.

```
Switch# configure terminal
Switch(config)# vlan 1
Switch(config-vlan)# no ip igmp snooping
Switch(config-vlan)#
```

33-3 ip igmp snooping fast-leave

This command is used to configure IGMP Snooping fast-leave on the interface. Use the **no**form to disable the fast-leave option on the specified interface.

ip igmp snooping fast-leave

no ip igmp snooping fast-leave

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. The **ip igmp snooping fast-leave** command allows IGMP membership to be immediatelyremoved from a port when receiving the leave message without using the group specific or group-source specific query mechanism.

Example

This example shows how to enable IGMP snooping fast-leave on VLAN 1.

```
Switch# configure terminal
Switch(config)#vlan 1
Switch(config-vlan)# ip igmp snooping fast-leave
Switch(config-vlan)#
```

33-4 ip igmp snooping last-member-query-interval

This command is used to configure the interval at which the IGMP snooping querier sends IGMP group-specific or group-source-specific (channel) query messages. Use the **no** form of this command to revert to the default setting.

ip igmp snooping last-member-query-interval *SECONDS*

no ip igmp snooping last-member-query-interval

Parameters

SECONDS	Specifies the maximum amount of time between group-specific query messages, including those sent in response to leave-group messages. The range of this value is 1 to 25.

Default

By default, this value is 1 second.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. On receiving an IGMP leave message, the IGMP snooping querier will assume that there are no local members on the interface if there are no reports received after the response time. Users can lower this interval to reduce the amount of time it takes a switch to detect the loss of the last member of a group.

Example

This example shows how to configure the last member query interval time to be 3 seconds.

```
Switch# configure terminal
Switch(config)#vlan 1000
Switch(config-vlan)# ip igmp snooping last-member-query-interval 3
Switch(config-vlan)#
```

33-5 ip igmp snooping mrouter

This command is used to configure the specified interface(s) as the multicast router ports or as forbidden to be multicast router ports on the Switch. Use the **no** form of this command to remove the interface(s) from router ports or forbidden multicast router ports.

ip igmp snooping mrouter {interface *INTERFACE-ID* **[,|-] | forbidden interface** *INTERFACE-ID* **[,|-]}**

no ip igmp snooping mrouter {interface *INTERFACE-ID* **[,|-] | forbidden interface** *INTERFACE-ID* **[,|-]}**

Parameters

interface	Specifies a static multicast router port.
forbidden interface	Specifies a port that cannot be multicast router port.
INTERFACE-ID	(Optional) Specifies an interface or an interface list. The interface can be a physical interface or a port-channel.
,	(Optional)Specifies a series of interfaces, or a separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional)Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

No IGMP snooping multicast router port is configured.

Auto-learning is enabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. To specify a multicast router port, the valid interface can be a physical port or a port-channel. The specified multicast router port must be member port of the configured VLAN. A multicast router port can be either dynamic learned or statically configured. With the dynamic learning, the IGMP snooping entity will learn IGMP, PIM, or DVMRP packet to identify a multicast router port.

Example

This example shows how to add an IGMP snooping static multicast router port for VLAN 1.

```
Switch# configure terminal
Switch(config)#vlan 1
Switch(config-vlan)# ip igmp snooping mrouter interface ethernet 1/0/1
Switch(config-vlan)#
```

33-6 ip igmp snooping querier

This command is used to enable the capability of the entity as an IGMP querier. Use the **no** form of this command to disable the querier function.

ip igmp snooping querier

no ip igmp snooping querier

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. If the system can play the querier role, the entity will listen for IGMP query packets sent by other devices. If IGMP query message is received, the device with lower value of IP address becomes the querier.

Example

This example shows how to enable the IGMP snooping querier on VLAN 1.

```
Switch# configure terminal
Switch(config)#vlan 1
Switch(config-vlan)# ip igmp snooping querier
Switch(config-vlan)#
```

33-7 ip igmp snooping query-interval

This command is used to configure the interval at which the IGMP snooping querier sends IGMP general query messages periodically. Use the **no** form of this command to revert to the default setting.

ip igmp snooping query-interval *SECONDS*

no ip igmp snooping query-interval

Parameters

SECONDS	Specifies to configure the interval at which the designated router sends IGMP general-query messages. The range is 1 to 31744.

Default

By default, this value is 125 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. The query interval is the interval between General Queries sent by the Querier. By varying the query interval, an administrator may tune the number of IGMP messages on the network; larger values cause IGMP Queries to be sent less often.

Example

This example shows how to configure the IGMP snooping query interval to 300 seconds on VLAN 1000.

```
Switch# configure terminal
Switch(config)#vlan 1000
Switch(config-vlan)# ip igmp snooping query-interval 300
Switch(config-vlan)#
```

33-8 ip igmp snooping query-max-response-time

This command is used to configure the maximum response time advertised in IGMP snooping queries. Use the **no** form of this command to revert to the default setting.

ip igmp snooping query-max-response-time *SECONDS*

no ip igmp snooping query-max-response-time

Parameters

SECONDS	Specifies to set the maximum response time, in seconds, advertised in IGMP snooping queries. The range is 1 to 25.

Default

By default, this value is 10 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. This command configures the period of which the group member can respond to an IGMP query message before the IGMP Snooping deletes the membership.

Example

This example shows how to configure the maximum response time to 20 seconds on VLAN 1000.

```
Switch# configure terminal
Switch(config)#vlan 1000
Switch(config-vlan)# ip igmp snooping query-max-response-time 20
Switch(config-vlan)#
```

33-9 ip igmp snooping query-version

This command is used to configure the general query packet version sent by the IGMP snooping querier. Use the **no** form of this command to revert to the default setting.

ip igmp snooping query-version {1 | 2 | 3}

no ip igmp snooping query-version

Parameters

NUMBER	Specifies the version of the IGMP general query sent by the IGMP snooping querier.

Default

By default, this value is 3.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. The query version number setting will affect the querier electing. When configured to version 1, IGMP snooping will always act as the querier, and

will not initiate new querier electing no matter what IGMP query packet is received. When configured to version 2 or version 3, IGMP snooping will initiate a new querier electing if any IGMPv2 or IGMPv3 query packet is received. When receiving an IGMPv1 query packet, IGMP snooping will not initiate a new querier electing.

Example

This example shows how to configure the query version to be 2 on VLAN 1000.

```
Switch# configure terminal
Switch(config)#vlan 1000
Switch(config-vlan)# ip igmp snooping query-version 2
Switch(config-vlan)#
```

33-10 ip igmp snooping robustness-variable

This command is used to set the robustness variable used in IGMP snooping. Use the **no** form of this command to revert to the default value.

ip igmp snooping robustness-variable *VALUE*

no ip igmp snooping robustness-variable

Parameters

VALUE	Specifies the robustness variable. The range is from 1 to 7.

Default

By default, this value is 2.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. The robustness variable provides fine-tuning to allow for expected packet loss on an interface. The value of the robustness variable is used in calculating the following IGMP message intervals:

- **Group member interval** – The amount of time that must pass before a multicast router decides there are no more members of a group on a network.

  This interval is calculated as follows: (robustness variable x query interval) + (1 x query response interval).

- **Other querier present interval** – The amount of time that must pass before a multicast router decides that there is no longer another multicast router that is the querier.

  This interval is calculated as follows: (robustness variable x query interval) + (0.5 x query response interval).

- **Last member query count** – The number of group-specific queries sent before the router assumes there are no local members of a group. The default number is the value of the robustness variable.

Users can increase this value if a subnet is expected to be loose.

Example

This example shows how to configure the robustness variable to be 3 on interface VLAN 1000.

```
Switch# configure terminal
Switch(config)#vlan 1000
Switch(config-vlan)# ip igmp snooping robustness-variable 3
Switch(config-vlan)#
```

33-11 ip igmp snooping static-group

This command is used to configure an IGMP snooping static group. Use the **no** form of this command is used to delete a static group.

ip igmp snooping static-group *GROUP-ADDRESS* **interface** *INTERFACE-ID* **[,|-]**

no ip igmp snooping static-group *GROUP-ADDRESS* **[interface** *INTERFACE-ID* **[,|-]]**

Parameters

GROUP-ADDRESS	Specifies an IP multicast group address.
INTERFACE-ID	(Optional) Specifies an interface or an interface list. The interface can be a physical interface or a port-channel.
,	(Optional) Specifies a series of interfaces, or a separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

By default, no static-group is configured.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. This command applies to IGMP snooping on a VLAN interface to statically add group membership entries.

The **ip igmp snooping static-group** command allows the user to create an IGMP snooping static group in case that the attached host does not support the IGMP protocol.

Example

This example shows how to statically add a group for IGMP snooping.

```
Switch# configure terminal
Switch(config)#vlan 1
Switch(config-vlan)# ip igmp snooping static-group 226.1.2.3 interface ethernet 1/0/5
Switch(config-vlan)#
```

33-12 show ip igmp snooping

This command is used to display IGMP snooping information on the Switch.

show ip igmp snooping [vlan *VLAN-ID***]**

Parameters

vlan *VLAN-ID*	(Optional) Specifies the VLAN to be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display IGMP snooping information for all VLANs where IGMP snooping is enabled.

Example

This example shows how to display IGMP snooping global state.

```
Switch#show ip igmp snooping

IGMP snooping global state: Enabled

Switch#
```

This example shows how to display IGMP snooping information on VLAN 2.

```
Switch#show ip igmp snooping vlan 2

    IGMP snooping state              : Disabled
    Fast leave                       : Enabled (host-based)
    Querier state                    : Enabled (Non-active)
    Query version                    : v2
    Query interval                   : 300 seconds
    Max response time                : 20 seconds
    Robustness value                 : 2
    Last member query interval       : 3 seconds

Switch#
```

33-13 show ip igmp snooping groups

This command is used to display IGMP snooping group information learned on the Switch.

show ip igmp snooping groups [vlan *VLAN-ID* **|** *IP-ADDRESS***]**

Parameters

vlan *VLAN-ID*	(Optional) Specifies the VLAN interface to be displayed. If no VLAN is specified, IGMP snooping group information of all VLANs will be displayed, at which IGMP Snooping is enabled.
IP-ADDRESS	(Optional) Specifies the group IP address to be displayed. If no IP address is specified, all IGMP group information will be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display IGMP snooping group information.

Example

This example shows how to display IGMP snooping group information.

```
Switch# show ip igmp snooping groups

IGMP Snooping Connected Group Membership:

VLAN ID  Group address    Source address   Exp(sec)  Interface
-------  ---------------  ---------------  --------  ---------
1        239.255.255.250         *         382       2/0/7

Total Entries: 1

Switch#
```

33-14 show ip igmp snooping mrouter

This command is used to display IGMP snooping router port information learned and configured on the Switch.

show ip igmp snooping mrouter [vlan *VLAN-ID***]**

Parameters

vlan *VLAN-ID*	(Optional) Specifies the VLAN. If no VLAN is specified, IGMP snooping information on all VLANs will be displayed of which IGMP snooping is enabled.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display dynamically learned or manually configured multicast router interfaces.

Example

This example shows how to display IGMP snooping router port information.

```
Switch# show ip igmp snooping mrouter

VLAN     Ports
-------- ---------------------------------
1       3/0/3-3/0/4 (static)
3/0/6 (forbidden)
         4/0/2 (dynamic)
2        4/0/4 (static)
         4/0/3 (dynamic)

Total Entries: 2

Switch#
```

33-15 show ip igmp snooping static-group

This command is used to display IGMP snooping statistics group information on the Switch.

show ip igmp snooping static-group [*GROUP-ADDRESS* **| vlan** *VLAN-ID***]**

Parameters

GROUP-ADDRESS	(Optional) Specifies the group IP address to be displayed.
vlan *VLAN-ID*	(Optional) Specifies the VLAN ID to be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the IGMP snooping static group information.

Example

This example shows how to display IGMP snooping static group information.

```
Switch#show ip igmp snooping static-group

VLAN ID  Group address    Interface
-------  ---------------  ------------------------
2        226.1.2.2        1/0/3

Total Entries: 1

Switch#
```

33-16 show ip igmp snooping statistics

This command is used to display IGMP snooping statistics information on the Switch.

show ip igmp snooping statistics vlan [*VLAN-ID***]**

Parameters

vlan *VLAN-ID*	Specifies the VLAN ID to display VLAN statistics.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the IGMP snooping related statistics information.

Example

This example shows how to display IGMP snooping statistics information.

```
Switch# show ip igmp snooping statistics vlan 1

VLAN 1 Statistics:
IGMPv1 Rx: Report 1, Query 0
IGMPv2 Rx: Report 0, Query 0, Leave 0
IGMPv3 Rx: Report 0, Query 0
IGMPv1 Tx: Report 0, Query 0
IGMPv2 Tx: Report 0, Query 0, Leave 0
IGMPv3 Tx: Report 0, Query 0

Total Entries: 1

Switch#
```

34. Interface Commands

34-1 clear counters

This command is used to clear counters for a physical port interface.

clear counters {all | interface *INTERFACE-ID* **[,|-]}**

Parameters

all	Specifies to clear counters for all interfaces.
INTERFACE-ID	Specifies the interface ID to clear the counter.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear counters for a physical port interface.

Example

This example shows how to clear the counters of interface ethernet1/0/1.

```
Switch# clear counters interface ethernet 1/0/1
Switch#
```

34-2 description

This command is used to add a description to an interface.

description *STRING*

no description

Parameters

STRING	Specifies a description for an interface with a maximum of 64 characters.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The specified description corresponds to the MIB object “ifAlias” defined in the RFC2233.

Example

This example shows how to add the description “Physical Port 10” to interface ethernet 1/0/10.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/10
Switch(config-if)# description "Physical Port 10"
Switch(config-if)#
```

34-3 interface

This command is used to enter the interface configuration mode for a single interface. Use the **no** form of this command to remove an interface.

interface *INTERFACE-ID*

no interface *INTERFACE-ID*

Parameters

INTERFACE-ID	Specifies the ID of the interface. The interface ID is formed by interface type and interface number. The interface types are as follows: • ethernet - Ethernet switch port with all different media. • vlan - VLAN interface. • port-channel - Aggregated port channel interface. • range - Enter the interface range configuration mode for multiple interfaces. • combo copper ethernet – Ethernet switch port with combo copper media • combo fiber ethernet - Ethernet switch port with combo fiber media

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command enters the interface configuration mode for a specific interface.The format of the interface number is dependent on the interface type.For physical port interfaces, the user cannot enter the interface if the Switch’s port does not exist. The physical port interface cannot be removed by the **no** command.

Use the **interface vlan** command to create Layer 3 interfaces. Use the **vlan** command in the global configuration mode to create a VLAN before creating Layer 3 interfaces. Use the **no interface vlan** command to remove a Layer 3 interface.

The port channel interface is automatically created when the **channel-group** command is configured for the physical port interface. A port channel interface will be automatically removed when no physical port interface has the **channel-group** command configured for it. Use the **no interface port-channel** command to remove a port-channel.

For a NULL interface, the **null0** interface is supported and can’t be removed.

Example

This example shows how to enter the interface configuration mode for the interface ethernet 1/0/5.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/5
Switch(config-if)#
```

This example shows how to enter the interface configuration mode for VLAN 100.

```
Switch# configure terminal
Switch(config)#interface vlan 100
Switch(config-if)#
```

This example shows how to enter interface configuration mode for port channel 3.

```
Switch# configure terminal
Switch(config)#interface port-channel 3
Switch(config-if)#

This example shows how to enter combo rj45 port interface configuration mode for the
interface ethernet 1/0/11
Switch# configure terminal
Switch(config)# interface combo copper ethernet 1/0/11
Switch(config-if-combo)#
```

34-4 interface range

This command is used to enter the interface range configuration mode for multiple interfaces.

interface range *INTERFACE-ID* **[, | -]**

Parameters

INTERFACE-ID	Specifies the physical port interface.
,	(Optional)Specifies the interface range by delimiting a list of interface IDs with commas. No spacesare allowed before and after the comma.
-	(Optional) Specifies an interface range by delimiting the start and the ending interface numbers with a hyphen. No spacesare allowed before and after the hyphen.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command enters the interface configuration mode for the specified range of interfaces. Commands configured in the interface range mode, applies to interfaces in the range.

Example

This example shows how to enter the interface configuration mode for the range of ports 1/0/1 to 1/0/5: and port 1/0/7.

```
Switch# configure terminal
Switch(config)# interface range ethernet 1/0/2-5,1/0/7
Switch(config-if-range)#

This example shows how to enter combo sfp port interface configuration mode for the range of ports 1/0/11 to 1/0/12
Switch# configure terminal
Switch(config)# interface combo fiber range ethernet 1/0/11-12
Switch(config-if-combo-range)#
```

34-5 show counters

This command is used to display interface information.

show counters [interface *INTERFACE-ID***]**

Parameters

INTERFACE-ID	Specifies that the interface can be a physical port. If no interface is specified, counters of all interfaces will be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the statistic counters for an interface.

Example

This example shows how to display the counters for interface ethernet1/0/1.

```
Switch#show counter interface ethernet 1/0/1

ethernet1/0/1 counters
rxHCTotalPkts                     : 1176
txHCTotalPkts                     : 348
rxHCUnicastPkts                   : 0
txHCUnicastPkts                   : 0
rxHCMulticastPkts                 : 755
txHCMulticastPkts                 : 0
rxHCBroadcastPkts                 : 421
txHCBroadcastPkts                 : 348
rxHCOctets                        : 112581
txHCOctets                        : 126324
rxHCPkt64Octets                   : 21
rxHCPkt65to127Octets              : 982
rxHCPkt128to255Octets             : 173
rxHCPkt256to511Octets             : 0
rxHCPkt512to1023Octets            : 0
rxHCPkt1024to1518Octets           : 0
rxHCPkt1519to1522Octets           : 0
rxHCPkt1519to2047Octets           : 0
rxHCPkt2048to4095Octets           : 0
rxHCPkt4096to9216Octets           : 0
txHCPkt64Octets                   : 0
txHCPkt65to127Octets              : 0
txHCPkt128to255Octets             : 0
txHCPkt256to511Octets             : 348
txHCPkt512to1023Octets            : 0
txHCPkt1024to1518Octets           : 0
txHCPkt1519to1522Octets           : 0
txHCPkt1519to2047Octets           : 0
txHCPkt2048to4095Octets           : 0
txHCPkt4096to9216Octets           : 0

rxCRCAlignErrors                  : 0
rxUndersizedPkts                  : 0
rxOversizedPkts                   : 0
rxFragmentPkts                    : 0
rxJabbers                         : 0
rxSymbolErrors                    : 0
rxMulticastDropPkts               : 0
rxMTUDropPkts                     : 0

ifInErrors                        : 0
ifOutErrors                       : 0
ifInDiscards                      : 1175
ifInUnknownProtos                 : 0
ifOutDiscards                     : 0
txDelayExceededDiscards           : 0

dot3StatsAlignmentErrors          : 0
dot3StatsFCSErrors                : 0
dot3StatsSingleColFrames          : 0
dot3StatsMultiColFrames           : 0
dot3StatsSQETestErrors            : 0
dot3StatsDeferredTransmisions     : 0
dot3StatsLateCollisions           : 0
```

```
dot3StatsExcessiveCollisions       : 0
dot3StatsInternalMacTransmitErrors : 0
dot3StatsCarrierSenseErrors        : 0
dot3StatsInternalMacReceiveErrors  : 0

linkChange                         : 1

Switch#
```

34-6 show interfaces

This command is used to display the interface information.

show interfaces [*INTERFACE-ID* **[- | ,]]**

Parameters

INTERFACE-ID	(Optional) Specifies that the interface can be a physical port, VLAN, or other.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If no interfaceis specified, all existing physical ports will be displayed.

Example

This example shows how to display the interface information for ethernet1/0/1.

```
Switch#show interfaces ethernet1/0/1

Ethernet1/0/1 is enabled, link status is up
  Interface type: 1000BASE-T
  Interface description:
  MAC Address: 00-01-02-03-04-01
  Auto-duplex, auto-speed, auto-mdix
  Send flow-control: off, receive flow-control: off
  Send flow-control oper: off, receive flow-control oper: off
  Full-duplex, 1Gb/s
  Maximum transmit unit: 1536 bytes
  Rx rate: 0 bytes/sec, TX rate: 0 bytes/sec
  RX bytes: 116316, TX bytes: 132495
  RX rate: 0 packets/sec, TX rate: 0 packets/sec
  RX packets: 1213, TX packets: 365
  RX multicast: 774, RX broadcast: 439
  RX CRC error: 0, RX undersize: 0
  RX oversize: 0, RX fragment: 0
  RX jabber: 0, RX dropped Pkts: 1212
  RX MTU exceeded: 0, TX excessive deferral: 0
  TX single collision: 0, TX excessive collision: 0
  TX late collision: 0

Switch#
```

34-7 show interfaces counters

This command is used to display counters on specified interfaces.

show interfaces [*INTERFACE-ID* **[,|-]] counters [errors]**

Parameters

errors	(Optional) Specifies to display the error counters.
INTERFACE-ID	(Optional) Specifies that the interface can be a physical port. If no interface is specified, the counters on all interfaces will be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command allows the user to display switch port statistics counters.

Example

This example shows how to display switch port counters on ports 1 to 8.

```
Switch#show interfaces ethernet 1/0/1-8 counters

Port          InOctets /             InMcastPkts /
              InUcastPkts            InBcastPkts
------------- ---------------------- ----------------------
ethernet1/0/1      1834520                629
              9234                   338
ethernet1/0/2      0                      0
              0                      0
ethernet1/0/3      0                      0
              0                      0
ethernet1/0/4      0                      0
              0                      0
ethernet1/0/5      0                      0
              0                      0
ethernet1/0/6      0                      0
              0                      0
ethernet1/0/7      0                      0
              0                      0
ethernet1/0/8      0                      0
              0                      0

Port          OutOctets /            OutMcastPkts /
              OutUcastPkts           OutBcastPkts
------------- ---------------------- ----------------------
ethernet1/0/1      5387265                0
              9381                   0
ethernet1/0/2      0                      0
              0                      0
ethernet1/0/3      0                      0
              0                      0
ethernet1/0/4      0                      0
              0                      0
ethernet1/0/5      0                      0
              0                      0
ethernet1/0/6      0                      0
              0                      0
ethernet1/0/7      0                      0
              0                      0
ethernet1/0/8      0                      0
              0                      0

Total Entries:8

Switch#
```

This example shows how to display switch ports error counters.

```
Switch#
Switch# show interfaces ethernet 1/0/1-8 counters errors

Port         Align-Err    Fcs-Err      UnderSize    OutDiscard   Carri-Sen
---------    --------     ---------    ----------   ----------   -------
ethernet1/0/1     0            0            0            0            0
ethernet1/0/2     0            0            0            0            0
ethernet1/0/3     0            0            0            0            0
ethernet1/0/4     0            0            0            0            0
ethernet1/0/5     0            0            0            0            0
ethernet1/0/6     0            0            0            0            0
ethernet1/0/7     0            0            0            0            0
ethernet1/0/8     0            0            0            0            0

Port         Single-Col   Multi-Col    Late-Col     Excess-Col   SQETest-Err
---------    --------     ---------    ----------   ----------   ------
ethernet1/0/1     0            0            0            0            0
ethernet1/0/2     0            0            0            0            0
ethernet1/0/3     0            0            0            0            0
ethernet1/0/4     0            0            0            0            0
ethernet1/0/5     0            0            0            0            0
ethernet1/0/6     0            0            0            0            0
ethernet1/0/7     0            0            0            0            0
ethernet1/0/8     0            0            0            0            0

Port         DeferredTx   IntMacTx     IntMacRx
---------    ----------   --------     ----------
ethernet1/0/1     0            0            0
ethernet1/0/2     0            0            0
ethernet1/0/3     0            0            0
ethernet1/0/4     0            0            0
ethernet1/0/5     0            0            0
ethernet1/0/6     0            0            0
ethernet1/0/7     0            0            0
ethernet1/0/8     0            0            0

total entries: 8
Switch#
```

34-8 show interfaces status

This command is used to display the Switch's port connection status.

show interfaces [*INTERFACE-ID* **[,|-]] status**

Parameters

INTERFACE-ID	(Optional) Specifies the interface ID. If no interface is specified, the connection status of all switch ports will be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displaysthe Switch's port connection status.

Example

This example shows how to display the Switch's port connection status.

```
Switch# show interface ethernet 1/0/1-8 status

Port         Description          Status        MAC Address        VLAN    Duplex
Speed      Type
------------ -------------------- ------------- ------------------ ------- ---------- ---
------- ----------
eth1/0/1                          Connected     88-76-B9-AA-49-38  1       Auto-Full  1G
1GBASE-T
eth1/0/2                          Not-Connected 88-76-B9-AA-49-39  1       Auto
Auto       1GBASE-T
eth1/0/3                          Not-Connected 88-76-B9-AA-49-3A  1       Auto
Auto       1GBASE-T
eth1/0/4                          Not-Connected 88-76-B9-AA-49-3B  1       Auto
Auto       1GBASE-T
eth1/0/5                          Not-Connected 88-76-B9-AA-49-3C  1       Auto
Auto       1GBASE-T
eth1/0/6                          Not-Connected 88-76-B9-AA-49-3D  1       Auto
Auto       1GBASE-T
eth1/0/7                          Not-Connected 88-76-B9-AA-49-3E  1       Auto
Auto       1GBASE-T
eth1/0/8                          Not-Connected 88-76-B9-AA-49-3F  1       Auto
Auto       1GBASE-T

Total Entries: 8

Switch#
```

34-9 show interfaces gbic

This command is used to display the GBIC (transceiver) Switch's port connection status.

show interfaces [*INTERFACE-ID* **[,|-]] gbic**

Parameters

INTERFACE-ID	(Optional) Specifies the interface ID. If no interface is specified, the connection status of all switch ports will be displayed.
gbic	Specifies to display GBIC status information

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays GBIC status information.

Example

This example shows how to display GBIC status information.

```
Switch# show interfaces gbic

eth1/0/9
 Interface Type                   : 10GBASE-R
 Laser Identifier                 : SFP or SFP+
 Connector Type                   : Copper pigtail
 Ethernet Compliance Code         : Unknown
 Encoding                         : 64B/66B
 Vendor Name                      : IBM-Amphenol
 Vendor OUI                       : 00:17:ef
 Vendor PN                        : 00AY756-H46148
 Vendor Rev                       : A
 Vendor SN                        : YL10FY7885C4
 Date Code                        : 170811
 Received Power Measurements Type : Average Power
 Compatibility                    : Multi-Mode, 10300Mbd, 256nm
 Transfer Distance:
    copper                : 2m

eth1/0/10
 Interface Type                   : 10GBASE-R

Switch#
```

34-10 shutdown

This command is used to disable an interface. Use the **no** form of this command to enable an interface.

shutdown

no shutdown

Parameters

None.

Default

By default, this option is no shutdown.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The physical port is valid for this configuration. This command is also configurable for port channel member ports.

The command will cause the port to enter the disabled state. Under the disabled state, the port will not be able to receive or transmit any packets. Using the **no shutdown** command will put the port back into the enabled state. When a port is shut down, the link status will also be turned off.

Example

This example shows how to enter the shutdown command to disable the port state of interface port 1/0/1.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# shutdown
```

35. IP Utility Commands

35-1 traceroute

This command is used to display a hop-by-hop path from the Switch through an IP network to a specific destination host..

traceroute {*IP-ADDRESS* **|** *IPV6-ADDRESS***} [***probe NUMBER***] [timeout** *SECONDS***] [max-ttl** *TTL***] [port** *DEST-PORT***]**

Parameters

IP-ADDRESS	Specifies the IPv4 address of the destination host.
IPV6-ADDRESS	Specifies the IPv6 address of the system to discover.
probe	(Optional) Specify the number of datagram sent.
timeout *SECONDS*	(Optional) Specifies response timeout value, in seconds.
max-ttl *TTL*	(Optional) Specifies the maximum TTL value for outgoing UDP datagrams.
port *DEST-PORT*	(Optional) Specifies the base UDP destination port number used in outgoing datagrams.

Default

By default, three 64-byte UDP datagrams with an Initial TTL of 1 is sent.

The maximum TTL value is 30.

The timeout period is 5 seconds.

The destination base UDP port number is 33434.

Command Mode

EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

To interrupt this command after the command has been issued, press **Ctrl-C**.

This command uses the TTL field in the IP header to cause routers and servers to generate specific return messages. A traceroute starts by sending a UDP datagram to the destination host with the TTL field set to 1. If a router finds a TTL value of 1 or 0, it drops the datagram and sends back an ICMP time-exceeded message to the sender.

The **traceroute** facility determines the address of the first hop by examining the source address field of the ICMP time-exceeded message. To identify the next hop, traceroute again sends a UDP packet, but this time with a TTL value of 2. The first router decrements the TTL field by 1 and send the datagram to the next router. The second router sees a TTL value of 1, discards the datagram, and returns the time-exceeded message to the source. This process continues until the TTL is incremented to a value large enough for the datagram to reach the destination host (or until the maximum TTL is reached). To determine when a datagram has reached its destination, traceroute sets the UDP destination port in the datagram to a very large value that the destination host is unlikely to be using. When a host receives a datagram with an unrecognized port number, it sends an ICMP port unreachable error to the source. This message indicates to the traceroute facility that it has reached the destination.

Example

This example shows how to traceroute destination IP address “8.8.8.8”.

```
Switch# traceroute 8.8.8.8 probe 8
 1    ms        192.168.0.1
 2    ms        168.95.23.118
 2    ms        220.128.9.242
 2    ms        220.128.9.13
 3    ms        142.250.169.122
 4    ms        108.170.244.129
 2    ms        8.8.8.8

Trace Complete
```

35-2 ping

This command is used to diagnose basic network connectivity.

ping {*IP-ADDRESS* **|** *IPV6-ADDRESS* **[VLAN-ID]} [count** *TIMES***] [timeout** *SECONDS***] [source {***IP-ADDRESS* **|** *IPV6-ADDRESS***}]**

Parameters

IP-ADDRESS	Specifies the IPv4 address of the destination host.
IPV6-ADDRESS	Specifies the IPv6 address of the system to discover.
VLAN-ID	(Optional) The ip address vlan ID to get the interface index
count *TIMES*	(Optional) Specifies to stop after sending the specified number of echo request packets.
timeout *SECONDS*	(Optional) Specifies response timeout value, in seconds.
source {*IP-ADDRESS* **|** *IPV6-ADDRESS***}**	Specifies the source IP address used for the ping packet. The specified IP address must one of the IP address configured for the Switch. The destination address and the source IP must be the same type of address, both are IPv4 or IPv6.

Default

If the **timeout** parameter is not specified, the timeout value will be 1 second.

Command Mode

EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to verify the reachability, reliability, and delay of the path to the destination host. If neither the count or timeout value is specified, the only way to stop the ping is by pressing Ctrl+C.

Example

This example shows how to ping the host with IP address 211.21.180.1 with count 4 times.

```
Switch#ping 211.21.180.1 count 4

Reply from 211.21.180.1, time=10ms
Reply from 211.21.180.1, time<10ms
Reply from 211.21.180.1, time<10ms
Reply from 211.21.180.1, time<10ms

 Ping Statistics for 211.21.180.1
 Packets: Sent =4, Received =4, Lost =0


Switch#
```

This example shows how to ping the host with IPv6 address 2001:238:f8a:77:7c10:41c0:6ddd:ecab.

```
Switch# ping 2001:238:f8a:77:7c10:41c0:6ddd:ecab

Reply from 2001:238:f8a:77:7c10:41c0:6ddd:ecab , bytes=100, time<10 ms
Reply from 2001:238:f8a:77:7c10:41c0:6ddd:ecab , bytes=100, time<10 ms
Reply from 2001:238:f8a:77:7c10:41c0:6ddd:ecab , bytes=100, time<10 ms
Reply from 2001:238:f8a:77:7c10:41c0:6ddd:ecab , bytes=100, time<10 ms

 Ping Statistics for 2001:238:f8a:77:7c10:41c0:6ddd:ecab
 Packets: Sent =4, Received =4, Lost =0

Switch#
```

36. Jumbo Frame Commands

36-1 max-rcv-frame-size

This command is used to configure the maximum Ethernet frame size allowed. Use the **no** form of this command to revert to the default setting.

max-rcv-frame-size *BYTES*

no max-rcv-frame-size

Parameters

BYTES	Specifies the maximum Ethernet frame size allowed. Range allowed from 1518~12288 bytes.

Default

By default, this value is 1536 bytes.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical ports configuration. Oversize frames will be dropped and checks are carried out on ingress ports. Use this command to transfer large frames or jumbo frames through the switch system to optimize server-to-server performance.

Example

This example shows how to configure the maximum received Ethernet frame size to be 6000 bytes on port 4/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet4/0/1
Switch(config-if)# max-rcv-frame-size 6000
Switch(config-if)#
```

37. Link Aggregation Control Protocol (LACP) Commands

37-1 channel-group

This command is used to assign an interface to a channel group. Use the **no** form of this command to remove an interface from a channel-group.

channel-group *CHANNEL-NO* **mode {on | active | passive}**

no channel-group

Parameters

CHANNEL-NO	Specifies the channel group ID. The valid range is 1 to 8.
on	Specifies that the interface is a static member of the channel-group.
active	Specifies the interface to operate in LACP active mode.
passive	Specifies the interface to operate in LACP passive mode.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for physical port interface configuration. The system will automatically create the port-channel when a physical port first joins a channel group. An interface can only join one channel-group.

If the mode **on** is specified in the command, the channel group type is static. If the mode **active** or **passive** is specified in the command, the channel group type is LACP. A channel group can only consist of either static members or LACP members. Once the type of channel group has been determined, other types of interfaces cannot join the channel group.

Use the **no** form of this command to remove the interface from the channel group. If the channel group has no member ports left after a port is removed, the channel group will be deleted automatically. A port channel can also be removed by the **no interface port-channel** command.

If the security function is enabled on a port, then this port cannot be specified as a channel group member.

Example

This example shows how to assign Ethernet interfaces 1/0/4 to 1/0/5 to a new LACP channel-group, with an ID of 3, and sets the LACP mode to active.

```
Switch# configure terminal
Switch(config)#interface range ethernet 1/0/4-5
Switch(config-if)# channel-group 3 mode active
Switch(config-if)#
```

37-2 lacp port-priority

This command is used to configure the port priority. Use the **no** form of this command to revert the port priority to the default settings.

lacp port-priority *PRIORITY*

no lacp port-priority

Parameters

PRIORITY	Specifies the port priority. The range is 1 to 65535.

Default

The default port-priority is 32768.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The LACP port-priority determines which ports can join a port-channel and which ports are put in the standalone mode. The lower value has a higher priority. If two or more ports have the same priority, the port number determines the priority

Example

This example shows how to configure the port priority to 20000 on interfaces 1/0/4 to 1/0/5.

```
Switch# configure terminal
Switch(config)#interface range ethernet 1/0/4-5
Switch(config-if)# lacp port-priority 20000
Switch(config-if)#
```

37-3 lacp timeout

This command is used to configure the LACP long or short timer. Use the **no** form of this command to return to the default value.

lacp timeout {short | long}

no lacp timeout

Parameters

short	Specifies that there will be 3 seconds before invalidating received LACPDU information. Once the partner recognizes this information in the received PDU, LACP PDU periodic transmissions will be sent at 1 second intervals.
long	Specifies that there will be 90 seconds before invalidating received LACPDU information.Once the partner recognizes this information in the received PDU, LACP PDU periodic transmissions will be sent at30 second intervals.

Default

By default, the LACP timeout mode is short.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port interface configuration.

Example

This example shows how to configure the port LACP timeout to long mode on Ethernet interface 1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# lacp timeout long
Switch(config-if)#
```

37-4 lacp system-priority

This command is used to configure the system priority. Use the **no** form of this command to revert the system priority back to the default value.

lacp system-priority *PRIORITY*

no lacp system-priority

Parameters

PRIORITY	Specifies the system priority. The range is 1 to 65535.

Default

The default LACP system-priority is 32768.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

During LACP negotiation, the system priority and port priority of the local partner will be exchanged with the remote partner. When the maximum number of actual members exceeds the limitation, the Switch will use port priority to determine whether a port is operating in a backup mode or in an active mode. The LACP system-priority determines the Switch that controls the port priority. Port priorities on the other switch are ignored.

The lower value has a higher priority. If two switches have the same system priority, the LACP system ID (MAC) determines the priority. The LACP system priority command applies to all LACP port-channels on the Switch.

Example

This example shows how to configure the LACP system priority to be 30000.

```
Switch# configure terminal
Switch(config)#lacp system-priority 30000
Switch(config)#
```

37-5 port-channel load-balance

This command is used to configure the load balance algorithm that the Switch uses to distribute packets across ports in the same channel. Use the **no** form of this command to revert to the default setting.

port-channel load-balance { dst-ip | dst-mac | src-dst-ip | src-dst-mac | src-ip | src-mac | l4-dst-port | l4-src-port | l4-src-dst-port }

no port-channel load-balance

Parameters

dst-ip	Specifies that the Switch should examine the IP destination address.
dst-mac	Specifies that the Switch should examine the MAC destination address.
src-dst-ip	Specifies that the Switch should examine the IP source address and IP destination address.
src-dst-mac	Specifies that the Switch should examine the MAC source and MAC destination address.
src-ip	Specifies that the Switch should examine the IP source address.
src-mac	Specifies that the Switch should examine the MAC source address.
l4-dst-port	Specifies that the Swtich should examine the destination port.
l4-src-port	Specifies that the Swtich should examine the source port.
l4-src-dst-port	Specifies that the Swtich should examine the source and destination port.

Default

The default load balance algorithm is **src-mac**.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the load balance algorithm. Only one algorithm can be specified.

Example

This example shows how to configure the load balance algorithm as **src-ip**.

```
Switch# configure terminal
Switch(config)#port-channel load-balance src-ip
Switch(config)#
```

37-6 show channel-group

This command is used to display the channel group information.

show channel-group [channel [*CHANNEL-NO*] {detail | neighbor} | load-balance | sys-id]

Parameters

CHANNEL-NO	(Optional) Specifies the channel group ID.
channel	(Optional) Specifies to display information for the specified port-channels.
detail	(Optional) Specifies to display detailed channel group information.
neighbor	(Optional) Specifies to display neighbor information.
load-balance	(Optional) Specifies to display the load balance information.
sys-id	(Optional) Specifies to display the system identifier that is being used by LACP.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If a port-channel number is not specified, all port-channels will be displayed. If the channel, **load-balance** and **sys-id** keywords are not specified with the **show channel-group** command, only summary channel-group information will be displayed.

Example

This example shows how to display the detailed information of all port-channels.

38. Multicast VLAN Commands

38-1 mvlan enable

This command is used to enable multicast VLAN and configure some options for the multicast VLAN feature. Use the **no** form of this command to disable the state or revert to the default settings.

mvlan {ipv4 enable | ipv6 enable}

no mvlan {ipv4 enable | ipv6 enable}

Parameters

ipv4 enable	Specifies to enable the IPv4 IGMP control packet process in multicast VLAN.
ipv6 enable	Specifies to enable the IPv6 MLD control packet process in multicast VLAN.

Default

Multicast VLAN for the IPv4 packet process is disabled.

Multicast VLAN for the IPv6 packet process is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

This command is used to enable or disable multicast VLAN and configure some options for the multicast VLAN feature.

Example

This example shows how to enable the multicast VLAN feature for IPv4 multicast packets.

```
Switch# configure terminal
Switch(config)# mvlan ipv4 enable

Switch(config)#
```

38-2 mvlan

This command is used to configure characteristics of the multicast VLAN feature. Use the **no** form of this command to revert to the default setting.

mvlan {forward-unmatched | ignore-vlan}

no mvlan {forward-unmatched | ignore-vlan}

Parameters

forward-unmatched	Specifies that the packet will be forwarded or dropped if the received IGMP or MLD control packet is either untagged or does not match any profile, and the associated default VLAN is either a multicast VLAN or is tagged with a multicast VLAN that does not match the associated profile.
ignore-vlan	Specifies the setting for tagged IGMP or MLD control packets. When this option is enabled, the Switch will ignore the VLAN of the receiving IGMP or MLD control packet, and try to find a matching profile.

Default

By default, forward-unmatched is disabled, and the packet is dropped.

By default, ignore VLAN is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

If an untagged IGMP/MLD report/leave/done packet is received by a port, it will be matched against the multicast VLAN group profile that the port belongs to. If it matches, it will be classified as belonging to the corresponding multicast VLAN and handled by the subsequent group learning process with the matched multicast VLAN.

If there is no match against all multicast VLANs and if the VLAN associated with the packet happens to be a multicast VLAN, the IGMP/MLD packet can be either dropped or forwarded to VLAN member ports depending on the setting of the **forward-unmatched** parameter. If the **no mvlan forward-unmatched** command is configured, the packet is dropped. If the **mvlan forward-unmatched** command is configured, the packet is forwarded.

If there are no matches against all multicast VLANs and the packet's VLAN is not configured as the multicast VLAN, the IGMP/MLD packet will not be handled by the multicast VLAN.

If the IGMP/MLD report/leave/done packet received by the receiver port is tagged, the handling is different based on setting of the **ignore-vlan** parameters.

If the packet VLAN is a multicast VLAN and the packet matches the group profile of the VLAN, the packet will be handled by the subsequent group learning process. If there is no match, the packet will be handled based on the setting of the **forward-unmatched** parameter. If the packet VLAN is not a multicast VLAN, the packet will not be handled by the multicast VLAN.

If the packet VLAN is IGMP/MLD snooping enabled, the packet will be processed by IGMP/MLD snooping. If the packet VLAN is IGMP/MLD snooping disabled, the VLAN is ignored and the multicast VLAN group profile associated with the port is used. If there is a match, the packet will be handled by the subsequent group learning process with the matched multicast VLAN. If there is no match but the packet VLAN is a multicast VLAN, the packet will be handled based on the setting of the **forward-unmatched** parameter. If the packet VLAN is not a multicast VLAN, the packet will not be handled by multicast VLAN.

Example

This example shows how to enable the forward unmatched and ignore VLAN setting.

```
Switch# configure terminal
Switch(config)# mvlan forward-unmatched
Switch(config)# mvlan ignore-vlan
Switch(config)#
```

38-3 mvlan vlan

This command is used to create a multicast VLAN. Use the **no** form of this command to remove a multicast VLAN.

mvlan vlan *VLAN-ID*

no mvlan vlan *VLAN-ID*

Parameters

VLAN-ID	Specifies the multicast VLAN. The range is 1 to 4094.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

A VLAN that has been created as an ordinary 802.1Q VLAN cannot be specified as a multicast VLAN and vice versa. A VLAN cannot be IGMP snooping enabled and specified as a multicast VLAN at the same time.

Example

This example shows how to create the multicast VLAN 100.

```
Switch# configure terminal
Switch(config)# mvlan ipv4 enable
Switch(config)# mvlan vlan 100
Switch(config-mvlan)#
```

38-4 member

This command is used to configure interfaces as source ports or as receiver ports of a multicast VLAN. Use the no form of this command to remove receiver ports or source ports.

member {receiver | source} {tagged | untagged} *INTERFACE-ID* [, | -]

no member {receiver | source} *INTERFACE-ID* [, | -]

Parameters

receiver	Specifies to configure the port as a subscriber port that can only receive multicast data in the multicast VLAN.
source	Specifies to configure the port as an uplink port that can send multicast data in the multicast VLAN.
tagged	Specifies that if a port is a tagged member, the packets sent from the port are tagged with the Multicast VLAN ID.
untagged	Specifies that if the port is an untagged member, the packets will be forwarded in the untagged form.

INTERFACE-ID	Specifies the interfaces to be used.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

No receiver or source port is a member of any multicast VLAN.

Command Mode

Multicast VLAN Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

The member port of a multicast VLAN can be either a receiver port or a source port. Receiver ports are ports connected to subscribers. Source ports are ports that the multicast traffic source comes from.

A multicast VLAN can have more than one source port. If IGMP/MLD report packets come from a source port, the multicast VLAN will not learn the IGMP/MLD group for this report, but only forward the packets to other source ports in the Multicast VLAN.

A port can be the receiver port of multiple multicast VLANs at the same time.

There are some restrictions when configuring receiver and source ports for a Multicast VLAN.

- In a single Multicast VLAN, a port cannot be a receiver port and a source port at the same time.
- The source ports in a single Multicast VLAN must all be either tagged members or untagged members.
- Tagged receiver ports cannot overlap with untagged receiver ports in a single Multicast VLAN.
- Source ports in one Multicast VLAN cannot overlap with receiver ports between two Multicast VLANs.
- Tagged source ports cannot overlap untagged source ports between two Multicast VLANs.

Example

This example shows how to configure ports 1 to 4 as tagged receiver ports in multicast VLAN 100.

```
Switch#configure terminal
Switch(config)#mvlan vlan 100
Switch(config-mvlan)#member receiver tagged eth1/0/1-4
Switch(config-mvlan)#
```

38-5 name

This command is used to specify the name of a multicast VLAN. Use the **no** form of this command to revert to the default setting.

name *VLAN-NAME*

no name

Parameters

VLAN-NAME	Specifies the VLAN name, with a maximum of 32 characters.

Default

The default multicast VLAN name is MVLANxxxx, where xxxx represents four numeric digits (including the leading zero) that are equal to the VLAN ID.

Command Mode

Multicast VLAN Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use this command to specify the name of a multicast VLAN.

Example

This example shows how to configure the multicast VLAN name of multicast VLAN 100 to “ip-tv”.

```
Switch# configure terminal
Switch(config)# mvlan vlan 100
Switch(config-mvlan)# name ip-tv

Switch(config-mvlan)#
```

38-6 replace-source-ip

This command is used to replace the source IP address in the reporting IGMP/MLD packet sent to uplink ports. Use the **no** form of this command to cancel the replacement.

replace-source-ip {ipv4 *IPV4-ADDRESS* **| ipv6** *IPV6-ADDRESS***} from { source | receiver | both}**

no replace-source-ip {ipv4 | ipv6}

Parameters

ipv4 *IPV4-ADDRESS*	Specifies the source IP address to be substituted for the source IP address in the reporting IGMP control packet to uplink ports.
ipv6 *IPV6-ADDRESS*	Specifies the source IP address to be substituted for the source IP address in the reporting MLD control packet to uplink ports.
source	Specifies to replace the source IP address of the IGMP or MLD report/leave/done packet received on any multicast VLAN source port with the specified IPv4 or IPv6 address.
receiver	Specifies to replace the source IP address of the IGMP or MLD report/leave/done packet received on any multicast VLAN receiver port with the specified IPv4 or IPv6 address.
both	Specifies to replace the source IP address of the IGMP or MLD report/leave/done packet received on any port in the multicast VLAN with the specified IPv4 or IPv6 address.

Default

None

Command Mode

Multicast VLAN Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

This command is used to report the join information to the source port. The purpose is to avoid the control packets being dropped by the uplink router due to IP spoofing checks.

If the replacing address is configured before forwarding the IGMP/MLD report/leave/done packet sent by the host, the source IP address in the report/leave/done packet will be replaced by this IP address. Otherwise, the source IP address will not be replaced.

Example

This example shows how to configure the IPv4 and IPv6 replacing source address.

```
Switch#configure terminal
Switch(config)#mvlan vlan 100
Switch(config-mvlan)#replace-source-ip ipv4 1.10.10.10 from receiver
Switch(config-mvlan)#replace-source-ip ipv6 FE80:3000::3 from source
Switch(config-mvlan)#
```

38-7 mvlan group-profile

This command is used to create a group profile for the multicast VLAN feature. Use the **no** form of this command to remove a group profile or all group profiles.

mvlan group-profile *PROFILE-NAME*

no mvlan group-profile {*PROFILE-NAME* **| all}**

Parameters

PROFILE-NAME	Specifies the name of the profile.
all	Specifies to remove all multicast VLAN profiles.

Default

None

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

A profile is used to define group address ranges. Multicast VLANs will check if the group address in the IGMP/MLD packet matches the range of addresses defined in this profile.

Example

This example shows how to create a profile named “mv_profile1”.

```
Switch#configure terminal
Switch(config)#mvlan group-profile mv_profile1
Switch(config-mvlan-profile)#
```

38-8 access-group

This command is used to bind an access group profile to a multicast VLAN. Use the **no** form of this command to remove the binding.

access-group *PROFILE-NAME*

no access-group *PROFILE-NAME*

Parameters

PROFILE-NAME	Specifies the name of the profile.

Default

None

Command Mode

Multicast VLAN Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

A single multicast VLAN can be bound with more than one profile as its real group range. Group ranges cannot overlap with multicast VLANs. If a port is a member of more than one multicast VLAN, the **group-profile** bound to the multicast VLAN will decide which multicast VLAN can learn the group.

If a port is member of a single multicast VLAN and an access group is configured for the multicast VLAN, only those groups permitted by the access group are learned with the multicast VLAN. If there is no access group configured, all multicast groups will be learned with the multicast VLAN.

Example

This example shows how to bind the profile “mv_profile1” to multicast VLAN 100.

```
Switch#configure terminal
Switch(config)#mvlan vlan 100

Switch(config-mvlan)#access-group mv_profile1
```

38-9 range

This command is used to configure the multicast address range for a multicast VLAN profile. Use the **no** form of this command to remove a range.

range {*IPV4-ADDRESS-START* **[***IPV4-ADDRESS-END***] |** *IPV6-ADDRESS-START* **[***IPV6-ADDRESS-END***]}**

no range {*IPV4-ADDRESS-START* **[***IPV4-ADDRESS-END***] |** *IPV6-ADDRESS-START* **[***IPV6-ADDRESS-END***]}**

Parameters

IPV4-ADDRESS-START	Specifies the IPv4 multicast start address in the range.

IPV4-ADDRESS-END	Specifies the IPv4 multicast end address in the range.
IPV6-ADDRESS-START	Specifies the IPv6 multicast start address in the range.
IPV6-ADDRESS-END	Specifies the IPv6 multicast end address in the range.

Default

None

Command Mode

Multicast VLAN Profile Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Multiple ranges can be added to a multicast VLAN profile. The IP address ranges specified in a single profile must be in the same address family.

Example

This example shows how to add an IPv4 range into the profile called “profile mv_profile1”.

```
Switch#configure terminal
Switch(config)#mvlan group-profile mv_profile1
Switch(config-mvlan-profile)#range 225.0.0.0 225.0.0.5
```

38-10 show mvlan group-profile

This command is used to display the multicast group profile configuration.

show mvlan group-profile [*PROFILE-NAME***]**

Parameters

PROFILE-NAME	(Optional) Specifies the profile name.

Default

None

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

Use this command to display all group profiles by not specifying the profile name.

Example

This example shows how to display all multicast VLAN profiles.

```
Switch#show       group-
mvlan             profile

                                Mult      Address
Profile                         icas
Name                            t
------------------------------

mv_profile1                     225.      - 225.0.0.5
                                0.0.
                                0
Total Entries: 1


Switch#
```

38-11 show mvlan access-group

This command is used to display which multicast group profiles are bound to which multicast VLANs.

show mvlan access-group [*VLAN-ID***]**

Parameters

VLAN-ID	(Optional) Specifies the VLAN ID.

Default

None

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

Use this command to display all binding information by not specifying the VLAN ID.

Example

This example shows how to display the group profiles associated with the multicast VLAN.

```
Switch#show mvlan access-group
↵
Multicast VLAN  Multicast Group Profiles
----------------  ------------------------------------
100               mv_profile1

Total Entries: 1
↵
Switch#
```

38-12 show mvlan

This command is used to display multicast VLAN configurations.

show mvlan [*VLAN-ID***]**

Parameters

VLAN-ID	(Optional) Specifies the VLAN ID.

Default

None

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

If no optional parameter is specified, all configuration and multicast VLAN information will be displayed.

Example

This example shows how to display all multicast VLAN configuration and information on the Switch.

```
Switch#show mvlan
IPv4 Multicast VLAN State      : Enabled
IPv6 Multicast VLAN State      : Disabled
Forward Unmatched              : Disabled
Ignore VLAN                    : Disabled

MVLAN 100
  Name                  : ip-tv
  Untagged Receiver     :
  Tagged Receiver       : 1/0/1-1/0/4
  Untagged Source       :
  Tagged Source         :
  Replace Source IP     : 1.10.10.10 (from receiver)/FE80:3000::3 (from source)
  Replace Priority      : 4 (IPv4)/Not replace (IPv6)


Total Entries: 1

Switch#
```

Display Parameters

IPv4 Multicast VLAN State	The state of the multicast VLAN process for IPv4 packet.
IPv6 Multicast VLAN State	The state of the multicast VLAN process for IPv6 packets.
Forward Unmatched	The forwarding mode for Multicast VLAN unmatched packets. **Enabled** means to forward unmatched packets, and **Disabled** means to drop unmatched packets.

Ignore VLAN	Ignore the VLAN tag of IGMP control packets and automatically assign IGMP control packets to the correct multicast VLAN to process.
Untagged/Tagged Receiver/Source	The receiver or source ports configured in multicast VLAN, and the VLAN tagged or untagged attribute for multicast packets forwarded to them.
Replace Source IP	The source IP address that will be replaced in the IGMP/MLD control packets before being forwarded in the multicast VLAN.

39. Link Layer Discovery Protocol (LLDP) Commands

39-1 clear lldp counters

This command is used to delete LLDP statistics.

clear lldp counters [all | interface *INTERFACE-ID* **[, | -]]**

Parameters

all	Specifies to clear LLDP counter information for all interfaces and global LLDP statistics.
interface *INTERFACE-ID*	Specifies the interface to clear LLDP counter information.
,	(Optional) Specifies a series of physical interfaces. No spaces before and after the comma.
-	(Optional) Specifies a range of physical interfaces. No spaces before and after the hyphen.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command with the **interface** keyword to reset LLDP statistics of the specified interface(s). If the command **clear lldp counters** is issued with the **all** keyword to clear global LLDP statistics and the LLDP statistics on all interfaces.When no optional keyword is selected, only the LLDP global counters will be cleared.

Example

This example shows how to clear LLDP statistics.

```
Switch# clear lldp counters all
Switch#
```

This example shows how to clear port of LLDP statistics.

```
Switch# clear lldp counters interface ethernet 1/0/1
Switch#
```

39-2 clear lldp table

This command is used to delete all LLDP information learned from neighboring devices.

clear lldp table {all | interface *INTERFACE-ID* **[, | -]}**

Parameters

all	Specifies to clear LLDP neighboring information for all interfaces.
INTERFACE-ID	Specifies the interface's ID.
,	(Optional) Specifies a series of physical interfaces. No spacesbefore and after the comma.
-	(Optional) Specifies a range of physical interfaces. No spaces before and after the hyphen.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

If this command is issued without the **interface** keyword, all neighboring information on all interfaces will be cleared.

Example

This example shows how to clear all neighboring information on all interfaces.

```
Switch# clear lldp table all
Switch#
```

This example shows how to clear neighboring information on interface.

```
Switch# clear lldp table interface ethernet 1/0/1
Switch#
```

39-3 lldp dot1-tlv-select

This command is used to specify which optional type-length-value settings (TLVs) in the IEEE 802.1 Organizationally Specific TLV set will be transmitted and encapsulated in the LLDPDUs and sent to neighbor devices. Use the **no** form of this commandto disable the transmissionof TLVs.

lldp dot1-tlv-select {port-vlan | vlan-name [*VLAN-ID* **[, | -]] | protocol-identity [***PROTOCOL-NAME***]}**

no lldp dot1-tlv-select {port-vlan | vlan-name [*VLAN-ID* **[, | -]] | protocol-identity [***PROTOCOL-NAME***]}**

Parameters

port-vlan	Specifies the port VLAN ID TLV to send. The Port VLAN ID TLV is an optional fixed length TLV that allows a VLAN bridge port to advertise the port's VLAN identifier (PVID) that will be associated with untagged or priority tagged frames.
vlan-name	Specifies the VLAN name TLV to send. The VLAN name TLV is an optional TLV that allows an IEEE 802.1Q-compatible IEEE 802 LAN station to advertise the assigned name of any VLAN with which it is configured.
VLAN-ID **[, | -]**	(Optional) Specifies the ID of the VLAN in the VLAN name TLV. The VLAN ID range is 1 to 4094. Separate nonconsecutive

	VLAN ID with a comma. Use a hyphen to designate a range of VLAN IDs. If no VLAN ID is specified, all applicable VLANs will be sent. In the **no** form of this command, if no VLAN ID is specified, all configured VLANs for the VLAN name TLV will be cleared and no VLAN name TLV will be sent.
protocol-identity [*PROTOCOL-NAME***]**	Specifies the Protocol Identity TLV to send. The Protocol Identity TLV is an optional TLV that allows an IEEE 802 LAN station to advertise particular protocols that are accessible through the port. The valid strings for *PROTOCOL-NAME* are: **eapol:** Extensible Authentication Protocol (EAP) over LAN **lacp:** Link Aggregation Control Protocol **gvrp:** GARP VLAN Registration Protocol **stp:** Spanning Tree Protocol The protocol name is optional. When no specific protocol string is specified, all protocols are selected or de-selected in the **no** form of the command.

Default

No IEEE 802.1 Organizationally Specific TLV is selected.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port configurations. If the optional TLVs advertisement state is enabled, they will be encapsulated in LLDPDUs and sent to other devices.

The protocol identity TLV optional data type indicates whether to advertise the corresponding local system's protocol identity instance on the port. The protocol identity TLV provides a way for devices to advertise protocols that are important to the operation of the network. For example, protocols like Spanning Tree Protocol, Link Aggregation Control Protocol, and numerous vendor proprietary variations are responsible for maintaining the topology and connectivity of the network. When both of the protocol functions are working and the protocol identity is enabled for advertising on a port, the protocol identity TLV will be advertised.

Only when the configured VLAN ID matches the configuration of the protocol VLAN on that interface and the VLAN exists, then the PPVID TLV for that VLAN will be sent. Only when the interface is a member port of the configured VLAN ID, the VLAN will be advertised in VLAN Name TLV.

Example

This example shows how to enable advertising Port VLAN ID TLV.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# lldp dot1-tlv-select port-vlan
Switch(config-if)#
```

This example shows how to enable the VLAN Name TLV advertisement from vlan1 to vlan3.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)#lldp dot1-tlv-select vlan-name 1-3
Switch(config-if)#
```

This example shows how to enable the LACP Protocol Identity TLV advertisement.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# lldp dot1-tlv-select protocol-identity lacp
Switch(config-if)#
```

39-4 lldp dot3-tlv-select

This command is used to specify which optional type-length-value settings (TLVs) in the IEEE 802.3 Organizationally Specific TLV set will encapsulated in the LLDPDUs and sent to neighbor devices.Use the **no** form of this commandto disable the transmission of the TLVs.

lldp dot3-tlv-select [mac-phy-cfg | link-aggregation | power |max-frame-size]

no lldp dot3-tlv-select [mac-phy-cfg | link-aggregation | power |max-frame-size]

Parameters

mac-phy-cfg	(Optional) Specifies the MAC/PHY Configuration/Status TLV to send. The MAC/PHY Configuration/Status TLV is an optional TLV that identifies (1) the duplex and bit-rate capability of the sending IEEE 802.3 LAN node, and (2) the current duplex and bit-rate settings of the sending IEEE 802.3 LAN node.
link-aggregation	(Optional) Specifies the Link Aggregation TLV to send. The Link Aggregation TLV indicates contains the following information. Whether the link is capable of being aggregated, whether the link is currently in an aggregation, and the aggregated port channel ID of the port. If the port is not aggregated, then the ID is 0.
power	(Optional)Specifies the power via MDI TLV to send. Three IEEE 802.3 PMD implementations (10BASE-T, 100BASE-TX and 1000BASE-T) allow power to be supplied over the link for connected non-powered systems. The Power Via MDI TLV allows network management to advertise and discover the MDI power support capabilities of the sending IEEE 802.3 LAN station.
max-frame-size	(Optional) Specifies the Maximum Frame Size TLV to send. The Maximum Frame Size TLV indicates the maximum frame size capability of the implemented MAC and PHY.

Default

No IEEE 802.3 Organizationally Specific TLV is selected.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port configuration. This command enables the advertisement of the optional IEEE 802.3 Organizationally Specific TLVs. The respective TLV will be encapsulated in LLDPDU and sent to other devices if the advertisement state is enabled.

Example

This example shows how to enable the advertising MAC/PHY Configuration/Status TLV.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# lldp dot3-tlv-select mac-phy-cfg
Switch(config-if)#
```

39-5 lldp fast-count

This command is used to configure the LLDP-MED fast start repeat count option on the Switch.Use the **no** form of this command to revert to the default setting.

lldp fast-count *VALUE*

no lldp fast-count

Parameters

VALUE	Specifies the LLDP-MED fast start repeat count value. This value must be between 1 and 10.

Default

By default, this value is 4.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When an LLDP-MED Capabilities TLV is detected, the application layer will start the fast start mechanism. This command is used to configure the fast start repeat count which indicates the number of LLDP message transmissions for one complete fast start interval.

Example

This example shows how to configure the LLDP MED fast start repeat count.

```
Switch# configure terminal
Switch(config)#lldp fast-count 10
Switch(config)#
```

39-6 lldp hold-multiplier

This command is used to configure the hold multiplier for LLDP updates on the Switch. Use the **no** form of this command to revert to the default setting.

lldp hold-multiplier *VALUE*

no hold-multiplier

Parameters

VALUE	Specifies the multiplier on the LLDPDUs transmission interval that used to compute the TTL value of an LLDPDU. This value must be between 2 and 10.

Default

By default, this value is 4.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This parameter is a multiplier on the LLDPDUs transmission interval that is used to compute the TTL value in an LLDPDU. The lifetime is determined by the hold-multiplier times the TX-interval. At the partner switch, when the TTL for a given advertisement expires, the advertised data is deleted from the neighbor switch's MIB.

Example

This example shows how to configure the LLDP hold-multiplier to 3.

```
Switch# configure terminal
Switch(config)#lldp hold-multiplier 3
Switch(config)#
```

39-7 lldp management-address

This command is used to configure the management address that will be advertised on the physical interface. Use the **no** form of this command to remove the settings.

lldp management-address [*IP-ADDRESS* **|** *IPV6-ADDRESS***]**

no lldp management-address [*IP-ADDRESS* **|** *IPV6-ADDRESS***]**

Parameters

IP-ADDRESS	Specifies the IPv4 address that is carried in the management address TLV.
IPV6-ADDRESS	(Optional) Specifies the IPv6 address that is carried in the management address TLV.

Default

No LLDP management address is configured (no Management Address TLV is sent).

Command Mode

Interface Configuration Mode.

Command Default Level

Level:12.

Usage Guideline

This command is available for physical port configuration. This command specifies the IPv4/IPv6 address that is carried in the management address TLV on the specified port. If an IP address is specified, but the address is not one of the addresses of the system interfaces, then the address will not be sent.

Multiple IPv4/IPv6 management addresses can be configured by using this command multiple times.

Use the **no lldp management-address** command without a management address to disable the management address adverted in LLDPDUs. If there is no effective management address in the list, no Management Address TLV will be sent.

Example

This example shows how to enable ethernet1/0/1 and ethernet1/0/2 for setting the management address entry (IPv4).

```
Switch# configure terminal
Switch(config)#interface range ethernet 1/0/1-1/0/2
Switch(config-if-range)# lldp management-address 10.1.1.1
Switch(config-if-range)#
```

This example shows how to enable ethernet3/0/3 and ethernet3/0/4 for setting the management address entry (IPv6).

```
Switch# configure terminal
Switch(config)#interface range ethernet 1/0/3-1/0/4
Switch(config-if-range)# lldp management-address FE80::250:A2FF:FEBF:A056
Switch(config-if-range)#
```

This example shows how to delete the management address 10.1.1.1 from ethernet3/0/1 and ethernet3/0/2. If 10.1.1.1 is the last one, no Management Address TLV will be sent.

```
Switch# configure terminal
Switch(config)#interface range ethernet 1/0/1-1/0/2
Switch(config-if-range)# no lldp management-address 10.1.1.1
Switch(config-if-range)#
```

This example shows how to delete the management address FE80::250:A2FF:FEBF:A056 from ethernet3/0/3. and ethernet3/0/4.

```
Switch# configure terminal
Switch(config)#interface range ethernet 1/0/3-1/0/4
Switch(config-if-range)# no lldp management-address FE80::250:A2FF:FEBF:A056
Switch(config-if-range)#
```

This example shows how to delete all management addresses from ethernet3/0/5 and then no Management Address TLV will be sent on ethernet3/0/5.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/5
Switch(config-if)# no lldp management-address
Switch(config-if)#
```

39-8 lldp med-tlv-select

This command is used to specify which optional LLDP-MED TLV will be transmitted and encapsulated in the LLDPDUs and sent to neighbor devices. Use the **no** form of this commandto disable the transmission of the TLVs.

lldp med-tlv-select [capabilities | inventory-management]

no lldp med-tlv-select [capabilities | inventory-management]

Parameters

capabilities	(Optional) Specifies to transmit the LLDP-MED capabilities TLV.
inventory-management	(Optional) Specifies to transmit the LLDP-MED inventory management TLV.

Default

No LLDP-MED TLV is selected.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port configuration. This command is used to enable or disable transmitting LLDP-MED TLVs.

When disabling the transmission of the Capabilities TLV, LLDP-MED on the physical interface will be disabled at the same time. In other words, all LLDP-MED TLVs will not be sent, even when other LLDP-MED TLVs are enabled to transmit.

By default, the Switch only sends LLDP packets until it receives LLDP-MED packets from the end device. The Switch continues to send LLDP-MED packets until it only receives LLDP packets.

Example

This example shows how to enable transmitting LLDP-MED TLVs and LLDP-MED Capabilities TLVs.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# lldp med-tlv-select capabilities
Switch(config-if)#
```

39-9 lldp receive

This command is used to enable a physical interface to receive LLDP messages. Use the **no** form of this command to disable receiving LLDP messages.

lldp receive

no lldp receive

Parameters

None.

Default

LLDP is enabled on all supported interfaces.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port configuration. This command is used to enable a physical interface to receive LLDP messages. When LLDP is not running, the Switchdoes not receive LLDP messages.

Example

This example shows how to enable a physical interface to receive LLDP messages.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# lldp receive
Switch(config-if)#
```

39-10 lldp reinit

This command is used to configure the minimum time of re-initialization the delay interval on the Switch. Use the **no** form of this command to revert to the default setting.

lldp reinit *SECONDS*

no lldp reinit

Parameters

SECONDS	Specifies the delay value for LLDP initialization on an interface. This value must be between 1 and 10 seconds.

Default

By default, this value is 2 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A re-enabled LLDP physical interface will wait for the re-initialization delay after the last disable command before reinitializing.

Example

This example shows how to configure the re-initialization delay interval to 5 seconds.

```
Switch# configure terminal
Switch(config)#lldp reinit 5
Switch(config)#
```

39-11 lldp run

This command is used to enable the Link Layer Discovery Protocol (LLDP) globally. Use the **no** form of this command to revert to the default setting.

lldp run

no lldp run

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to globally enable LLDP and then the Switch can start to transmit LLDP packets and receive and process the LLDP packets. However, the transmission and receiving of LLDP can be controlled respectively by the **lldp transmit** command and the **lldp receive** command in the interface configuration mode. LLDP takes effect on a physical interface only when it is enabled both globally and on the physical interface.

By advertising LLDP packets, the Switch announces the information to its neighbor through physical interfaces. On the other hand, the Switch will learn the connectivity and management information from the LLDP packets advertised from the neighbor(s).

Example

This example shows how to enable LLDP.

```
Switch# configure terminal
Switch(config)#lldp run
Switch(config)#
```

39-12 lldp forward

This command is used to enable the LLDP forwarding state. Use the **no** form of this command to revert to the default settings.

lldp forward

no lldp forward

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This is a global control for the LLDP forward. When the LLDP global state is disabled and LLDP forwarding is enabled, the received LLDPDU packet will be forwarded.

Example

This example shows how to enable the LLDP global forwarding state.

```
Switch# configure terminal
Switch(config)# lldp forward
Switch(config)#
```

39-13 lldp tlv-select

This command is used to select theType-Length-Value (TLVs) in the 802.1AB basic management set, will be transmitted and encapsulated in the LLDPDUs, and sent to neighbor devices. Use the **no** form of this command to disable this option.

lldp tlv-select [port-description | system-capabilities | system-description | system-name]

no lldp tlv-select [port-description | system-capabilities | system-description | system-name]

Parameters

port-description	(Optional) Specifies the port description TLV to send. The port description TLV allows network management to advertise the IEEE 802 LAN station's port description.
system-capabilities	(Optional) Specifies the system capabilities TLV to send. The system capabilities field will contain a bit-map of the capabilities that defines the primary functions of the system.
system-description	(Optional) Specifies the system description TLV to send. The system description should include the full name and version identification of the system's hardware type, software operating system, and networking software.
system-name	(Optional) Specifies the system name TLV to send. The system name should be the system's fully qualified domain name.

Default

No optional 802.1AB basic management TLV is selected.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port configuration. This command is used to select the optional TLVs to be transmitted. If the optional TLVs advertisement is selected, they will be encapsulated in the LLDPDU and sent to other devices.

Example

This example shows how to enable all supported optional 802.1AB basic management TLVs.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# lldp tlv-select
Switch(config-if)#
```

This example shows how to enable advertising the system name TLV.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# lldp tlv-select system-name
Switch(config-if)#
```

39-14 lldp transmit

This command is used to enable the LLDP advertise (transmit) capability. Use the **no** form of this command to disable LLDP transmission.

lldp transmit

no lldp transmit

Parameters

None.

Default

By default, LLDP transmit is enabled on all supported interfaces.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port configuration. This command is used to enable LLDP transmission on a physical interface. When LLDP is not running, the Switch doesn't transmit LLDP messages.

Example

This example shows how to enable LLDP transmission.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# lldp transmit
Switch(config-if)#
```

39-15 lldp tx-delay

This command is used to configure the transmission delay timer. This delay timer defines the minimum interval between the sending of LLDP messages due to constantly changing MIB content. Use the **no** form of this command to revert to the default setting.

lldp tx-delay *SECONDS*

no lldp tx-delay

Parameters

SECONDS	Specifies the delay value for sending successive LLDPDUs on an interface. The valid values are from 1 to 8192 seconds and should not be greater than one-fourth of the transmission interval timer.

Default

By default, this value is 2 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The LLDP transmission interval must be greater than or equal to four times of the transmission delay timer.

Example

This example shows how to configure the transmission delay timer to 8 seconds.

```
Switch# configure terminal
Switch(config)#lldp tx-delay 8
Switch(config)#
```

39-16 lldp tx-interval

This command is used to configure the LLDPDUs transmission interval on the Switch. Use the **no** form of this command to revert to the default setting.

lldp tx-interval *SECONDS*

no lldp tx-interval

Parameters

SECONDS	Specifies the interval between consecutive transmissions of LLDP advertisements on each physical interface. The range is from 5 to 32768 seconds.

Default

By default, this value is 30 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This interval controls the rate at which LLDP packets are sent.

Example

This example shows how to configure LLDP updates are sent every 50 seconds.

```
Switch# configure terminal
Switch(config)#lldp tx-interval 50
Switch(config)#
```

39-17 snmp-server enable traps lldp

This command is used to enable the LLDP and LLDP-MED trap state.

snmp-server enable traps lldp [med]

no snmp-server enable traps lldp [med]

Parameters

med	(Optional) Specifies to enable the LLDP-MED trap state.

Default

The LLDP and LLDP-MED trap statesare disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **snmp-server enable traps lldp** command to enable the sending of LLDP notifications.

Use the **snmp-server enable traps lldp med** command to enable the sending of LLDP-MED notifications.

Example

This example shows how to enable the LLDP MED trap.

```
Switch# configure terminal
Switch(config)#snmp-server enable traps lldp med
Switch(config)#
```

39-18 lldp subtype

This command is used to configure the subtype of LLDP TLV(s).

lldp subtype port-id {mac-address | local}

Parameters

port-id	Specifies the subtype of the port ID TLV.
mac-address	Specifies the subtype of the port ID TLV to “MAC Address (3)” and the field of “port ID” will be encoded with the MAC address.
local	Specifies the subtype of the port ID TLV to use “Locally assigned (7)” and the field of “port ID” will be encoded with the port number.

Default

The subtype of port ID TLV is **local** (port number).

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the subtype of LLDP TLV(s). A port ID subtype is used to indicate how the port is being referenced in the port ID field.

Example

This example shows how to configure the subtype of the port ID TLV to mac-address.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# lldp subtype port-id mac-address
Switch(config-if)#
```

39-19 show lldp

This command is used to display the Switch's general LLDP configuration.

show lldp

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the LLDP system's global configurations.

Example

This example shows how to display the LLDP system's global configuration status.

```
Switch#show lldp

LLDP System Information
    Chassis ID Subtype        : MAC Address
    Chassis ID                : 3C-1E-04-A1-CC-00
    System Name               : Switch
    System Description        : Gigabit Ethernet SmartPro Switch
    System Capabilities Supported: Repeater, Bridge
    System Capabilities Enabled  : Repeater, Bridge
LLDP-MED System Information:
    Device Class              : Network Connectivity Device
    Hardware Revision         : A1
    Firmware Revision         : 1.00.006
    Software Revision         : 1.00.001
    Serial Number             :
    Manufacturer Name         : D-Link Corporation
    Model Name                : DGS-1250-28XP
    Asset ID                  :
    PoE Device Type           : PSE Device
    PoE PSE Power Source      : Primary

LLDP Configurations
    LLDP State                : Disabled
    LLDP Forward State        : Disabled
    Message TX Interval       : 30
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

39-20 show lldp interface

This command is used to display the LLDP configuration at the physical interface.

show lldp interface *INTERFACE-ID*[**, | -**]

Parameters

INTERFACE-ID	Specifies to display the LLDP configuration for a specific interface. Valid interfaces are physical interfaces.
,	(Optional) Specifies a series of physical interfaces. No spaces before and after the comma.
-	(Optional) Specifies a range of physical interfaces. No spaces before and after the hyphen.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the LLDP information of each physical interface.

Example

This example shows how to display a specific physical interface's LLDP configuration.

```
Switch#show lldp interface ethernet 1/0/1

Port ID: ethernet1/0/1
------------------------------------------------------------------------------
Port ID                                                 :ethernet1/0/1
Admin Status                                            :TX and RX
Notification                                            :Disabled
Basic Management TLVs:
    Port Description                                    :Enabled
    System Name                                         :Enabled
    System Description                                  :Enabled
    System Capabilities                                 :Enabled
    Enabled Management Address:
        (None)
IEEE 802.1 Organizationally Specific TLVs:

    Port VLAN ID                                        :Enabled
    Enabled Port_and_Protocol_VLAN_ID
        1, 2, 3
    Enabled VLAN Name
        1-3
    Enabled Protocol_Identity
        EAPOL, LACP, GVRP, STP
IEEE 802.3 Organizationally Specific TLVs:

    MAC/PHY Configuration/Status                        :Enabled
    Link Aggregation                                    :Disabled
    Maximum Frame Size                                  :Disabled

LLDP-MED Organizationally Specific TLVs:

    LLDP-MED Capabilities TLV                           :Enabled
    LLDP-MED Network Policy TLV                         :Disabled
    LLDP-MED Extended Power Via MDI PSE TLV             :Disabled
    LLDP-MED Inventory TLV                              :Disabled


Switch#
```

Display Parameters

Enabled Management Address	Displays the enabled IPv4/IPv6 addresses. The indicated string "(None)" means that the user did not configure the management address with the **lldp management-address** command or the enabled default IPv4 and IPv6 addresses are not applicable.
Enabled Port and Protocol VLAN ID	This indicating string is shown when there are enabled port and protocol VLANs. The VLAN list is the configured enabled VLANs. If there is no configured PPVID VLAN, the string is "(None)".
Enabled VLAN Name	This indicating string is shown when there are enabled VLANs for sending VLAN Name TLVs. The VLAN list includes the configured enabled VLANs. If there is no configured VLAN for the VLAN Name TLV, the string is "(None)".
Enabled Protocol Identity	Displaysthe enabled protocol string for protocol identity TLVs. If there is no enabled protocol for protocol identity TLVs, the string

	is “(None)”.

39-21 show lldp local interface

This command is used to display physical interface information that will be carried in the LLDP TLVs and sent to neighbor devices.

show lldp local interface *INTERFACE-ID* **[, | -] [brief | detail]**

Parameters

INTERFACE-ID	Specifies the interface’s ID. Valid interfaces are physical interfaces.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No spaces before and after the comma.
-	(Optional) Specifies a range of interfaces. No spaces before and after the hyphen.
brief	(Optional) Specifies to display the information in brief mode.
detail	(Optional) Specifies to display the information in detailed mode.If neither brief nor detail is specified, display the information in the normal mode.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays each physical interface’s local LLDP information currently available for populating outbound LLDP advertisements.

Example

This example shows how to display the local information of port 1 in detailed mode.

```
Switch(config-if)# show lldp interface ethernet 1/0/1
Port ID:eth1/0/1
------------------------------------------------------
Port ID                                 :eth1/0/1
Admin Status                            :TX_and_RX
Notification Status                     :Disabled
Basic Management TLVs                   :
    Port Description                         :Disabled
    System Name                              :Disabled
    System Description                       :Disabled
    System Capabilitiess                     :Disabled
    Enabled Management Address               :
      <None>
IEEE 802.1 Organizationally Specific TLVs:
    Port VLAN ID                             :Disabled
    Enabled VLAN Name
      <None>
    Enabled Protocol_Identity
      <None>
IEEE 802.3 Organizationally Specific TLVs:
    MAC/PHY Configuration/Status             :Disabled
    Power Via MDI                            :Disabled
    Link Aggregation                         :Disabled
    Maximum Frame Size                       :Disabled
LLDP-MED Organizationally Specific TLVs::
    LLDP-MED Capabilities TLV                :Disabled
    LLDP-MED Network Policy TLV              :Disabled
    LLDP-MED Inventory TLV                   :DisabledCTRL+C ESC q Quit SPACE n Next Page
ENTER Next Entry a All
```

This example shows how to display the local information ofport 1 in normal mode.

```
Switch(config-if)# show lldp local interface ethernet 1/0/1
Port ID : eth1/0/1
-----------------------------------
Port Id Subtype                         : local
Port Id                                 : eth1/0/1
Port Description                        :
Port VLAN ID                            : 1
Management Address Count                : 1
VLAN Name Entries Count                 : 1
Protocol Identity Entries Count         : 1
MAC/PHY Configuration/Status            : (See detail)
Link Aggregation                        : (See detail)
Maximum Frame Size                      : 1536
LLDP-MED Capabilities                   : (See detail)
Network Policy                          : (See detail)

Switch(config-if)#
```

This example shows how to display local information of port 1 in brief mode.

```
Switch#show lldp local interface ethernet 1/0/1 brief

Port ID: ethernet1/0/1
------------------------------------------------------------------------------
Port ID Subtype                          : Local
Port ID                                  : ethernet1/0/1
Port Description                         :


Switch#
```

39-22 show lldp management-address

This command is used to display the management address information.

show lldp management-address [*IP-ADDRESS* | *IPV6-ADDRESS***]**

Parameters

IP-ADDRESS	(Optional) Specifies to display the LLDP management information for a specific IPv4 address.
IPV6-ADDRESS	(Optional) Specifies to display the LLDP management information for a specific IPv6 address.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the management address information.

Example

This example shows how to display all management address information.

```
Switch# show lldp management-address

Address 1 : (default)
-----------------------------------------------
    Subtype                          : IPv4
    Address                          : 10.90.90.90
    IF Type                          : IfIndex
    OID                              : 1.3.6.1.4.1.171.10.118.2
    Advertising Ports                : -

Address 2 :
-----------------------------------------------
    Subtype                          : IPv4
    Address                          : 10.90.90.90
    IF Type                          : IfIndex
    OID                              : 1.3.6.1.4.1.171.10.118.2
    Advertising Ports                : -

Total Entries : 2

Switch#
```

39-23 show lldp neighbor interface

This command is used to display each physical interface's information currently learned from the neighbor.

show lldp neighbors interface *INTERFACE-ID* **[, | -] [brief | detail]**

Parameters

INTERFACE-ID	Specifies the interface ID.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No spaces before and after the comma.
-	(Optional) Specifies a range of interfaces. No spaces before and after the hyphen.
brief	(Optional) Specifies to display the information in brief mode.
detail	(Optional) Specifies to display the information in detailed mode.If neither brief nor detail is specified, display the information in normal mode.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command display the information learned from the neighbor devices.

Example

This example shows how to display information about neighboring devices learned by LLDP on ethernet4/0/9 in detailed mode.

```
Switch# show lldp neighbor interface ethernet 1/0/9 detail

Port ID : ethernet 1/0/9
------------------------------------------------------------------------------
Remote Entities Count : 1
Entity 1
    Chassis ID Subtype                          : MAC Address
    Chassis ID                                  : 00-01-02-03-04-05
    Port ID Subtype                             : Local
    Port ID                                     : ethernet1/0/5
    Port Description                            : RMON Port
    System Name                                 : Switch1
    System Description                          : Stackable Ethernet Switch
    System Capabilities Supported               : Repeater, Bridge
    System Capabilities Enabled                 : Repeater, Bridge
    Management Address Count                    : 0
        (None)
    Port VLAN ID                                : 0
    PPVID Entries Count                         : 0
        (None)
    VLAN Name Entries Count                     : 0
        (None)
    Protocol ID Entries Count                   : 0
        (None)
    MAC/PHY Configuration/Status                : (None)
    Power Via MDI                               : (None)
    Link Aggregation                            : (None)
    Maximum Frame Size                          : 0
    Unknown TLVs Count                          : 0
        (None)
LLDP-MED capabilities                       :
LLDP-MED device class                   : Endpoint device class III
    LLDP-MED capabilities support           :
          LLDP-MED capabilities                 : Support
          Network Policy                        : Support
          Location identification               : Not Support
          Extended power via MDI                : Support
          Inventory                             : Support
       LLDP-MED capabilities enabled              :
          LLDP-MED capabilities                   : Enabled
          Network Policy                          : Enabled
          Location identification                 : Enabled
          Extended power via MDI                  : Enabled
          Inventory                               : Enabled
   Extended power via MDI                         :
             Power device type                    : PD device
             Power Source                         : from PSE
             Power request                        : 8 watts
Network policy                              :
        Application type                        : Voice
        VLAN ID                                 : -
        Priority                                : -
        DSCP                                    : -
        Unknown                                 : True
        Tagged                                  : -
```

```
    Inventory Management                        :
        (None)

Switch#
```

This example shows how to display remote LLDP information in the normal mode.

```
Switch# show lldp neighbor interface ethernet 1/0/1

Port ID : 1
------------------------------------------------------------------------
Remote Entities Count : 2
Entity 1
      Chassis ID Subtype            : MAC Address
      Chassis ID                    : 00-01-02-03-04-01
      Port ID Subtype               : Local
      Port ID                       : ethernet3/0/1
      Port Description              : RMON Port 3 on Unit 1
      System Name                   : Switch1
      System Description            : Stackable Ethernet Switch
      System Capabilities Supported : Repeater, Bridge
      System Capabilities Enabled : Repeater, Bridge
      Management Address Count      : 1
      Port VLAN ID                  : 1
      PPVID Entries Count           : 5
      VLAN Name Entries Count       : 3
      Protocol ID Entries Count     : 2
      MAC/PHY Configuration Status  : (See Detail)
      Power Via MDI                 : (See Detail)
      Link Aggregation              : (See Detail)
      Maximum Frame Size            : 1536
LLDP-MED capabilities               : (See Detail)
      Network policy                : (See Detail)
Extended Power Via MDI              : (See Detail)
    Inventory Management            : (See Detail)
    Unknown TLVs Count              : 2
Entity 2
      Chassis ID Subtype            : MAC Address
      Chassis ID                    : 00-01-02-03-04-02
      Port ID Subtype               : Local
      Port ID                       : ethernet2/0/1
      Port Description              : RMON Port 1 on Unit 2
      System Name                   : Switch2
      System Description            : Stackable Ethernet Switch
System Capabilities Supported : Repeater, Bridge
System Capabilities Enabled   : Repeater, Bridge
      Management Address Count      : 2
      Port VLAN ID                  : 1
      PPVID Entries Count           : 5
      VLAN Name Entries Count       : 3
      Protocol Id Entries Count     : 2
      MAC/PHY Configuration Status  : (See Detail)
      Power Via MDI                 : (See Detail)
      Link Aggregation              : (See Detail)
      Maximum Frame Size            : 1536
      LLDP-MED capabilities         : (See Detail)
      Extended power via MDI        : (See Detail)
```

```
Network policy                      : (See Detail)
    Inventory Management            : (See Detail)
Unknown TLVs Count            : 2

Switch#
```

This example shows how to display the neighbor information on ethernet3/0/1 to ethernet3/0/2 in brief mode.

```
Switch# show lldp neighbor interface ethernet 1/0/1-1/0/2 brief

Port ID: ethernet 1/0/1
----------------------------------------------------------------
Remote Entities Count : 2
Entity 1
      Chassis ID Subtype            : MAC Address
      Chassis ID                    : 00-01-02-03-04-01
      Port ID Subtype               : Local
      Port ID                       : ethernet3/0/1
      Port Description              : RMON Port 1 on Unit 3
Entity 2
      Chassis ID Subtype            : MAC Address
      Chassis ID                    : 00-01-02-03-04-02
      Port ID Subtype               : Local
      Port ID                       : ethernet4/0/1
      Port Description              : RMON Port 1 on Unit 4

Port ID : ethernet 1/0/2
----------------------------------------------------------------------
Remote Entities Count : 3
Entity 1
      Chassis ID Subtype            : MAC Address
      Chassis ID                    : 00-01-02-03-04-03
      Port ID Subtype               : Local
      Port ID                       : ethernet2/0/1
      Port Description              : RMON Port 2 on Unit 1
Entity 2
      Chassis ID Subtype            : MAC Address
      Chassis ID                    : 00-01-02-03-04-04
      Port ID Subtype               : Local
      Port ID                       : ethernet2/0/2
      Port Description              : RMON Port 2 on Unit 2
Entity 3
      Chassis ID Subtype            : MAC Address
      Chassis ID                    : 00-01-02-03-04-05
      Port ID Subtype               : Local
      Port ID                       : ethernet3/0/2
      Port Description              : RMON Port 2 on Unit 3

Total Entries: 2

Switch#
```

39-24 show lldp traffic

This command is used to display the system's global LLDP traffic information.

show lldp traffic

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

The global LLDP traffic information displays an overview of neighbor detection activities on the Switch.

Example

This example shows how to display global LLDP traffic information.

```
Switch#show lldp traffic

Last Change Time   : 7958183
Total Inserts      : 7
Total Deletes      : 0
Total Drops        : 0
Total Ageouts      : 0

Switch#
```

Display Parameters

Last Change Time	The amount of time since the last update to the remote table in days, hours, minutes, and seconds.
Total Inserts	Total number of inserts to the remote data table.
Total Deletes	Total number of deletes from the remote data table.
Total Drops	Total number of times the complete remote data received was not inserted due to insufficient resources.
Total Ageouts	Total number of times a complete remote data entry was deleted because the Time to Live interval expired.

39-25 show lldp traffic interface

This command is used to display the each physical interface's LLDP traffic information.

show lldp traffic interface *INTERFACE-ID* **[, | -]**

Parameters

INTERFACE-ID	Specifies the interface ID.
,	(Optional) Specifies a series of interfaces, or separate a range

	of interfaces from a previous range. No spaces before and after the comma.
-	(Optional) Specifies a range of interfaces. No spaces before and after the hyphen.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays LLDP traffic on each physical interface.

Example

This example shows how to display statistics information of port 4.

```
Switch# show lldp traffic interface ethernet 1/0/4

Port ID : eth1/0/4
----------------------------------------
Total Transmits                    : 171
Total Discards                     : 7
Total Errors                       : 7
Total Receives                     : 7
Total TLV Discards                 : 0
Total TLV Unknows                  : 0
Total Ageouts                      : 0


Switch#
```

Display Parameters

Total Transmits	The total number of LLDP packets transmitted on the port.
Total Discards	The total number of LLDP frames discarded on the port for any reason.
Total Errors	The number of invalid LLDP frames received on the port.
Total Receives	The total number of LLDP packets received on the port.
Total TLV Discards	The number of TLVs discarded.
Total TLV Unknowns	The total number of LLDP TLVs received on the port where the type value is in the reserved range, and not recognized.
Total Ageouts	The total number of times a complete remote data entry was deleted for the port because the Time to Live interval expired.

39-26 show snmp-server traps lldp

This command is used to display LLDP snmp-server traps information.

show snmp-server traps lldp

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

The global LLDP traps information display on the Switch.

Example

This example shows how to display global LLDP traffic information.

```
Switch#show snmp-server traps lldp

  lldp                          : Disabled
  lldp med                      : Disabled
Switch#
```

40. Loopback Detection (LBD) Commands

40-1 loopback-detection (Global)

This command is used to enable the loopback detection function globally. Use the **no** form of this command to disable the function globally.

loopback-detection [mode {port-based | vlan-based}]

no loopback-detection [mode]

Parameters

mode	(Optional) Specifies the detection mode.
port-based	Specifies that the loop detection will work in the port-based mode.
vlan-based	Specifies that the loop detection will work in the VLAN-based mode.

Default

By default, this option is disabled.

By default, the detection mode is port-based.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Generally, port-based loop detection is used in ports that are connected to users, and VLAN-based detection is used in trunk ports when the partner switch does not support the loop detection function.

When doing port-based detection, the LBD enabled port will send untagged port-based LBD packets out from the port to discover the loop. If there is a loop occurrence on the path, then the packet being transmitted will loop back to the same port or to another port located on the same device. When an LBD enabled port detects a loop condition, packet transmitting and receiving is disabled at the port.

When doing VLAN-based detection, the port will periodically send VLAN-based LBD packets for each VLAN that the port has membership of the VLAN is enabled for loop detection. If the port is a tagged member of the detecting VLAN, tagged LBD packets are sent. If the port is an untagged member of the detecting VLAN, untagged LBD packets are sent. If there is a loop occurrence on the VLAN path, then packet transmitting and receiving will be temporarily stopped on the looping VLAN at the port where the loop is detected.

If an LBD disabled port receives an LBD packet and detects that the packet is sent out by the system itself, the sending port will be blocked if the packet is a port-based LBD packet, or the VLAN of the sending port will be blocked if the packet is a VLAN-based LBD packet.

If the port is configured for VLAN-based and if the port is an untagged member of multiple VLANs, then the port will send one untagged LBD packet for each VLAN with the VLAN number specified in the VLAN field of the packet.

There are two ways to recover an error disabled port. The user can use the **errdisable recovery cause loopback-detect** command to enable the auto-recovery of ports that were disabled by loopback detection. Alternatively, manually recover the port by entering the **shutdown**command followed by the **no shutdown** command for the port.

The VLAN being blocked on a port can be automatically recovered, if the **errdisable recovery cause loopback-detect** command is configured. Alternatively, manually recover the operation by entering the **shutdown** command followed by the **no shutdown** command for the port.

Example

This example shows how to enable the port-based loopback detection function globally and set the detection mode to port-based.

```
Switch# configure terminal
Switch(config)#loopback-detection
Switch(config)# loopback-detection mode port-based
Switch(config)#
```

40-2 loopback-detection (Interface)

This command is used to enable the loopback detection function for an interface. Use the **no** form of this command to disable the function for an interface.

loopback-detection

no loopback-detection

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable the loopback detection function on an interface. This command is available for port and port-channel interface configuration.

Example

This example shows how to enable the loopback detection function on interface ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# loopback-detection
Switch(config-if)#
```

40-3 loopback-detection interval

This command is used to configure the timer interval. Use the **no** form of this command to revert to the default setting.

loopback-detection interval *SECONDS*

no loopback-detection interval

Parameters

interval *SECONDS*	Specifies the interval in seconds at which CPT packets are transmitted. The valid range is from 1 to 32767.

Default

By default, this value is 10 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the interval at which LBD packets are sent to discover the loop occurrence.

Example

This example shows how to configure the time interval to 20 seconds.

```
Switch# configure terminal
Switch(config)#loopback-detection interval 20
Switch(config)#
```

40-4 loopback-detection vlan

This command is used to configure the VLANs to be enabled for loop detection. Use the **no** form of this command to revert to the default setting.

loopback-detection vlan *VLAN-LIST*

no loopback-detection vlan *VLAN-LIST*

Parameters

VLAN-LIST	Specifies the VLAN identification number, numbers, or range of numbers to be matched. Enter one or more VLAN values separated by commas or hyphens for a range list.

Default

By default, this option is enabled for all VLANs.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the list of VLANs that are enabled for loop detection. The command setting takes effect when the port's loop detection mode is operated in the VLAN-based mode.

If the VLAN ID list is empty, LBD Control packets are sent out for all VLANs that the port is a member of. LBD Control packets will be sent out for the VLAN that the member port within the specified VLAN list.

The VLAN list can be incremented by issuing this command multiple times.

Example

This example shows how to enable VLANs 100 to 200 for loop detection.

```
Switch# configure terminal
Switch(config)#loopback-detection vlan 100-200
Switch(config)#
```

40-5 show loopback-detection

This command is used to display the current loopback detection control settings.

show loopback-detection [interface *INTERFACE-ID* **[, | -] | port-channel <1-8>]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies the interface's ID to be displayed.
,	(Optional)Specifies a series of interfaces, or separate a range of interfaces from a previous range. No spaces are allowed before and after the comma.
-	(Optional)Specifies a range of interfaces. No spaces are allowed before and after the hyphen.
port-channel <1-8>	(Optional) Specifies the channel group to be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the loopback detection setting and status.

Example

This example shows how to displays the current loopback detection settings and status.

```
Switch# show loopback-detection

Loop Detection : Enabled
Detection Mode : vlan-based
LBD enabled VLAN : all VLANs
Interval         : 20 seconds
Action           : Shut-down

Interface         Loopback Detection State  Result         Time Left(sec)
-------------     -------------------------  -------------- -------------
ethernet1/0/3                Disabled            Normal            0
ethernet1/0/4                Disabled            Normal            0
ethernet1/0/5                Disabled            Normal            0
ethernet1/0/6                Disabled            Normal            0
ethernet1/0/7                Disabled            Normal            0
ethernet1/0/8                Disabled            Normal            0
ethernet1/0/9                Disabled            Normal            0
ethernet1/0/10               Disabled            Normal            0
ethernet1/0/11               Enabled             Loop on VLAN 1    infinite
ethernet1/0/12               Enabled             Loop on VLAN 1    infinite
Port-Channel1           Disabled            Normal            0

Switch#
```

This example shows how to displays the loopback detection status for port 1/0/1.

```
Switch# show loopback-detection interface ethernet 1/0/1

Interface         Loopback Detection State  Result         Time Left(sec)
-------------     -------------------------  -------------- -------------
ethernet1/0/11               Enabled             Loop on VLAN 1    infinite

Switch#
```

This example shows how to displays the loopback detection status for port-channel 2.

```
Switch# show loopback-detection interface port-channel 2

Interface         Loopback Detection State  Result         Time Left(sec)
-------------     -------------------------  -------------- -------------
Port-Channel1           Disabled            Normal            0

Switch#
```

Display Parameters

Interface	Indicates the port that has loopback detection enabled.
Result	Indicates whether a loop is detected.
Time Left	The remaining time before being auto-recovered.

40-6 snmp-server enable traps loopback-detection

This command is used toenable the sending SNMP notifications of loopback detection. Use the **no** form of this command to revert to the default setting.

snmp-server enable traps loopback-detection

no snmp-server enable traps loopback-detection

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable or disable the sending SNMP notifications of loopback detection.

Example

This example shows how to enable the sending SNMP notifications of loopback detection.

```
Switch# configure terminal
Switch(config)# snmp-server enable traps loopback-detection.
Switch(config)#
```

40-7 show snmp-server traps

This command is used toenable the sending SNMP notifications of loopback detection. Use the **no** form of this command to revert to the default setting.

show snmp-server traps loopback-detection

Parameters

None.

Default

None.

Command Mode

EXEC Mode

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display loopback-detection SNMP trap state.

Example

This example shows how to enable the sending SNMP notifications of loopback detection.

```
Switch# show snmp-server traps loopback-detection

Loopback Detection Trap State: disable

Switch#
```

40-8 loopback-detection action

This command is used to set the loop action of loopback detection. Use the **no** form of this command to revert to the default setting.

loopback-detection action {shutdown | none}

no loopback-detection action

Parameters

shutdown	Loop action to shutdown port
none	Loop action none

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the loop action.

Example

This example shows how to set the loop action of loopback detection.

```
Switch(config)# loopback-detection action shutdown
Switch(config)#
```

41. Mirror Commands

41-1 monitor session destination interface

This command is used to configure the destination interface for a port monitor session, allowing packets on source ports to be monitored via a destination port. Use the **no** form of this command to delete a port monitor session or remove the destination interface of the session.

monitor session *SESSION-NUMBER* **destination interface** *{INTERFACE-ID* | **port-channel** *<1-8>}*

no monitor session *SESSION-NUMBER*

Parameters

session *SESSION-NUMBER*	Specifies the session number for the port monitor session. The valid range is 1 to 2.
interface *INTERFACE-ID*	Specifies the destination interface for the port monitor session.
port-channel *<1-8>*	Specifies the channel group for port monitor session.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the destination interface for a local monitor session.

Both physical ports and port channels are valid as destination interfaces for monitor sessions. For a monitor session, multiple source interfaces can be specified, but only one destination interface can be specified. An interface cannot be a source interface of one session and destination port of another session simultaneously. An interface can be configured as the destination interface of multiple sessions, but it can be a source interface of only one session.

Example

This example shows how to create a port monitor session with the session number 1. It assigns a physical port ethernet1/0/1 as the destination port and three physical ports (ethernet1/0/2 to ethernet1/0/4) as monitor source ports.

```
Switch# configure terminal
Switch(config)#monitor session 1 destination interface ethernet 1/0/1
Switch(config)# monitor session 1 source interface ethernet 1/0/2-4
Switch(config)#
```

41-2 monitor session source interface

This command is used to configure the source port of a port monitor session. Use the **no** form of this command to remove a port monitor session or remove a source port from the port monitor session.

monitor session *SESSION-NUMBER* **source interface** *{INTERFACE-ID [, | -]* | **port-channel** *<1-8>}* **[both | rx | tx]**

no monitor session *SESSION-NUMBER* **source interface** *INTERFACE-ID* **[, | -]**

no monitor session *SESSION-NUMBER*

Parameters

session *SESSION-NUMBER*	Specifies the session number for the port monitor session. The valid range is 1 to 4.
interface *INTERFACE-ID*	Specifies the source interface for a port monitor session.
,	(Optional) Specifies the number of interfaces, or separate a range of interfaces from a previous range. No spaces before and after the comma.
-	(Optional) Specifies a range of interfaces. No spaces before and after the hyphen.
port-channel *<1-8>*	(Optional) Specifies the channel group for port monitor session.
both	(Optional) Specifies to monitor the packets transmitted and received on the port.
rx	(Optional) Specifies to monitor the packets received on the port.
tx	(Optional) Specifies to monitor the packets transmitted on the portwithout forwarding, which means regardless of the port's STG status.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Both physical ports and port channels are valid as source interfaces of monitor sessions.

For a monitor session, multiple source interfaces can be specified, but only one destination interface can be specified. An interface cannot be a source interface of one session and destination port of another session simultaneously. An interface can be configured as destination interface of multiple sessions, but it can be a source interface of only one session.

If the direction is not specified, both TX (transmitted) and RX (received) traffic are monitored. Once TX forwarding has been specified, it cannot be changed back to TX only.

Example

This example shows how to create a port monitor session with session number 1. It assigns a physical port ethernet1/0/1 as a destination port and three physical ports (ethernet1/0/2 to ethernet1/0/4) as monitor source ports.

```
Switch# configure terminal
Switch(config)#monitor session 1 destination interface ethernet 1/0/1
Switch(config)# monitor session 1 source interface ethernet 1/0/2-4
Switch(config)#
```

41-3 show monitor session

This command is used to display all or a specific port mirroring session.

show monitor session [*SESSION-NUMBER***]**

Parameters

SESSION-NUMBER	(Optional) Specifies the session number which you want to display.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If this command is used without specifying a session number, all monitor sessions are displayed.

Example

This example shows how to display a created port monitor session with the session number 1.

```
Switch# show monitor session 1

Session: 1
    Session Type: local session
    Destination Port: ethernet1/0/3
    Source Port:
        Both:
            ethernet1/0/7
            ethernet1/0/8
        RX:
            ethernet1/0/9
        TX:
            ethernet1/0/10
total entries: 1

Switch#
```

41-4 monitor session destination remote vlan

Use the command to configure the RSPAN VLAN and destination port for a RSPAN source session. Use the no form of the command to removeconfiguration of the RSPAN VLAN.

monitor session SESSION-NUMBER destination remote vlan VLAN-ID interface {*INTERFACE-ID* **| port-channel** *<1-8>***}**

no monitor session SESSION-NUMBER destination remote vlan

Parameters

SESSION-NUMBER	(Optional) Specifies the session number which you want to display.
remote vlan *VLAN-ID*	Specify the RSPAN VLAN used to tunnel the monitored packets to the remote site.
interface *INTERFACE-ID*	Specifies the source interface for a port monitor session.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use the command on the source switch of a **RSPAN** session.The monitor session destination remote vlan command configures thedestination port used to transmit the monitor packets and the **RSPAN** VLAN usedto tunnel the monitored packets to the remote site. The destination port does notneed to be the member port of the **RSPAN VLAN**. The destination port can beeither a physical port or a port channel.Use the monitor session source interface command to configure the source portswhose packets will be monitored.Use the remote-span command in vlan config mode to specify a VLAN as a RSPAN VLAN. **When a VLAN is specified as a RSPAN VLAN, the accessmember port of the VLAN will become inactive.** The monitor packet will betunneled over the trunk member port of the RSPAN VLAN.The RSPAN VLAN is a tunnel VLAN. The source port does not need to bemember ports of the RSPAN VLAN.

Example

This example shows how to create a RSPAN session on the source switch. Itassigns VLAN 2 as the RSPAN VLAN with destination interface 1/0/2 and source port 1/0/10 as the port being monitored.

```
Switch(config)# vlan 2
Switch(config-vlan)# remote-span
Switch(config-vlan)# exit
Switch(config)# monitor session 1 destination remote vlan 2 interface ethernet 1/0/2

Switch(config)# monitor session 1 source interface ethernet 1/0/10
```

41-5 monitor session source remote vlan

Use the command to configure the RSPAN VLAN for a RSPAN destinationsession. Use the no form of the command to remove configuration of the RSPAN VLAN.

monitor session SESSION-NUMBER source remote vlan VLAN-ID

no monitor session SESSION-NUMBER source remote vlan

Parameters

SESSION-NUMBER	(Optional) Specifies the session number which you want to display.
remote vlan *VLAN-ID*	Specify the RSPAN VLAN used to tunnel the monitored packets to the remote site.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use the command on the destination switch of a **RSPAN** session.The monitor session source remote vlan command configures the VLAN that themonitored source packets are tunneled over from the remote site. Use themonitor session destination interface command to configure the destination port.Use the remote-span command in vlan config mode to specify a VLAN as a RSPAN VLAN. **When a VLAN is specified as a RSPAN VLAN, the accessmember port of the VLAN except the destination interface will become inactive**.

Example

This example shows how to create a RSPAN session on the destination switch. Itassigns VLAN 100 as the RSPAN VLAN and interface 1/0/4 as the destination port. Italso assigns VLAN 100 as the RSPAN VLAN. The monitored packets arrive at interface 1/0/2 and will be transmitted out toward interface 1/0/4

```
Switch(config)# vlan 100
Switch(config-vlan)# remote-span
Switch(config-vlan)# exit
Switch(config)# interface ethernet 1/0/2
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport trunk allowed vlan 100
Switch(config-if)# exit
Switch(config)# interface ethernet 1/0/4
Switch(config-if)# switchport mode access
Switch(config-if)# switchport access vlan 100
Switch(config-if)# exit
Switch(config)# monitor session 2 source remote vlan 100
Switch(config)# monitor session 2 destination interface ethernet 1/0/4
Switch(config)#
```

42. MLD Snooping Commands

42-1 clear ipv6 mld snooping statistics

This command is used to clear the statistic counter of the Switch.

clear ipv6 mld snooping statistics {all | vlan *VLAN-ID***}**

Parameters

all	Specifies to clear IPv6 MLD snooping statistics for all VLANs and all ports.
vlan *VLAN-ID*	Specifies the VLAN used. If no VLAN is specified, statistics for all VLANs are cleared.

Default

None.

Command Mode

Privilege EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to clear the statistic counter of the Switch.

Example

This example shows how to clear all MLD snooping statistics.

```
Switch# clear ipv6 mld snooping statistics all
Switch#
```

42-2 ipv6 mld snooping

This command is used to enable or disable MLD snooping.

ipv6 mld snooping

no ipv6 mld snooping

Parameters

None.

Default

MLD snooping is disabled on all VLAN interfaces.

The MLD snooping global state is disabled by default.

Command Mode

Interface Configuration Mode.

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

For a VLAN to operate with MLD snooping, both the global state and per interface state must be enabled. On a VLAN, the setting of IGMP snooping and MLD snooping are independent. That is, IGMP snooping and MLD snooping can be simultaneously enabled on the same VLAN.

Example

This example shows how to disable MLD snooping globally.

```
Switch# configure terminal
Switch(config)#no ipv6 mld snooping
Switch(config)#
```

This example shows how to enable MLD snooping globally.

```
Switch# configure terminal
Switch(config)# ipv6 mld snooping
Switch(config)#
```

This example shows how to enable MLD snooping on VLAN1.

```
Switch# configure terminal
Switch(config)# vlan 1
Switch(config-vlan)# ipv6 mld snooping
Switch(config-vlan)#
```

42-3 ipv6 mld snooping fast-leave

This command is used to configure MLD snooping fast-leave on the interface. Use the **no** form of this command to disable the fast-leave option on the specified interface.

ipv6 mld snooping fast-leave

no ipv6 mld snooping fast-leave

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. The **ipv6 mld snooping fast-leave** command allows MLD membership to beimmediately removed from a port when receiving the leave message without using the group specific or group-source specific query mechanism.

Example

This example shows how to enable MLD snooping fast-leave on VLAN 1.

```
Switch# configure terminal
Switch(config)#vlan 1
Switch(config-vlan)# ipv6 mld snooping fast-leave
Switch(config-vlan)#
```

42-4 ipv6 mld snooping last-listener-query-interval

This command is used to configure the interval at which the MLD snooping querier sends MLD group-specific or group-source-specific (channel) query messages. Use the **no** form of this command to revert to the default setting.

ipv6 mld snooping last-listener-query-interval *SECONDS*

no ipv6 mld snooping last-listener-query-interval

Parameters

SECONDS	Specifies the maximum amount of time between group-specific query messages, including those sent in response to leave-group messages. The range of this value is 1 to 25.

Default

By default, this value is 1 second.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. On receiving an MLD done message, the MLD snooping querier will assume that there are no local members on the interface if there are no reports received after the response time. Users can lower this interval to reduce the amount of time it takes a switch to detect the loss of the last member of a group.

Example

This example shows how to configure the last-listener query interval time to be 3 seconds on VLAN 1000.

```
Switch# configure terminal
Switch(config)#vlan 1000
Switch(config-vlan)# ipv6 mld snooping last-listener-query-interval 3
Switch(config-vlan)#
```

42-5 ipv6 mld snooping mrouter

This command is used to configure the specified interface(s) as the router ports or forbidden to be IPv6 multicast router ports on the VLAN interface on the Switch. Use the **no** form of this command to remove the interface(s) from router ports or forbidden IPv6 multicast router ports.

ipv6 mld snooping mrouter {interface *INTERFACE-ID* **[,|-] | forbidden interface** *INTERFACE-ID* **[,|-]}**

no ipv6 mld snooping mrouter {interface *INTERFACE-ID* **[,|-] | forbidden interface** *INTERFACE-ID* **[,|-]}**

Parameters

interface	Specifies a range of interfaces as being connected to multicast-enabled routers.
forbidden interface	Specifies a range of interfaces as being not connected to multicast-enabled routers.
INTERFACE-ID	Specifies an interface or an interface list. No space is allowed before and after the comma. The interface can be a physical interface or a port-channel.

Default

No IPv6 MLD snooping multicast router port is configured.

Auto-learning is enabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. To specify a multicast router port, the valid interface can be a physical port or a port-channel. The specified multicast router port must be member port of the configured VLAN.

The multicast router port can be either dynamically learned or statically configured into an MLD snooping entity. With the dynamic learning, the MLD snooping entity will listen to MLD and PIMv6 packet to identify whether the partner device is a router.

Example

This example shows how to configure ethernet1/0/1 as an MLD snooping multicast router port and ethernet1/0/2 as an MLD snooping forbidden multicast router port on VLAN 1.

```
Switch# configure terminal
Switch(config)#vlan 1
Switch(config-vlan)# ipv6 mld snooping mrouter interface ethernet 1/0/1
Switch(config-vlan)# ipv6 mld snooping mrouter forbidden interface ethernet 1/0/2
Switch(config-vlan)#
```

42-6 ipv6 mld snooping querier

This command is used to enable the MLD snooping querier on the Switch. Use the **no** form of this command to disable the MLD snooping querier function.

ipv6 mld snooping querier

no ipv6 mld snooping querier

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. The interface must have IPv6 address assigned to start the querier.

If the system can play the querier role, the entity will listen for MLD query packets sent by other devices. If MLD query message is received, the device with lower value of IPv6 address becomes the querier.

Example

This example shows how to enable the MLD snooping querier state on VLAN 1.

```
Switch# configure terminal
Switch(config)#vlan 1
Switch(config-vlan)# ipv6 mld snooping querier
Switch(config-vlan)#
```

42-7 ipv6 mld snooping query-interval

This command is used to configure the interval at which the MLD snooping querier sends MLD general query messages periodically. Use the **no** form of this command to revert to the default setting.

ipv6 mld snooping query-interval *SECONDS*

no ipv6 mld snooping query-interval

Parameters

SECONDS	Specifies to configure the interval at which the designated router sends MLD general-query messages. The range is 1 to 31744.

Default

By default, this value is 125 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. The query interval is the interval between General Queries sent by the Querier. By varying the query interval, an administrator may tune the number of MLD messages on the network; larger values cause MLD Queries to be sent less often.

Example

This example shows how to configure the MLD snooping query interval to 300 seconds on VLAN 1000.

```
Switch# configure terminal
Switch(config)#vlan 1000
Switch(config-vlan)# ipv6 mld snooping query-interval 300
Switch(config-vlan)#
```

42-8 ipv6 mld snooping query-max-response-time

This command is used to configure the maximum response time advertised in MLD snooping queries. Use the **no** form of this command to revert to the default setting.

ipv6 mld snooping query-max-response-time *SECONDS*

no ipv6 mld snooping query-max-response-time

Parameters

SECONDS	Specifies to set the maximum response time, in seconds, advertised in MLD Snooping queries. The range is from 1 to 25.

Default

By default, this value is 10 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. This command configures the period of which the group member can respond to an MLD query message before the MLD Snooping deletes the membership.

Example

This example shows how to configure the maximum response time to 20 seconds on VLAN 1000.

```
Switch# configure terminal
Switch(config)#vlan 1000
Switch(config-vlan)# ipv6 mld snooping query-max-response-time 20
Switch(config-vlan)#
```

42-9 ipv6 mld snooping query-version

This command is used to configure the general query packet version sent by the MLD snooping querier. Use the **no** form of this command to revert to the default setting.

ipv6 mld snooping query-version {1 | 2}

no ipv6 mld snooping query-version

Parameters

1	Specifies that the version of the MLD general query, sent by MLD snooping querier, is 1.
2	Specifies that the version of the MLD general query, sent by MLD snooping querier, is 2.

Default

By default, this version number is 2.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration.

Example

This example shows how to configure the query version to be 1 on VLAN 1000.

```
Switch# configure terminal
Switch(config)#vlan 1000
Switch(config-vlan)# ipv6 mld snooping query-version 1
Switch(config-vlan)#
```

42-10 ipv6 mld snooping robustness-variable

This command is used to set the robustness variable used in MLD snooping. Use the **no** form of this command to revert to the default value.

ipv6 mld snooping robustness-variable *VALUE*

no ipv6 mld snooping robustness-variable

Parameters

VALUE	Specifies the robustness variable. The range is from 1 to 7.

Default

By default, this value is 2.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration.

The robustness variable provides fine-tuning to allow for expected packet loss on an interface. The value of the robustness variable is used in calculating the following MLD message intervals:

- **Group member interval** - Amount of time that must pass before a multicast router decides there are no more members of a group on a network. This interval is calculated as follows: (robustness variable x query interval) + (1 x query response interval).
- **Other querier present interval** - Amount of time that must pass before a multicast router decides that there is no longer another multicast router that is the querier. This interval is calculated as follows: (robustness variable x query interval) + (0.5 x query response interval).
- **Last listener query count** - The number of group-specific queries sent before the router assumes there are no local listeners of a group. The default number is the value of the robustness variable.

User can increase this value if a subnet is expected to be loose.

Example

This example shows how to configure the robustness variable to be 3 on interface VLAN 1000.

```
Switch# configure terminal
Switch(config)#vlan 1000
Switch(config-vlan)# ipv6 mld snooping robustness-variable 3
Switch(config-vlan)#
```

42-11 ipv6 mld snooping static-group

This command is used to configure an MLD snooping static group. Use the **no** form of this command to delete a static group.

ipv6 mld snooping static-group *IPV6-ADDRESS* **interface** *INTERFACE-ID* **[,|-]**

no ipv6 mld snooping static-group *IPV6-ADDRESS* **[interface** *INTERFACE-ID* **[,|-]]**

Parameters

IPV6-ADDRESS	Specifies an IPv6 multicast group address.
interface *INTERFACE-ID* **[,|-]**	Specifies an interface or an interface list. No space is allowed before and after the comma. The interface can be a physical interface or a port-channel.

Default

No static-group is configured.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. This command applies to MLD snooping on a VLAN interface to statically add group membership entries.

The **ipv6 mld snooping static-group** command allows the user to create an MLD snooping static group in case that the attached host does not support MLD protocol.

Example

This example shows how to statically add group records for MLD snooping on VLAN 1.

```
Switch# configure terminal
Switch(config)#vlan 1
Switch(config-vlan)# ipv6 mld snooping static-group FF02::12:03 interface ethernet 1/0/5
Switch(config-vlan)#
```

42-12 show ipv6 mld snooping

This command is used to display MLD snooping information on the Switch.

show ipv6 mld snooping [vlan *VLAN-ID***]**

Parameters

vlan *VLAN-ID*	(Optional) Specifies the VLAN to be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display MLD snooping information for all VLANs on which MLD snooping are enabled by not specifying specific VLAN.

Example

This example shows how to display MLD snooping configurations.

```
Switch# show ipv6 mld snooping

MLD snooping global state: Enabled

VLAN #1 configuration
  MLD snooping state    : Enabled
  Fast leave            : Enabled (host-based)
  Querier state         : Enabled (Non-active)
  Query version         : v2
  Query interval        : 125 seconds
  Max response time     : 10 seconds
  Robustness value      : 2
  Last listener query interval    : 1 seconds

Total Entries: 1

Switch#
```

42-13 show ipv6 mld snooping groups

This command is used to display MLD snooping group-related information learned on the Switch.

show ipv6 mld snooping groups [*IPV6-ADDRESS* **| vlan** *VLAN-ID***]**

Parameters

IPV6-ADDRESS	(Optional) Specifies the group IPv6 address. If no IPv6 address is specified, all MLD group information will be displayed.
vlan *VLAN-ID*	(Optional) Specifies the VLAN interface. If no interface is specified, MLD group information about all interfaces will be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display MLD group information by command.

Example

This example shows how to display MLD snooping group information.

```
Switch# show ipv6 mld snooping groups

MLD Snooping Connected Group Membership:

VLAN ID  Group address         Source address       Exp(sec)  Interface
-------  -------------------   -------------------  --------  ---------
1        FF1E::                         *           258       2/0/7
1        FF1E::3                        *           258       2/0/7
1        FF1E::4               3620:110:1::3a2b     258       2/0/7

Total Entries: 3

Switch#
```

42-14 show ipv6 mld snooping mrouter

This command is used to display MLD snooping multicast router port information automatically learned or manually configured on the Switch.

show ipv6 mld snooping mrouter [vlan *VLAN-ID***]**

Parameters

vlan *VLAN-ID*	(Optional) Specifies the VLAN. If no VLAN is specified, MLD snooping Multicast Router Information on all VLANs will be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display dynamically learned or manually configured multicast router interfaces.

Example

This example shows how to display MLD snooping multicast router information.

```
Switch# show ipv6 mld snooping mrouter

VLAN    Ports
-----   ----------------------------
4094    1/0/12 (forbidden)

Total Entries: 3

Switch#
```

42-15 show ipv6 mld snooping static-group

This command is used to display MLD snooping static group information on the Switch.

show ipv6 mld snooping static-group [*GROUP-ADDRESS* **| vlan** *VLAN-ID***]**

Parameters

GROUP-ADDRESS	Specifies the group IPv6 address to be displayed.
vlan *VLAN-ID*	Specifies the VLAN ID to be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the MLD snooping static group information.

Example

This example shows how to display MLD snooping static group information .

```
Switch#show ipv6 mld snooping static-group

VLAN ID  Group address                          Interface
-------  ---------------                        ------------------------
1        FF1E::1                                1/0/1,1/0/5

Total Entries: 1

Switch#
```

42-16 show ipv6 mld snooping statistics

This command is used to display MLD snooping statistics information on the Switch.

show ipv6 mld snooping statistics vlan [*VLAN-ID***]**

Parameters

vlan *VLAN-ID*	Specifies the VLAN of which to display the VLAN statistics.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the MLD snooping related statistics information.

Example

This example shows how to display MLD snooping statistics information.

```
Switch# show ipv6 mld snooping statistics interface

Interface ethernet4/0/1
Rx: V1Report 1, v2Report 2, Query 1, v1Done 2
Tx: v1Report 1, v2Report 2, Query 1, v1Done 2

Interface ethernet4/0/3
Rx: V1Report 0, v2Report 0, Query 0, v1Done 0
Tx: v1Report 0, v2Report 0, Query 0, v1Done 0

Interface ethernet4/0/4
Rx: V1Report 3, v2Report 0, Query 3, v1Done 0
Tx: v1Report 2, v2Report 2, Query 1, v1Done 2

Total Entries: 3

Switch# show ipv6 mld snooping statistics vlan

VLAN1 Statistics:
Rx: v1Report 0, v2Report 58, Query 0, v1Done 0
Tx: v1Report 0, v2Report 0, Query 0, v1Done 0

Total Entries: 1

Switch#
```

43. Multiple Spanning Tree Protocol (MSTP) Commands

43-1 instance

This command is used to map a VLAN or a set of VLANs to an MST instance. Use the **no** instance without VLANs specified to remove instances. Use the **no** instance with VLAN specified to return the VLANs to the default instance (CIST).

instance *INSTANCE-ID* **vlans** *VLANDID* **[, | -]**

no instance *INSTANCE-ID* **[vlans** *VLANDID* **[, | -]]**

Parameters

INSTANCE-ID	Specifies the MSTP instance identifier to which the specified VLANs are mapped. This value must be between 1 and 4094.
vlans *VLANDID*	Specifies the VLANs to be mapped to or removed from the specified instance.This value must be between 1 and 4094.
,	(Optional)Specifies a series of VLAN, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional)Specifies a range of VLAN. No space is allowed before and after the hyphen.

Default

None.

Command Mode

MST Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Any unmapped VLAN is mapped to the CIST instance. When mapping the VLANs to an instance, if the instance doesn't exist, this instance will be created automatically. If all VLANs of an instance are removed, this instance will be destroyed automatically. In another way, users can remove the instance manually by using the **no instance** command without VLANs specified.

Example

This example shows how to map a range of VLANs to instance 2.

```
Switch# configure terminal
Switch(config)#spanning-tree mst configuration
Switch(config-mst)# instance 2 vlans 1-100
Switch(config-mst)#
```

43-2 name

This command is used to configure the name of an MST region. Use the **no** form of this command to revert to the default setting.

name *NAME*

no name *NAME*

Parameters

NAME	Specifies the name given for a specified MST region. The name string has a maximum length of 32 characters and the type is a general string which allows spaces.

Default

The default name is the Switch's MAC address.

Command Mode

MST Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Two or more switches with the same VLAN mapping and configuration version number are considered to be in different MST regions if the region names are different.

Example

This example shows how to configure the MSTP configuration name to "MName".

```
Switch# configure terminal
Switch(config)#spanning-tree mst configuration
Switch(config-mst)# name MName
Switch(config-mst)#
```

43-3 revision

This command is used to configure the revision number for the MST configuration. Use the **no** form of this command to revert to the default setting.

revision *VERSION*

no revision

Parameters

VERSION	Specifies the revision number for the MST configuration. The range is from 0 to 65535.

Default

By default, this value is 0.

Command Mode

MST Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Two Ethernet switches that have the same configuration but different revision numbers are considered to be part of two different regions.

Example

This example shows how to configure the revision level of the MSTP configuration to 2.

```
Switch# configure terminal
Switch(config)#spanning-tree mst configuration
Switch(config-mst)# revision 2
Switch(config-mst)#
```

43-4 show spanning-tree mst

This command is used to display the information that used in the MSTP version.

show spanning-tree mst [configuration]

show spanning-tree mst [instance *INSTANCE-ID* **[, | -]] [interface** *INTERFACE-ID* **[, | -]] [detail]**

Parameters

configuration	Specifies to display the table for the mapping relationship between VLANs and MSTP Instances.
instance *INSTANCE-ID* **[, | -]**	Specifies to display the MSTP information for the designated instance only. Define multiple instances byusing ‘,’ to specify a series of instances or to separate a range of instances from a previous range. Use ‘-‘ to specify a range of instances. No space before and after the comma or hyphen.
interface *INTERFACE-ID*	Specifies to display the STP information for the specified interface.
,	(Optional)Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional)Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the MSTP configuration and operation status. If a private VLAN is configured and the secondary VLAN does not map to the same primary VLAN, the **show spanning-tree mst configuration** command will display a message to indicate this condition.

Example

This example shows how to display MSTP detailed information.

```
Switch#show spanning-tree mst detail

 Spanning tree: Disabled,protocol: RSTP
 Number of MST instances: 1

>>>>MST00  vlans mapped : 1-4094
 Bridge Address: 00-01-02-03-04-00, Priority: 32768 (32768 sysid 0)
 Designated Root Address: 00-00-00-00-00-00, Priority: 0 (0 sysid 0)
 Regional Root Bridge Address: 00-00-00-00-00-00, Priority: 0 (0 sysid 0)
 Designated Bridge Address: 00-00-00-00-00-00, Priority: 0 (0 sysid 0)

 ethernet1/0/1
   Port state: forwarding
   Port role: nonStp
   Port info : port ID 128.1, priority: 128, cost: 200000
   Designated root address: 00-00-00-00-00-00, priority: 0
   Regional Root address: 00-00-00-00-00-00, priority: 0
   Designated bridge address: 00-00-00-00-00-00, priority: 0, port id: 0.0


Switch#
```

This example shows how to display MSTP detailed information for interface ethernet1/0/1.

```
Switch#show spanning-tree mst interface ethernet 1/0/1 detail

ethernet1/0/1
 Configured link type: auto, operation status: point-to-point
 Configured fast-forwarding: auto, operation status: non-edge

>>>>MST instance: 00,  vlans mapped : 1-4094
 Port state: forwarding
 Port role: nonStp
 Port info : port ID 128.1, priority: 128, cost: 200000
 Designated root address: 00-00-00-00-00-00, priority: 0
 Regional Root address: 00-00-00-00-00-00, priority: 0
 Designated bridge address: 00-00-00-00-00-00, priority: 0, port id: 0.0


Switch#
```

This example shows how to display MSTP summary information.

```
Switch#show spanning-tree mst

 Spanning tree: Disabled,protocol: RSTP
 Number of MST instances: 1

>>>>MST00  vlans mapped : 1-4094
 Bridge Address: 00-01-02-03-04-00, Priority: 32768 (32768 sysid 0)
 Designated Root Address: 00-00-00-00-00-00, Priority: 0 (0 sysid 0)
 Regional Root Bridge Address: 00-00-00-00-00-00, Priority: 0 (0 sysid 0)
 Designated Bridge Address: 00-00-00-00-00-00, Priority: 0 (0 sysid 0)

                                                Priority
 Interface      Role       State      Cost      .Port#
 ---------      ----       -----      ----      -------
 ethernet1/0/1       nonStp     forwarding 200000    128.1


Switch#
```

This example shows how to display MSTP summary information for interfaces ethernet1/0/3 to ethernet 1/0/4.

```
Switch# show spanning-tree mst interface ethernet 1/0/3-4

ethernet1/0/3
Configured link type: auto, operation status: point-to-point
  Configured fast-forwarding: auto, operation status: edge

                                       Priority
 Instance  Role       State      Cost    .Port#
--------  ----       -----      ------  ---------
MST00     designated forwarding  20000   128.3
MST01     backup     blocking   200000   128.3

ethernet1/0/4
Configured link type: auto, operation status: point-to-point
  Configured fast-forwarding: auto, operation status: edge

                                       Priority
 Instance  Role       State      Cost    .Port#
--------  ----       -----      ------  ---------
MST00     root       forwarding  20000   128.4
MST01     backup     blocking   200000   128.4

Switch#
```

This example shows how to display MSTP summary information for interfaces ethernet3/0/3 to ethernet 3/0/4 of MST02.

```
Switch# show spanning-tree mst instance 2 interface ethernet 1/0/3-4

>>>>MST02 vlans mapped:   2-3
Bridge Address:00-12-d9-87-47-00 , Priority: 32770 (32768 sysid 2)
Designated Root Address:00-12-d9-87-47-00 , Priority: 32770
Designated Bridge Address:00-12-d9-87-47-00 , Priority: 32770
                                          Priority
   Interface  Role       State      Cost    .Port#
---------  ----       -----      ------  ---------
ethernet1/0/3    backup     blocking   200000    128.3
ethernet1/0/4    backup     blocking   200000    128.4

Switch#
```

This example shows how to display MSTP instance mapping configuration.

```
Switch# show spanning-tree mst configuration

Name     : [region1]
Revision : 2, Instances configured: 3
Digest   :  A222086F87562346CA7D40AD90AB61ED
Instance   Vlans
---------  -------------
0          21-4094
1          1-10
2          11-20

Switch#
```

43-5 spanning-tree mst

This command is used to configure the path cost and portpriority parameters for any MST instance (including the CIST with instance ID 0). Use the **no** form of this command to revert to the default setting.

spanning-tree mst *INSTANCE-ID* **{cost** *COST* **| port-priority** *PRIORITY***}**

no spanning-tree mst *INSTANCE-ID* **{cost | port-priority}**

Parameters

INSTANCE-ID	Specifies the MSTP instance identifier.
cost *COST*	Specifies the path cost for an instance.This value must be between 1 and 200000000.
port-priority *PRIORITY*	Specifies the port priority for an instance. This value must be between 0 and 240 in increments of 16.

Default

The **cost** value depends on the port speed. The faster the interface's speed is will indicate a smaller cost. MST always uses long path costs.

The default **priority** value is 128.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When entering the **cost** value, do not include a comma in the entry. For example, enter 1000, not 1,000.

Example

This example shows how to configure the interface's path cost.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# spanning-tree mst 0 cost 17031970
Switch(config-if)#
```

43-6 spanning-tree mst configuration

This command is used to enter the MST Configuration Mode.Use the **no** form of this command to revert to the default setting.

spanning-tree mst configuration

no spanning-tree mst configuration

Parameters

None.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enter the MST Configuration Mode.

Example

This example shows how to enter the MST Configuration Mode.

```
Switch# configure terminal
Switch(config)#spanning-tree mst configuration
Switch(config-mst)#
```

43-7 spanning-tree mst max-hops

This command is used to configure the MSTP maximum hop count value. Use the **no** form of this command to revert to the default setting.

spanning-tree mst max-hops *HOP-COUNT*

no spanning-tree mst max-hops

Parameters

max-hops *HOP-COUNT*	Specifies the MSTP maximum hop count number. The range is from 1 to 40 hops.

Default

By default, this value is 20 hops.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the maximum hops for MSTP.

Example

This example shows how to configure the MSTP maximum hop count value.

```
Switch# configure terminal
Switch(config)#spanning-tree mst max-hops 19
Switch(config)#
```

43-8 spanning-tree mst hello-time

This command is used to configure the per-port hello time used in the **MSTP** version. Use the **no** form of this command to revert to the default setting.

spanning-tree mst hello-time *SECONDS*

no spanning-tree mst hello-time

Parameters

SECONDS	Specifies to determine the time interval to send one BPDU at the designated port. This value is either 1 or 2.

Default

By default, this value is 2.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This MSTP hello-time only takes effect in the MSTP mode.

Example

This example shows how to configure the port hello-time to 1 for the Ethernet interface ethernet1/01.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# spanning-tree mst hello-time 1
Switch(config-if)#
```

43-9 spanning-tree mst priority

This command is used to configure the bridge priority value for the selected MSTP instance. Use the **no** form of this command to revert to the default setting.

spanning-tree mst *INSTANCE-ID* **priority** *PRIORITY*

no spanning-tree mst *INSTANCE-ID* **priority**

Parameters

INSTANCE-ID	Specifies the MSTP instance identifier. Instance 0 represents the default instance, CIST.
PRIORITY	Specifies the bridge priority value that must be divisible by 4096. The range is from 0 to 61440.

Default

By default, this value is 32768.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The priority has same meaning with as the bridge priority in the STP command reference, but can specify a different priority for distinct MSTP instances.

Example

This example shows how to configure the bridge priority for the MSTP instance 2.

```
Switch# configure terminal
Switch(config)#spanning-tree mst 2 priority 0
Switch(config)#
```

44. MAC Authentication Commands

44-1 mac-auth system-auth-control

This command is used to enable MAC authentication globally. Use the **no** form of this command to disable the MAC authentication globally.

mac-auth system-auth-control

no mac-auth system-auth-control

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Usage Guideline

MAC authentication is a feature designed to authenticate a user by MAC address when the user is trying to access the network via the Switch. The Switch itself can perform the authentication based on a local database or be a RADIUS client and perform the authentication process via the RADIUS protocol with a remote RADIUS server.

Example

This example shows how to enable MAC authentication globally.

```
Switch# configure terminal
Switch(config)# mac-auth system-auth-control
Switch(config)#
```

44-2 mac-auth enable

This command is used to enable MAC authentication on the specified interface. Use the **no** form of this command to disable MAC authentication.

mac-auth enable

no mac-auth enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Usage Guideline

This command is only available for physical port interface configuration. It can be used to enable MAC authentication on the specified interface.

In addition, MAC authentication has the following limitations:

- The MAC authentication port cannot be enabled when port security is enabled on the port.
- The MAC authentication port cannot be enabled when IP-MAC-Port-Binding is enabled on the port.
- The MAC authentication port cannot be enabled on a link aggregation port.

Example

This example shows how to enable MAC authentication on port 1.

```
Switch# configure terminal
Switch(config)# interface eth
1/0/1

Switch(config-if)# mac-auth enable

Switch(config-if)#
```

44-3 mac-auth password

This command is used to configure the password of authentication for local and RADIUS authentication. Use the no form of this command to revert to the default setting.

mac-auth password [0 | 7] ***STRING***

no mac-auth enable

Parameters

0	(Optional) Specifies the password in the clear text form. If neither 0 nor 7 are specified, the default form will be clear text.
7	(Optional) Specifies the password in the encrypted form. If neither 0 nor 7 are specified, the default form will be clear text.
password *STRING*	Specifies to set the password for MAC authentication. If in the clear text form, the length of the string cannot be over 16 characters.

Default

By default, the password is the client's MAC address.

Command Mode

Global Configuration Mode.

Usage Guideline

This command is used to configure the password used in the authentication of MAC address users. If the command is not configured, the password for authentication of the MAC address user is formatted based on the MAC address. The MAC addresses format can be configured with the **authentication username mac-format** command.

Example

This example shows how to configure the password for MAC authentication.

```
Switch# configure terminal
Switch(config)# mac-auth password 0
Dlink@1234

Switch(config)#
```

44-4 mac-auth username

This command is used to configure the username for local and RADIUS authentication. Use the **no** form of this command to revert to the default setting.

mac-auth username STRING

no mac-auth username

Parameters

STRING	Specifies the username for MAC authentication. The length of the string cannot be over 16 characters.

Default

By default, the username is the client's MAC address.

Command Mode

Global Configuration Mode,

Usage Guideline

This command is used to configure the username to authenticate MAC address users. The username is used to authenticate via both the local database and remote servers. If the command is not configured, the username for authentication is formatted based on the MAC address.

Example

This example shows how to configure the username for MAC authentication.

```
Switch# configure terminal
Switch(config)# mac-auth username user1
Switch(config)#
```

44-5 snmp-server enable traps mac-auth

This command is used to enable the sending of SNMP notifications for MAC authentication. Use the **no** form of this command to disable the sending of SNMP notifications.

snmp-server enable traps mac-auth

no snmp-server enable traps mac-auth

Parameters

None.

Default

By default, this feature is disabled.

Command Mode

Global Configuration Mode.

Usage Guideline

None.

Example

This example shows how to enable the sending of traps for MAC authentication.

```
Switch# configure terminal
Switch(config)# snmp-server enable traps mac-auth
Switch(config)#
```

45. nmsManaged Commands

45-1 nmsmanaged

This command is display the DNC (D-Link Nuclias Connect) connection status.

nmsManaged

no nmsManaged

Parameters

None	None

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to turn on DNC mechanism. Use no form to disable DNC feature. Please be awared the system will reboot automatically when command “nmsManaged” executed.

Example

```
This example shows the current connection status.
Switch# nmsManaged
Switch#

Boot Procedure                                      1.00.001
-----------------------------------------------------------------

Power on self test..................................... 100 %



Loading Runtime Image.................................. 100 %
Uncompressing Kernel Image ............................ 100 %

Starting kernel ...
```

45-2 show nmsManaged

This command is display the DNC (D-Link Nuclias Connect) connection status.

Show nmsManaged

Parameters

None	None

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to show connection status of DNC.

Example

This example shows the current connection status.

```
Switch> show nmsManaged
Status                      :Enable
Connection Status           :Connected
Management status           :Managed
D-Link NMS URL              :DNH-100-7917.local:8443
Network UUID                :A5E9-B5B00DCB-11E98ACD-5D2D
Periodic Message Interval   :60
```

46. Neighbor Discovery (ND) Inspection

46-1 ipv6 nd inspection policy

This command is used to create an ND inspection policy. This command will enter the ND Inspection Policy Configuration Mode. Use the **no** form of this command to remove the ND inspection policy.

ipv6 nd inspection policy *POLICY-NAME*

no ipv6 nd inspection policy *POLICY-NAME*

Parameters

POLICY-NAME	Specifies the ND inspection policy name.

Default

None.

Command Mode

Global Configuration Mode.

Usage Guideline

Use this command to create an ND inspection policy. This command will enter the ND Inspection Policy Configuration Mode. ND inspection is mainly for inspection of Neighbor Solicitation (NS) and Neighbor Advertisement (NA) messages.

Example

This example shows how to create an ND policy name called “policy1”.

```
Switch# configure terminal
Switch(config)# ipv6 nd inspection policy policy1
Switch(config-nd-inspection)#
```

46-2 validate source-mac

This command is used to check the source MAC address against the link-layer address for ND messages. Use the no form of this command to disable the check.

validate source-mac

no validate source-mac

Parameters

None.

Default

By default, this option is disabled.

Command Mode

ND Inspection Policy Configuration Mode.

Usage Guideline

When the Switch receives an ND message that contains a link-layer address, the source MAC address is checked against the link-layer address. The packet will be dropped if the link-layer address and the MAC addresses are different from each other.

Example

This example shows how to enable the Switch to drop an ND message whose link-layer address does not match the MAC address.

```
Switch# configure terminal
Switch(config)# ipv6 nd inspection policy policy1
Switch(config-nd-inspection)# validate source-mac
Switch(config-nd-inspection)#
```

46-3 device-role

This command is used to specify the role of the attached device. Use the no form of this command to revert to the default setting.

device-role {host | router}

no device-role

Parameters

host	Specifies to set the role of the device to
router	Specifies to set the role of the device to router.

Default

By default, the device's role is **host**.

Command Mode

ND Inspection Policy Configuration Mode.

Usage Guideline

Use this command to specify the role of the attached device. By default, the device's role is set as host and inspection for NS and NA messages are performed. If the device role is set as router, the NS and NA inspection is not performed. When performing NS/NA inspection, the message will be verified against the dynamic binding table learned from the ND protocol or from the DHCP.

Example

This example shows how to create a ND policy named "policy1" and configures the device's role to host.

```
Switch# configure terminal
Switch(config)# ipv6 nd inspection policy policy1
Switch(config-nd-inspection)# device-role host
Switch(config-nd-inspection)#
```

46-4 ipv6 nd inspection attach-policy

This command is used to apply an ND inspection policy on the specified interface. Use the **no** form of this command to remove the ND inspection policy.

ipv6 nd inspection attach-policy [*POLICY-NAME***]**

no ipv6 nd inspection attach-policy

Parameters

POLICY-NAME	(Optional) Specifies the ND inspection policy name.

Default

By default, ND inspection policy is not applied.

Command Mode

Interface Configuration Mode.

Usage Guideline

This command is only available for physical port interface configuration.

Use this command to apply the ND Inspection policy on a specified interface. If no parameter is specified, the behavior of the default policy is as follows:

- NS/NA messages are inspected.
- Layer 2 header source MAC address validations are disabled.

Example

This example shows how to apply ND inspection policy called “policy1” on port 3.

```
Switch# configure terminal
Switch(config)# ipv6 nd inspection policy policy1
Switch(config-nd-inspection)# device-role host
Switch(config-nd-inspection)# validate source-mac
Switch(config-nd-inspection)# exit
Switch(config)# interface eth 1/0/3
Switch(config-if)# ipv6 nd inspection attach-policy policy1
Switch(config-if)#
```

46-5 show ipv6 nd inspection policy

This command is used to display Router Advertisement (RA) guard policy information.

show ipv6 nd inspection policy [*POLICY-NAME***]**

Parameters

POLICY-NAME	(Optional) Specifies the IPv6 RA guard policy name.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Usage Guideline

Use this command to display Router Advertisement (RA) guard policy information. If no parameter is specified, information of all policies will be displayed.

Example

This example shows how to display the policy configuration for a policy named “inspect1”.

```
Switch# show ipv6 nd inspection policy inspect1


Policy inspect1 configuration:
   Device Role: host
   Validate Source MAC: Enabled
   Target: eth1/0/1-1/0/2


Switch#
```

47. Network Access Authentication Commands

47-1 authentication guest-vlan

This command is used to configure the guest VLAN setting. Use the **no** form of this command to remove the guest VLAN.

authentication guest-vlan *VLAN-ID*

no authentication guest-vlan

Parameters

VLAN-ID	Specifies the authentication guest VLAN.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command cannot be configured if the specified VLAN does not exist as a static VLAN. The host cannot access the network until it passes the authentication. If the guest VLAN is configured, the host is allowed to access the guest VLAN without passing the authentication. During authentication, if the RADIUS server assigns a VLAN to the user, then the user will be authorized to this assigned VLAN. Guest VLAN and VLAN assignment does not take effect on trunk VLAN port and VLAN tunnel port.

Normally guest VLAN and VLAN assignment are functioning for hosts that connect to untagged ports. It may cause unexpected behavior if it is functioning on hosts that send tagged packets.

If the authentication host-mode is set to **multi-host**, the port will be added as a guest VLAN member port and the PVID of the port will change to guest VLAN. Traffic that comes from guest VLAN can be forward whatever whether authenticated. Traffic that comes from other VLANs will still be dropped until it pass authentication. When one host passes authentication, the port will leave the guest VLAN and be added to the assigned VLAN. The PVID of the port will be changed to the assigned VLAN.

If guest VLAN is disabled, the port will exit the guest VLAN and return to the native VLAN. The PVID will change to the native VLAN.

Example

This example shows how to specify VLAN 5 as a guest VLAN.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# authentication guest-vlan 5
Switch(config-if)#
```

47-2 authentication host-mode

This command is used to specify the authentication mode. Use the **no** form of this command to revert to the default setting.

authentication host-mode {multi-host | multi-auth [vlan *VLAN-ID* **[, | -]]}**

no authentication host-mode [multi-auth vlan *VLAN-ID* **[, | -]]**

Parameters

multi-host	Specifies the port to operate in the multi-host mode. Only a single authentication is performed and all hosts connected to the port are allowed.
multi-auth	Specifies the port to operate in the multi-auth mode.Each host will be authenticated individually.
vlan *VLAN-ID*	(Optional) Specifies the authentication VLAN(s). This is useful when different VLANs on the Switch have different authentication requirements. Using the **no** command, all the VLANs are removed If not specified. This means that it does not care which VLAN the client comes from, the client will be authenticated if the client's MAC address (regardless of the VLAN) is not authenticated. After the client is authenticated, the client will not be re-authenticated when received from other VLANs. This option is useful for trunk ports to do per-VLAN authentication control. When a port's authentication mode is changed to multi-host, the previous authentication VLAN(s) on this port will be cleared.

Default

By default, **multi-auth** is used.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If the port is operated in the **multi-host** mode, and if one of the hosts is authenticated, then all other hosts are allowed to access the port. According to 802.1X authentication, if the re-authentication fails or the authenticated user logs off, the port will be blocked for a quiet period. The port restores the processing of EAPOL packets after the quiet period.

If the port is operated in the **multi-auth** mode, then each host needs to be authenticated individually to access the port. A host is represented by its MAC address. Only the authorized host is allowed to access.

Example

This example shows how to specify the Ethernet port 1/0/1 to operate in the multi-host mode.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# authentication host-mode multi-host
Switch(config-if)#
```

NOTE: For 802.1X authentication, Dynamic VLAN is only supported in "Multi-Host" mode (port based)

47-3 authentication periodic

This command is used to enable periodic re-authentication for a port. Use the **no** form of this command to disable periodic re-authentication.

authentication periodic

no authentication periodic

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable periodic re-authentication for a port.

Example

This example shows how to enable periodic re-authentication on Ethernet port ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# authentication periodic
Switch(config-if)#
```

47-4 authentication timer reauthentication

This command is used to configure the timer to re-authenticate a session. Use the **no** form of this command to revert to the default setting.

authentication timer reauthentication {*SECONDS***}**

no authentication timer reauthentication

Parameters

SECONDS	Specifies the timer to re-authenticate a session. The range is from 1 to 65535.

Default

By default, this value is 3600 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the re-authentication timer.

Example

This example shows how to configure the re-authentication timer value to 200 for ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# authentication timer reauthentication 200
Switch(config-if)#
```

47-5 authentication timer restart

This command is used to configure the timer to restart the authentication after the last failed authentication. Use the **no** form of this command to revert to the default setting.

authentication timer restart *SECONDS*

no authentication timer restart

Parameters

SECONDS	Specifies the authentication restart timer value. The range is from 1 to 65535

Default

By default, this value is 60 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The Switch will be in the quiet state for a failed authentication session until the expiration of the timer.

Example

This example shows how to configurethernete restart timer to 20 for ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# authentication timer restart 20
Switch(config-if)#
```

47-6 authentication username

This command is used to create a user in the local database for authentication. Use the **no** form of this command to remove a user in the local database.

authentication username *NAME* **password [0 | 7]** *PASSWORD* **[vlan** *VLAN-ID***]**

no authentication username *NAME* **[vlan]**

Parameters

NAME	Specifies the username with a maximum of 32 characters.
0	(Optional) Specifies the password in the clear text form. If neither 0 nor 7 are specified, the default form is clear text.
7	(Optional) Specifies the password in the encrypted form. If neither 0 nor 7 are specified, the default form is clear text.
password *STRING*	Specifies to set password for MAC authentication. If in the clear text form, the length of the string cannot be over 32.
vlan *VLAN-ID*	Specifies the VLAN to be assigned.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to configure the local database used for user authentication.

Example

This example shows how to create a local account with user1 as the username and pass1 as password.

```
Switch# configure terminal
Switch(config)# authentication username user1 password pass1
Switch(config)#
```

47-7 clear authentication sessions

This command is used to remove authentication sessions.

clear authentication sessions {dot1x | all | interface *INTERFACE-ID* **[dot1x] | mac-address** *MAC-ADDRESS***}**

Parameters

dot1x	Specifies to clear all dot1x sessions.
all	Specifies to clear all sessions.
interface *INTERFACE-ID*	Specifies a port to clear sessions.
mac-address *MAC-ADDRESS*	Specifies a specific user to clear session.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear the authentication sessions.

Example

This example shows how to remove authentication sessions on Ethernet port 1/0/1.

```
Switch# clear authentication sessions interface ethernet 1/0/1
Switch#
```

47-8 authentication mac-move deny

This command is used to disable MAC move on the Switch. Use the **no** form of this command to revert to the default setting.

authentication mac-move deny

no authentication mac-move deny

Parameters

None.

Default

By default, this option is permitted.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command control whether to allow authenticated hosts to do roaming across different switch ports. This command only controls whether a host which is authenticated at a port set to **multi-auth** mode is allowed to move to another port.

If a station is allowed to move, there are two situations. It may either need to be re-authenticated or directly moved to the new port without re-authentication based on the following rule. If the new port has the same authentication configuration as the original port, then re-authentication is not needed. The host will inherit the same authorization attributes with new port. The authenticated host can do roaming from port 1 to port 2, and inherit the authorization attributes without re-authentication. If the new port has the different authentication configuration as the original port, then re-authentication is needed. The authenticated host on port 1 can move and re-authenticated by port 2. If the new port has no authentication method enabled, then the station is directly moved to the new port. The session with the original port is removed. The authenticated host on port 1 can be moved to port 2.

If MAC move is disabled and an authenticated host moves to another port, then this is treated as a violation error.

Example

This example shows how to enable MAC move on the Switch.

```
Switch# configure terminal
Switch(config)#authentication mac-move deny
Switch(config)#
```

47-9 authorization disable

This command is used to disable the acceptance of the authorized configuration. Use the **no** form to enable the acceptance of the authorized configuration.

authorization disable

no authorization disable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is used to enable or disable the acceptance of an authorized configuration. When authorization is enabled for authentication, the authorized attributes (for example VLAN, 802.1p default priority, bandwidth, and ACL) assigned by the RADIUS server will be accepted if the authorization status is enabled. Bandwidth and ACL are assigned on a per-port basis. If in the **multi-auth** mode, VLAN and 802.1p are assigned on a per-host basis. Otherwise, Bandwidth and ACL are assigned on a per-port basis.

Due to hardware limitation, the rate assigned via authentication server would be automatically converted to multiples of 16.

For example:

Authentication server configured Ingress bandwidth assigned 3000; Egress bandwidth assigned 5000.

The actual rate configured in DGS-1250 would be Ingress bandwidth 2992; Egress bandwidth 4992.

Example

This example shows how to enable the authorization status.

```
Switch# configure terminal
Switch(config)#no authorization disable
Switch(config)#
```

47-10 authentication username mac-format

This command is used to define how a switch processes and interprets MAC addresses when they are used as usernames for **MAC Authentication Bypass (MAB)** or other MAC-based authentication methods. Use the **no** form to disable the authentication username mac-format.

authentication username mac-format case {lowercase | uppercase} delimiter {hyphen | colon | dot | none} number {1 | 2 | 5}

no authentication username mac-format

Parameters

case {lowercase | uppercase}	Determines the letter case of the MAC address. Example: aa:bb:cc... (lowercase) vs. AA:BB:CC... (uppercase).
delimiter {hyphen | colon | dot | none}	Defines the character used to separate the MAC address segments. Options: - (hyphen), : (colon), . (dot), or no separator at all.
number {1 | 2 | 5}	Specifies how many characters appear between each delimiter. 1: A:B:C:D... 2: AA:BB:CC:DD:EE:FF (Standard format) 5: AAAA.BBBB.CCCC (Cisco standard format, usually used with dot)

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The most critical guideline is to match the format expected by your RADIUS server (e.g., Cisco ISE, FreeRADIUS). If the switch sends aa-bb-cc but the server expects AABBCC, the authentication will fail. Apply the same MAC format globally across all switches in your network. Inconsistent formatting makes troubleshooting logs and managing the endpoint database extremely difficult.

Example

This example shows how to enable the authorization status.

```
Switch# configure terminal
Switch(config)# authentication username mac-format case lowercase delimiter hyphen number
1
Switch(config)#
```

47-11 show authentication sessions

This command is used to display authentication information.

show authentication sessions [dot1x | interface *INTERFACE-ID* **[, | -] [dot1x] | mac-address** *MAC-ADDRESS***]**

Parameters

dot1x	(Optional) Specifies to display all dot1x sessions.
interface *INTERFACE-ID*	(Optional) Specifies a port to display.
,	(Optional)Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional)Specifies a range of interfaces. No space is allowed

	before and after the hyphen.
mac-address *MAC-ADDRESS*	(Optional) Specifies to display a specific user.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command without parameters to display the sessions associated with all ports.

Example

This example shows how to display sessions on Ethernet port 1/0/1.

```
Switch# show authentication sessions interface ethernet 1/0/1

Interface: ethernet1/0/1
MAC Address: 00-16-76-35-1A-38
Authentication VLAN: 1

Authentication Username: Administrator
Assigned Priority: 0
Assigned Ingress Bandwidth : 0 kbps
Assigned Egress Bandwidth  : 0 kbps
802.1X Authenticator State: HELD
802.1X Backend State : IDLE


Total Authenticating Hosts: 0
Total Authenticated Hosts: 1
Total Blocked Hosts: 0

Switch#
```

Display Parameters

Interface	The authentication host received interface.
MAC Address	The MAC address of authentication host.
Authentication VLAN	The original VLAN of the host start authentication.
Authentication State	The authentication status of host. **Start:** Host received, but no any authentication start. **Initialization:** Authentication resource ready, but no new authentication start. **Authenticating:** Host is under authenticating. **Failure:** Authentication failure. **Success:** Host pass authentication.
Accounting Session ID	The accounting session ID that used to do accounting after authenticated.
Authentication Username	It indicates the user name of host. It's not available while the host is selected by MAC-Auth.

Client IP Address	It indicates the address of the client associates. It's only available while the host is selected by Web-Auth or JWAC.
Assigned VID	Effectively assigned VLAN ID that was authorized after the host passed authentication.
Assigned Priority	Effectively assigned priority that was authorized after the host passed authentication.
Assigned Ingress Bandwidth	Effectively assigned ingress that was authorized after the host passed authentication.
Assigned Egress Bandwidth	Effectively assigned egress that was authorized after the host passed authentication.
802.1X Authenticator State	Indicates the 802.1X authenticator PAE state: It can be one of the following values: **INITIALIZE:** Indicates the authenticator is initializing the state machine and ready to authenticate the supplicant. **DISCONNECTED:** Indicates that the state machine initialization has finished, but no supplicant connects to this port. **CONNECTING:** Indicates that the Switch has detected a supplicant connecting to this port. The PAE will attempt to establish communication with a supplicant. **AUTHENTICATING:** Indicates that a supplicant is being authenticated. **AUTHENTICATED:** Indicates that the Authenticator has successfully authenticated the supplicant. **ABORTING:**Indicates that the authentication procedure is being prematurely aborted due to the receipt of a re-authentication request, an EAPOL-Start frame, an EAPOL-Logoff frame, or an authentication timeout. **HELD:**Indicates that the state machine ignores and discards all EAPOL packets in order to discourage brute force attacks. This state is entered from the AUTHENTICATING state following an authentication failure. **FORCE_AUTH:**Indicates that the supplicant is always authorized. **FORCE_UNAUTH:**Indicates that the supplicant is always unauthorized.
802.1X Backend State	Indicates the 802.1X backend PAE state. It can be one of the following values: **REQUEST:**Indicates that the state machine has received an EAP request packet from the authentication server and is relaying that packet to the Supplicant as an EAPOL-encapsulated frame. **RESPONSE:**Indicates that the state machine has received an EAPOL-encapsulated EAP Response packet from the supplicant and is relaying the EAP packet to the authentication Server. **SUCCESS:**Indicates that the authentication server has confirmed that the supplicant is a legal client. The backend state machine will notify the authenticator PAE state machine and the supplicant. **FAIL:**Indicates that the authentication server has confirmed the supplicant is an illegal client. The backend state machine will notify the authenticator PAE state machine and the supplicant. **TIMEOUT:**Indicates that the authentication server or supplicant has time out. **IDLE:**In this state, the state machine is waiting for the Authenticator state machine to signal the start of a new authentication session.

	INITIALIZE: Indicates the authenticator is initializing the state machine.

48. Port Security Commands

48-1 clear port-security

This command is used to delete the auto-learned secured MAC addresses.

clear port-security {all | {address *MAC-ADDR* **| interface** *INTERFACE-ID* **[, | -]}}**

Parameters

all	Specifies to delete all auto-learned secured entries.
address *MAC-ADDR*	Specifies to delete the specified auto -learned secured entry based on the MAC address entered.
interface *INTERFACE-ID*	Specifies to delete all auto-learned secured entries on the specified physical interface.
,	(Optional)Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional)Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command clears auto-learned secured entries, either dynamic or permanent.

Example

This example shows how to remove a specific secure address from the MAC address table.

```
Switch# clear port-security address 0080.0070.0007
Switch#
```

48-2 show port-security

This command is used to display the current port security settings.

show port-security [[[interface *INTERFACE-ID* **[, | -]] | [address]]**

Parameters

INTEFACE-ID	Specifies the ID of the interface to be displayed.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed

	before and after the hyphen.
address	Specifies to display all the secure MAC addresses, including both configured and learned entries.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the current port security settings.

Example

This example shows how to display the port security settings of interfaces ethernet1/0/1 to ethernet1/0/3.

```
Switch# show port-security interface ethernet 1/0/1-3
Interface No.     : ethernet1/0/1
Max No.           : 32
Curr No.          : 0
Violation Action  : Protect
Violation Count   : -
Security Mode     : DeleteOnTimeout
Admin State       : Disabled
Current State     : -
Aging Time        : 0
Aging Type        : Absolute

Interface No.     : ethernet1/0/2
Max No.           : 32
Curr No.          : 0
Violation Action  : Protect
Violation Count   : -
Security Mode     : DeleteOnTimeout
Admin State       : Disabled
Current State     : -
Aging Time        : 0
Aging Type        : Absolute

Interface No.     : ethernet1/0/3
Max No.           : 32
Curr No.          : 0
Violation Action  : Protect
Violation Count   : -
Security Mode     : DeleteOnTimeout
Admin State       : Disabled
Current State     : -
Aging Time        : 0
Aging Type        : Absolute

Switch#
```

48-3 snmp-server enable traps port-security

This command is used to enable sending SNMP notifications for port security address violation. Use the **no** form of this command to disable sending SNMP notifications.

snmp-server enable traps port-security [trap-rate *TRAP-RATE***]**

no snmp-server enable traps port-security [trap-rate]

Parameters

trap-rate *TRAP-RATE*	(Optional) Specifies the number of traps per second. The range is from 0 to 1000. The default value ("0") indicates an SNMP trap to be generated for every security violation.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable or disable SNMP notifications for port security address violation, and configure the number of traps per second.

Example

This example shows how to enable sending trap for port security address violation and set the number of traps per second to 3.

```
Switch# configure terminal
Switch(config)# snmp-server enable traps port-security
Switch(config)#
```

48-4 switchport port-security

This command is used to configure the port security settings to restrict the number of users that are allowed to gain access rights to a port. Use the **no** form of this command to disable port security or to delete a secure MAC address.

switchport port-security [maximum *VALUE* **| violation {protect | restrict | shutdown} | mode {permanent | delete-on-timeout} | mac-address [permanent]** *MAC-ADDRESS* **[vlan** *VLAN-ID***]]**

no switchport port-security [maximum | violation | mode | mac-address [permanent] *MAC-ADDRESS* **[vlan** *VLAN-ID***]]**

Parameters

maximum *VALUE*	(Optional) Specifies to set the maximum number of secure MAC addresses allowed. If not specified, the default value is 32. The valid range is from 0 to 6656.
protect	(Optional) Specifies to drop all packets from the insecure hosts at the port-security process level, but does not increment the security-violation count.

restrict	(Optional) Specifies to drop all packets from the insecure hosts at the port-security process level and increments the security-violation count and record the system log.
shutdown	(Optional) Specifies to shut down the port if there is a security violation and record the system log.
permanent	(Optional) Specifies that under this mode, all learned MAC addresses will not be purged out unless the user manually deletes those entries.
delete-on-timeout	(Optional) Specifies that under this mode, all learned MAC addresses will be purged out when an entry is aged out or when the user manually deletes these entries.
mac-address *MAC-ADDRESS*	(Optional) Specifies to add a secure MAC address to gain port access rights.
permanent	(Optional) Specifies to set the secure permanent configured MAC address of the port. This entry is same as the one learnt under the permanent mode.
vlan *VLAN-ID*	(Optional) Specifies a VLAN. If no VLAN is specified, the MAC address will be set with a PVID.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When port security is enabled, if the port mode is configured as **delete-on-timeout**, the port will automatically learn the dynamic secured entry which will be timed out. These entries will be aged out based on the setting specified by the **switchport port-security aging** command. If the port mode is permanent, the port will automatically learn permanent secured entries which will not be timed out. The auto-learned permanent secured entry will be stored in the running configuration.

As the port mode-security state is changed, the violation counts will be cleared, and the auto-permanent entries will be converted to corresponding dynamic entries. As the port-security state is changed to disabled, the auto-learned secured entries, either dynamic or permanent with its violation counts are cleared. As the related VLAN configuration is changed, the auto-learned dynamic secured entries are cleared.

Permanent secured entry will be kept in the running configuration and can be stored to the NVRAM by using the **copy** command. The user configured secure MAC addresses are counted in the maximum number of MAC addresses on a port.

As a permanent secured entry of a port security enabled port, the MAC address cannot be moved to another port.

When the maximum setting is changed, the learned address will remain unchanged when the maximum number increases. If the maximum number is changed to a lower value which is lower than the existing entry number, the command is rejected.

A port-security enabled port has the following restrictions.

- The port security function cannot be enabled simultaneously with 802.1X, MAC (MAC-based Access Control), JWAC, WAC and IMPB, that provides more advanced security capabilities.
- If a port is specified as the destination port for the mirroring function, the port security function cannot be enabled.
- If the port is a link aggregation member port, the port security function cannot be enabled.

When the maximum number of secured users is exceeded, one of the following actions can occur:

- **Protect** - When the number of port secure MAC addresses reaches the maximum number of users that is allowed on the port, the packets with the unknown source address is dropped until some secured entry is removed to release the space.
- **Restrict** - A port security violation restricts data and causes the security violation counter to increment.
- **Shutdown** - The interface is disabled, based on errors, when a security violation occurs.

Example

This example shows how to configure the port security mode to be permanent, specifying that a maximum of 5 secure MAC addresses are allowed on the port.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# switchport port-security mode permanent
Switch(config-if)# switchport port-security maximum 5
Switch(config-if)#
```

This example shows how to manually add the secure MAC addresses 00-00-12-34-56-78 with VID 5 at interface ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# switchport port-security mac-address 00-00-12-34-56-78 vlan 5
Switch(config-if)#
```

This example shows how to configure the Switch to drop all packets from the insecure hosts at the port-security process level and increment the securityviolation counter if a security violation is detected.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# switchport port-security violation restrict
Switch(config-if)#
```

48-5 switchport port-security aging

This command is used to configure the aging time for auto-learned dynamic secure addresses on an interface. Use the **no** form of this command to revert to the default settings.

switchport port-security aging {time *MINUTES* **| type {absolute | inactivity}}**

no switchport port-security aging {time | type}

Parameters

MINUTES	Specifies the aging time for the auto-learned dynamic secured address on this port. Its range is from 1 to 1440 in minutes.
type	Specifies to set the aging type.
absolute	Specifies to set absolute aging type. All the secure addresses on this port age out exactly after the time specified and is removed from the secure address list. This is the default type.
inactivity	Specifies to set the inactivity aging type. The secure addresses on this port age out only if there is no data traffic from the secure source address for the specified time period.

Default

By default, the port security aging feature is disabled.

The default time is 0 minutes.

The default aging type is **absolute**.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to disable the ageing or set the ageing time for auto-learned dynamic secured entries. In order for the inactivity setting to take effect, the FDB table ageing function must be enabled.

Example

This example shows how to apply the aging time for automatically learned secure MAC addresses for interface ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# switchport port-security aging time 1
Switch(config-if)#
```

This example shows how to configure the port security aging time type for interface ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# switchport port-security aging type inactivity
Switch(config-if)#
```

48-6 port-security limit

This command is used to configure the maximum secure MAC address number on the system. Use the **no** form of this command to revert to the default setting.

port-security limit global *VALUE*

no port-security limit global

Parameters

VALUE	Specifies the maximum number of port security entries that can be learned on the system. The range is from 1 to 6656. If the setting is smaller than the number of current learned entries, the command will be rejected.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to set the limit on the port security entry number which can be learned on a system.

Example

This example shows how to configure the maximum secure MAC address number for the system.

```
Switch# configure terminal
Switch(config)#port-security limit global 100
Switch(config)#
```

48-7 show port-security global-settings

This command is used to display port security global settings.

show port-security global-settings

Parameters

None

Default

None.

Command Mode

EXEC Mode

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display port security global settings.

Example

This example shows how to display port security global settings.

```
Switch# show port-security global-settings
Trap State             : Disabled
Trap Rate              : 0
System Maximum Address : No Limit

Switch#
```

48-8 show snmp-server traps port-security

This command is used to display port security traps is enabled or not.

show snmp-server traps port-security

Parameters

None

Default

None.

Command Mode

EXEC Mode

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display port security traps states.

Example

This example shows how to display port security traps states.

```
Switch# show snmp-server traps port-security
  port-security               : Disabled
Switch#
```

49. Power Saving Commands

49-1 dim led

This command is used to disable the port LED function. Use the **no** form of this command to restore the LED function.

dim led

no dim led

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to turn off the port LED function. Use the **no** form of this command to restore the LED function. When the port LED function is disabled, LEDs used to illustrate port status are all turned off to save power.

Example

This example shows how to disable the port LED function:

```
Switch# configure terminal
Switch(config)#dim led
Switch(config)#
```

49-2 power-saving

This command is used to enable individual power saving functions. Use the **no** form of this command to disable these functions.

power-saving {port-shutdown | dim-led | hibernation}

no power-saving {port-shutdown | dim-led | hibernation}

Parameters

dim-led	Specifies that power saving will be applied by scheduled dimming LEDs.
port-shutdown	Specifies that power saving will be applied by scheduled port shutdown.
hibernation	Specifies that power saving will be applied by scheduled system hibernation. This parameter can only be used when the stacking is disabled.

Default

By default, all the options are disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The user can enable or disable dimming LEDs, port shutdown, and hibernation using this command.

When dim LED is enabled, the device will turn off all the port's LEDs in the specified time range to save power.

When port shutdown is enabled, the device will shut off all ports in the specified time range to save power.

When hibernation is enabled, the device will enter the hibernation mode in the specified time range to save power. This parameter can only be used when the stacking is disabled.

Example

This example shows how to enable power saving by shutting off the Switch's ports and toggle the Switch into the hibernation mode.

```
Switch# configure terminal
Switch(config)#power-saving port-shutdown
Switch(config)# power-saving hibernation
Switch(config)#
```

49-3 power-saving eee

This command is used to enable the Energy-Efficient Ethernet (eee) function on the specified port(s). Use the **no** form of this command to disable the eee function.

power-saving eee

no power-saving eee

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable or disable the specified port's eee power saving function. The Energy-Efficient Ethernet (eee) power-saving mode saves power consumption while a link is up when there is low utilization of packet traffic. The physical interface will enter into a Low Power Idle (LPI) mode when there is no data to be transmitted. In the eee power-saving mode, power consumption is scalable to the actual bandwidth utilization.

Example

This example shows how to enable the eee power saving function.

```
Switch# configure terminal
Switch(config)#interface ethernet1/0/1
Switch(config-if)# power-saving eee
Switch(config-if)#
```

49-4 power-saving dim-led time-range

This command is used to configure the timerange profile for the dim LED schedule. Use the **no** form of this command to delete the specified timerange profile.

power-saving dim-led time-range *PROFILE-NAME*

no power-saving dim-led time-range *PROFILE-NAME*

Parameters

PROFILE-NAME	Specifies the name of the timerange profile to be configured. The maximum length is 32 characters.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to add or delete a time range profile for the dim LED schedule. When the schedule is up, all port's LED will be turned off.

Example

This example shows how to add a time-range profile for the dim LED schedule.

```
Switch# configure terminal
Switch(config)#power-saving dim-led time-range off-duty
Switch(config)#
```

49-5 power-saving hibernation time-range

This command is used to configure the timerange profile for the system hibernation schedule. Use the **no** form of this command to delete the specified timerange profile.

power-saving hibernation time-range *PROFILE-NAME*

no power-saving hibernation time-range *PROFILE-NAME*

Parameters

PROFILE-NAME	Specifies the name of the timerange profile to be configured. The maximum length is 32 characters.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to add or delete a time range profile for the system hibernation schedule. When the system enters the hibernation mode, the Switch will go into a low power state and idle. It will shut down all the ports and LEDs, all network function will be disabled, and only the console connection will work via the RS232 port. If the Switch is an endpoint type Power Sourcing Equipment (PSE), the Switch will not provide power to the port. This command can only be used when the stacking is disabled.

Example

This example shows how to add a timerange profile for the hibernation schedule.

```
Switch# configure terminal
Switch(config)#power-saving hibernation time-range off-duty
Switch(config)#
```

49-6 power-saving shutdown time-range

This command is used to configure the timerange profile for the portshutdown schedule. Use the **no** form of this command to delete the specified timerange profile.

power-saving shutdown time-range *PROFILE-NAME*

no power-saving shutdown time-range *PROFILE-NAME*

Parameters

PROFILE-NAME	Specifies the name of the timerange profile to be configured. The maximum length is 32 characters.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to add or delete a time range profile for the port shutdown schedule. When the schedule is up, the specific port will be disabled.

Example

This example shows how to add a timerange profile for the port shutdown schedule.

```
Switch# configure terminal
Switch(config)#interface ethernet1/0/1
Switch(config-if)# power-saving shutdown time-range off-duty
Switch(config-if)#
```

49-7 show power-saving

This command is used to display the powersaving configuration information.

show power-saving [dim-led] [port-shutdown] [hibernation] [eee [INTERFACE-ID[,|-]]]

Parameters

dim-led	(Optional) Specifies to display the dim LED state.
port-shutdown	(Optional) Specifies to display the portshutdown state.
hibernation	(Optional) Specifies to display the hibernation state.
eee	(Optional) Specifies to display the EEE state.
INTERFACE-ID	(Optional) Specifies the output interface for the EEE.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If no optional keywords were specified, all powersaving configuration information will be displayed.

Example

This example shows how to display all powersaving configuration information.

```
Switch#show power-saving
Function Version: 3.00

Scheduled Hibernation  power saving
  State: Disable

Administrative Dim-LED
  State: Disabled

Scheduled Dim-LED Power Saving
  State: Disabled

Scheduled Port-shutdown Power Saving
  State: Disabled

EEE_Enabled Ports
  ethernet1/0/1

Switch#
```

50. Protocol Independent Commands

50-1 ip route

This command is used to create a static route entry. Use the **no** form of this command to remove a static route entry.

ip route *NETWORK-PREFIX NETWORK-MASKIP-ADDRESS* **[primary | backup]**

no ip route *NETWORK-PREFIX NETWORK-MASKIP-ADDRESS*

Parameters

NETWORK-PREFIX	Specifies the network address.
NETWORK-MASK	Specifies the network mask.
IP-ADDRESS	Specifies the IP address of the next hop that can be used to reach destination network.
primary	(Optional) Specifies the route as the primary route to the destination.
backup	(Optional) Specifies the route as the backup route to the destination.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to create an IP static route. Floating static route is supported. This means that there could be two routes with the same destination network address and different next hop. If **primary** or **backup** is not specified, the static route will be automatically determined to be a primary route or a backup route. Primary route has higher priority than backup route, and is always be used for forwarding when it is active. When primary is down, the backup route will be used.

Example

This example shows how to add a static route entry for 20.0.0.0/8 with the next-hop 10.1.1.254.

```
Switch# configure terminal
Switch(config)#ip route 20.0.0.0 255.0.0.0 10.1.1.254
Switch(config)#
```

50-2 ipv6 route

This command is used to create an IPv6 static route entry. Use the **no** form of this command to remove an IPv6 static route entry.

ipv6 route {default | *NETWORK-PREFIXIPREFIX-LENGTH***} [***INTERFACE-ID***]** *NEXT-HOP-ADDRESS* **[primary | backup]**

no ipv6 route {default | *NETWORK-PREFIXIPREFIX-LENGTH***} [***INTERFACE-ID***]** *NEXT-HOP-ADDRESS*

Parameters

default	Specifies to add or delete a default route.
NETWORK-PREFIXIPREFIX-LENGTH	Specifies the network prefix and the prefix length of the static route.
INTERFACE-ID	(Optional) Specifies the forwarding interface for routing the packet.
NEXT-HOP-ADDRESS	(Optional) Specifies the IPv6 address of the next hop to reach the destination network. If the address is a link-local address, then the interface ID also need to be specified.
primary	(Optional) Specifies the route as the primary route to the destination.
backup	(Optional) Specifies the route as the backup route to the destination.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Floating static route is supported. This means that there could be two routes with same destination network address and different next hop. If **primary** or **backup** is not specified, the static route will be automatically determined to be a primary route or a backup route. Primary route has higher priority than backup route, and is always be used for forwarding when it is active. When primary is down, the backup route will be used.

Example

This example shows how to create a static route destined to the network where proxy server resides.

```
Switch# configure terminal
Switch(config)#ipv6 route 2001:0101::/32 vlan 1  fe80::0000:00ff:1111:2233
Switch(config)#
```

50-3 show ip route

This command is used to display the entry in the routing table.

show ip route [[*IP-ADDRESS* **[***MASK***] | connected | static] | hardware]**

Parameters

IP-ADDRESS	(Optional) Specifies the network address of which routing information should be displayed.
MASK	(Optional) Specifies the subnet mask for the specified network.
connection	(Optional) Specifies to display directly connected route.
static	(Optional) Specifies to display the static route.
hardware	(Optional) Specifies to display the routes that have been written

into chip.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the best routes that are currently at work.

Example

This example shows how to display the routing table.

```
Switch#show ip route
Code: C - connected, S - static
      * - candidate default


Gateway of last resort is not set

C    10.0.0.0/8 is directly connected, vlan1

Total Entries: 1


Switch#
```

50-4 show ip route summary

This command is used to display the brief information for the working routing entries.

show ip route summary

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the brief information for the working routing entries.

Example

This example shows how to display the IP route entries.

```
Switch#show ip route summary

Route Source    Networks
Connected       1
Static          0
Total           1

Switch#
```

50-5 show ipv6 route

This command is used to display the entry in routing table.

show ipv6 route {[*IPV6-ADDRESS* **|** *NETWORK-PREFIXIPREFIX-LENGTH* **[longer-prefixes] |** *INTERFACE-ID* **| connected | static] [database] | hardware}**

Parameters

IPV6-ADDRESS	(Optional) Specifies an IPv6 address to find a longest prefix matched IPv6 route.
NETWORK-PREFIX	(Optional) Specifies the network address of which routing information should be displayed.
PREFIX-LENGTH	(Optional) Specifies the prefix length for the specified network
longer-prefixes	(Optional) Specifies to display the route and all of the more specific routes.
INTERFACE-ID	(Optional) Specifies the interface type.
connected	(Optional) Specifies to display directly connected route.
static	(Optional) Specifies to display the static route.
database	(Optional) Specifies to display all the related entries in the routing database instead of just the best route.
hardware	Specifies to display the routes that have been written into chip.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the best routes that are currently at work.

Example

This example shows how to display the routing entries for IPv6.

```
Switch# show ipv6 route

IPv6 Routing Table
Code: C - connected, S - static

C     2000:410:1::/64 [0/1] is directly connected, vlan1
S     2001:0101::/64 [1/1] via fe80::0000:00ff:1111:2233, vlan1
S     2001:0102::/64 [1/1] via fe80::0000:00ff:1111:2233, vlan1

Total Entries: 3 entries, 3 routes

Switch#
```

This example shows how to display the static routing entries for IPv6.

```
Switch# show ipv6 route static

IPv6 Routing Table
Code: C - connected, S - static

S     2001:0101::/64 [1/1] via fe80::0000:00ff:1111:2233, vlan1
S     2001:0102::/64 [1/1] via fe80::0000:00ff:1111:2233, vlan1

Total Entries: 2 entries, 2 routes

Switch#
```

50-6 show ipv6 route summary

This command is used to display the current state of the IPv6 routing table.

show ipv6 route summary

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

When the system provides forwarding services for IPv6 traffic, it is very important and helpful to check the forwarding/routing table to understand what the traffic path will be currently in the network.

Example

This example shows how to display the current state of the IPv6 routing table.

```
Switch# show ipv6 route summary

Route Source    Networks
Connected       2
Static          0
Total           3
Switch#
```

51. Power over Ethernet (PoE) Commands

51-1 poe pd description

This command is used to configure the description for the PD connected to the PoE port. Use no form of this command to clear the description.

poe pd description *string*

no poe pd description *string*

Parameters

String	String that describes the PD connected to a PoE interface. The maximum length is 32.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for physical port configuration and could be used to configure a description for the PD connected to the port.

Example

This example example shows how to configure the PoE PD description on interface eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# poe pd description test
Switch(config-if)#
```

51-2 poe pd legacy-support

This command is used to enable support of legacy PD. Use no form of this command to disable it.

poe pd legacy-support

no poe pd legacy-support

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for physical port configuration.

Use the command to enable support of legacy PD connected to the port. If legacy support is disabled, the system will not provide power to the legacy PD.

Example

This example shows how to enable legacy support for PD connected to interface eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# poe pd legacy-support
Switch(config-if)#
```

51-3 poe pd priority

This command is used to configure the priority for provisioning power to the port. Use the no poe pd priority command to return the priority to default setting.

poe pd priority {critical | high | low}

no poe pd priority

Parameters

critical	Specify the PD connected to the port gains the highest priority.
high	Specify the PD connected to the port gains the second high priority
low	Specify the PD connected to the port gains the low priority

Default

By default, the priority is low.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for physical port configuration.

Since the power budget is limited, as more PDs are added to the system, the power source may not be sufficient to supply the power. The PoE system enters the power critical section when the remaining power source is not enough to serve the new added PD. Whether power is supplied to the new added PD will depend on the policy configured by **poe policy preempt** command.

If the policy preempt setting is disabled, then the policy is first in first serviced. Thus the new PD will not be serviced if the power source is running out.

If the policy preempt setting is enabled, then the power provisioned to PD with lower priority can be preempted in order to release power to the new connected PD with higher priority.

Example

This example shows how to configure at the priority of eth 1/0/1 to the first priority.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# poe pd priority critical
Switch(config-if)#
```

51-4 poe policy preempt

This command is used to enable disconnection of PD which is power-provisioned with lower priority in order to release the power to the new connected PD with higher priority under power shortage condition. Use the no form of the command to reset to default setting.

poe policy preempt

no poe policy preempt

Parameters

None.

Default

By default, the option is disable.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Since the power budget is limited, as more PDs are added to the system, the power source may not be sufficient to supply the power. The PoE system enters the power critical section when the remaining power budget is not enough to serve the new added PD.

The poe policy preempt command configures whether to disconnect the PD which is powered with lower priority in order to release the power to the new connected PD with higher priority under power shortage condition. If the policy preempt setting is disabled, then the policy is first in first serviced. Thus the new PD will not be serviced if the power budget is running out.

If the policy preempt setting is enabled, then the power provisioned to PD with lower priority can be preempted to release the power to the new connected PD with higher priority.

Example

This example shows how to configure PoE system power service policy preemptive mode.

```
Switch# configure terminal
Switch(config)# poe policy preempt
Switch(config#
```

51-5 poe power-inline

This command is used to configure the power management mode for the Power over Ethernet (PoE) ports. Use the no form of this command to remove the time range profile association or restore the mode to default settings.

poe power-inline {auto [max *MAX-WATTAGE*] **[time-range** *PROFILE-NAME*] **| never}**

no poe power-inline [auto {max | time-range}

Parameters

auto	Enable auto-detection of PDs and provision power to the PD.
max *MAX-WATTAGE*	(Optional) Set the max wattage of power that can be provisioned to the auto-detected PD. If not specified, then the class of the PD auto determines the maximum wattage which can be provisioned. The valid range for max wattage is 1000 mW to 30000 mW.
time-range *PROFILE-NAME*	(Optional) Specifies the name of time-range profile to delineate the activation period.
never	Disable supplying power to PD connected to the port.

Default

By default, the option is set to auto mode.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is supported only on PoE-capable ports.

When the port is set to auto mode, the port will automatically detect the PD and provision power to the PD. The user can explicitly specify a max wattage value which can be provisioned to the port. If the user doesn't specify the max wattage value, then the class of the PD auto determines the maximum wattage which can be provisioned. The PD will not be provisioned if it requests more wattage than the max wattage which is determined.

The user can specify time range with a port. Once a PoE port is associated with a time-range profile, it will only be activated during the time frame specified in the profile. That is, the PD will not get powered during timeframe out of the specified time range.

The user can pre-allocate power budget to the port by configuring the port to work in static mode. The power budget is allocated to the port even though there is no PD connected to the port. If the maximum wattage is specified, the specified number of wattage is pre-allocated.

When the command no poe power-inline is issued, the power management mode will be reset to default setting. The specified time range profile does not need to exist to configure the command. If the time range profile does not exist, the command acts as if time range is not specified..

Example

This example shows how to enable PD detection and power up PoE interface eth 1/0/1 automatically.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# poe power-inline auto
Switch(config-if)#
```

51-6 poe usage-threshold

This command is used to configure the utilization threshold to initiate a notification. Use the no form of this command to restore the default setting.

poe usage-threshold <integer(1-99)>

no poe usage-threshold

Parameters

integer(1-99)	Specifies a usage threshold to generate a notification. The valid range is1 to 99. The unit is percentage.

Default

By default, the option is set to 99.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the usage threshold is configured, if the utilization of the PSE exceeds the configured notification threshold, then the “pethMainPowerUsageOnNotification” trap will be initiated. Once the percentage decreases and become lower than the notification threshold, then the “pethMainPowerUsageOffNotification” trap is initiated to indicate this situation.

Example

This example shows how to configure the usage notification threshold to 50%.

```
Switch# configure terminal
Switch(config)# poe usage-threshold 50
Switch(config)#
```

51-7 poe perpetual

This command is used to configure PoE perpetual in switch.

poe perpetual

no poe perpetual

Parameters

None.

Default

By default, the option is disable.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure PoE perpetural mechanism. This feature provides uninterrupted power to connected PDs even when the PSE switch is rebooting.

NOTE: The Switch supports both Fast PoE and Perpetual PoE. By default, the Fast PoE is enabled and cannot be disabled manually, whereas the Perpetual PoE is disabled but can be enabled manually. For Fast PoE, PDs will be powered on without the need for the Swich to boot into the operating system. For Perpetual PoE, PDs will receive power even during system reboot.

Example

This example shows how to enable PoE perpetual in switch.

```
Switch# configure terminal
Switch(config)# poe perpetual
Switch(config)#
```

51-8 poe guard-band

This command is used to configure PoE guard band parameter in switch.

poe guard-band <integer(*0-15400*)>

no poe guard-band

Parameters

integer(*0-15400*)	The value entered for guard band.Unit in **mW**.

Default

By default, the value is set to 7000 (mW).

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure PoE guard band value in switch. PoE guard band provides a safe ranch of power usage in switch. When total power usage reaches the (**Power budget – Guard band**) value the PSE switch stop to power the next request PD.

Example

This example shows to configure guard band to 15.4W.

```
Switch# configure terminal
Switch(config)# poe guard-band 15400
Switch(config)#
```

51-9 poe pd alive

This command is used to configure PD alive feature in switch.

poe pd alive ip [*IP-ADDRESS* **|** *IPV6-ADDRESS* **]**

poe pd alive interval *INTERVAL-TIME*

poe pd alive retry *RETRY-COUNT*

poe pd alive waiting-time *WAITINGTIME*

poe pd alive action {*reset* **|** *notify* **|** *both***}**

no poe pd alive [{ip | interval | retry | waiting-time | action}]

Parameters

ip *[IP-ADDRESS* **|** *IPV6-ADDRESS]*	Specifiied the IPv4 or IPv6 address as target address of PD.

interval *INTERVAL-TIME*	Specifies the interval for query the destination IP address. Range from 10 seconds to 300 seconds. Default value is 30 seconds.
retry *RETRY-COUNT*	Soecifies the retry count when fail to reach the destination PD. Range from 1 to 5 times. Default value is 2 times.
waiting-time *WAITINGTIME*	Specifies the waiting for retry. Range from 30 seconds to 300 seconds. Default value is 180 seconds.
action	Specifies the action when PSE failed to contact the PD. **Notify** refers to sending log and trap to network administrator. **Reset** refers to reset this particular interface PoE state. **Both** refers to execute **Notify** and **Reset**. Default action is **BOTH**.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the PD alive feature parameters. PD alive helps to continuous check if PD device is available, otherwise, recovery action (notify, reset or both) can be executed based on how network administrator desired.

Example

This example shows to configure PD alive for destination IP address .

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/5
Switch(config-if)# poe pd alive ip 10.90.90.91
Switch(config-if)# poe pd alive action both
Switch(config-if)#
```

51-10 snmp-server enable traps poe

This command is used to enable sending of power over ethernet notifications. Use the no form of the command to disable sending power over Ethernet notifications.

snmp-server enable traps poe

no snmp-server enable traps poe

Parameters

None.

Default

By default, the option is disable.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to send power over ethernet usage threshold exceeding traps.

Example

This example shows how to enable trap for power over Ethernet event.

```
Switch# configure terminal
Switch(config)# snmp-server enable traps poe
Switch(config)#
```

51-11 clear poe statistic

This command is used to clear the statistic counters on the port.

clear poe statistic {all | interface INTERFACE-ID [,|-]}

Parameters

interface *INTERFACE-ID*	Specifies the interface ID to display.
,	(Optional)Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional)Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

None.

Command Mode

Privilege EXEC mode.

Command Default Level

Level: 12.

Usage Guideline

There are counters on port to record the statistic and they can be shown by show poe power-inline statistics command. Use this command to clear all the counter value on the port.

Example

This example shows how to clear statistic on interface eth3/0/1.

```
Switch#
Switch# clear poe statistic interface ethernet 1/0/1
Switch#
```

51-12 show poe pd alive

This command is display PD alive configuration.

show poe pd alive [interface {*INTERFACE-ID* **[, | -]}]**

Parameters

interface *INTERFACE-ID*	Specifies the interface ID to display.
,	(Optional)Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.

-	(Optional)Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

By default, the option is disable.

Command Mode

EXEC mode or any configuration mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to display PD alive configurations.

Example

This example shows how to display PD alive configure in all ports.

```
Switch# show poe pd alive

Port ID: eth1/0/1
------------------------------
    PD Alive State    : Disabled
    PD IP Address     :
    Poll Interval     : 30
    Retry Count       : 2
    Waiting Time      : 180
    Action            : Both


Port ID: eth1/0/2
------------------------------
    PD Alive State    : Disabled
    PD IP Address     :
    Poll Interval     : 30
    Retry Count       : 2
    Waiting Time      : 180
    Action            : Both
```

51-13 show poe power-inline

This command is used to display the Power over Ethernet (PoE) status for the specified PoE port, or for all PoE ports in the switch system.

show poe power-inline [interface {*INTERFACE-ID* **[, | -]}] {status | configurati**

on | statistics | measurement}

Parameters

interface *INTERFACE-ID*	Specifies the interface ID to display.
,	(Optional)Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional)Specifies a range of interfaces. No space is allowed before and after the hyphen.
status	Display the port PoE status

configuration	Display the port configuration information
statistics	Display the port error counters
measurement	Display the port voltage, current, consumed power and temperature

Default

None.

Command Mode

EXEC mode or any configuration mode.

Command Default Level

Level: 12.

Usage Guideline

The **show poe power-inline** command is used to display the PoE status of port, power inline configuration status, statistic counters, the measurement result and the data link layer classification using information. If INTERFACE-ID is not specified with this command, then all PoE interfaces will be shown. Only the PoE capable interfaces are displayed.

Example

This is a sample output from the **show poe power-inline status** command.

```
Switch# show poe power-inline status

Interface   State          Class     Max(W)    Used(W)   Description

-------------------------------------------------------------------------------
----------
eth1/0/1    searching      N/A       1.0       0.0       test

eth1/0/2    searching      N/A       0.0       0.0

eth1/0/3    searching      N/A       0.0       0.0

eth1/0/4    searching      N/A       0.0       0.0

eth1/0/5    delivering     class4    30.0      6.6

eth1/0/6    searching      N/A       0.0       0.0

eth1/0/7    searching      N/A       0.0       0.0

eth1/0/8    searching      N/A       0.0       0.0


Faulty code
[1] MPS (Maintain Power Signature) Absent
[2] PD short
[3] Overload
[4] Power Denied
[5] Thermal Shutdown
[6] Classification Failure
[7] UVLO
[8] OVLO

Switch#
```

51-14 show poe power module

This command is used to display the setting and actual values of the power modules.

show poe power module [detail]

Parameters

detail	(Optional) In addition to the power information, more detailed chip parameter information is displayed.

Default

None.

Command Mode

EXEC mode or any configuration mode.

Command Default Level

Level: 1.

Usage Guideline

This command could display the detailed power information and PoE chip parameters for PoE modules.

Example

This example shows how to display PoE power system's power information.

```
Switch# show poe power module detail

PoE Perpetual is Disabled

Delivered(W)    Power Budget(W)    Usage-Threshold(%)  Guard Band(W)  Policy Preem
pt Trap State
-------------------------------------------------------------------------------
---------------
7.3             240.0              50                  7.0            Enabled
   Enabled

PoE system parameters:
Max Ports       Device ID       SW Version
----------      ----------      ----------
8               0138            10.20

Switch#
```

52. Quality of Service (QoS) Commands

52-1 mls qos cos

This command is used to configure the default Class of Service (CoS) value of a port. Use the **no** form of this command to revert to the default settings.

mls qos cos {*COS-VALUE* **| override}**

no mls qos cos

Parameters

COS-VALUE	Specifies to assign a default CoS value to a port. This CoS will be applied to the incoming untagged packets received by the port.
override	Specifies to override the CoS of the packets. The default CoS will be applied to all incoming packets, tagged or untagged, received by the port.

Default

By default, this CoS value is 0.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the **override** option is not specified, the CoS of the packets will be the packet's CoS if the packets are tagged, and will be the port default CoS if the packet is untagged.

When the **override** option is specified, the port default CoS will be applied to all packets received by the port. Use the **override** keyword when all incoming packets on certain ports deserve a higher or lower priority than packets that enter from other ports. Even if a port was previously set to trust DSCP or CoS, this command overrides that trust state, and all CoS values on the incoming packets are changed to the default CoS value that is configured with the **mls qos cos** command. If an incoming packet is tagged, the CoS value of the packet is modified at the ingress port.

Example

This example shows how the default CoS of Ethernet port 1/0/1 is set to 3.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
switch(config-if)# mls qos cos 3
switch(config-if)#
```

52-2 mls qos map dscp-cos

This command is used to define a Differentiated Services Code Point (DSCP)-to-class of service (CoS) map. Use the **no** form of this command to revert to the default setting.

mls qos map dscp-cos *DSCP-LIST* **to** *COS-VALUE*

no mls qos map dscp-cos *DSCP-LIST*

Parameters

dscp-cos *DSCP-LIST* **to** *COS-VALUE*	Specifies the list of DSCP code points to be mapped to a CoS value. The range is from 0 to 63. The series of DSCPs can be separated by commas (,) or hyphens (-) with no spaces or hyphens before and after.
DSCP-LIST	Specifies the range of DSCP values.

Default

CoS Value:	0	1	2	3	4	5	6	7
DSCP Value:	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The DSCP to CoS map is used by a DSCP trust port to map a DSCP value to an internal CoS value. In turn this CoS value is then mapped to the CoS queue based on the CoS to queue map configured by the **priority-queue cos-map** command.

Example

This example shows how to configure the DSCP to CoS map for mapping DSCP 12, 16, and 18 to CoS 1 for ethernet2/0/6.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/6
Switch(config-if)# mls qos map dscp-cos 12,16,18 to 1
Switch(config-if)#
```

52-3 mls qos scheduler

This command is used to configure the scheduling mechanism. Use the **no** form of this command to reset the packet scheduling mechanism to the default.

mls qos scheduler {sp | wrr | wfq}

no mls qos scheduler

Parameters

sp	Specifies that all queues are in strict priority scheduling.
wrr	Specifies the queues in the frame count weighted round-robin scheduling. If the weight of a queue be configured to zero, the queue is in the SP scheduling mode.
wfq	Specifies the queues in weight fair queue (WFQ) scheduling.

Default

The default queue scheduling algorithm is WRR.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Specify schedule algorithms to WRR, SP for the output queue. By default, the output queue scheduling algorithm is WRR. WDRR operates by serving an accumulated set of backlogged credits in the transmit queue in a round robin order. Initially, each queue sets its credit counter to a configurable quantum value. Every time a packet from a CoS queue is sent, the size of the packet is subtracted from the corresponding credit counter and the service right is turned over to the next lower CoS queue. When the credit counter drops below 0, the queue is no longer serviced until its credits are replenished. When the credit counters of all CoS queues reaches 0, the credit counters will be replenished at that time.

All packets are serviced until their credit counter is zero or negative and the last packet is transmitted completely. When this condition happens, the credits are replenished. When the credits are replenished, a quantum of credits are added to each CoS queue credit counter. The quantum for each CoS queue may be different based on the user configuration.

To set a CoS queue in the strict priority mode, any higher priority CoS queue must also be in the strict priority mode.

WRR operates by transmitting permitted packets into the transmit queue in a round robin order. Initially, each queue sets its weight to a configurable weighting. Every time a packet from a higher priority CoS queue is sent, the corresponding weight is subtracted by 1, and the packet in the next lower CoS queue will be serviced. When the weight of a CoS queue reaches zero, the queue will not be serviced until its weight is replenished. When weights of all CoS queues reach 0, the weights get replenished at a time.

Example

This example shows how to configure the queue scheduling algorithm to the strict priority mode.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# mls qos scheduler sp
Switch(config-if)#
```

52-4 mls qos trust

This command is used to configure the trust state of a port to trust either the CoS field or the DSCP field of the arriving packet for subsequent QoS operation. Use the **no** form of this command to revert to the default setting.

mls qos trust {cos | dscp}

no mls qos trust

Parameters

cos	Specifies that the CoS bits of the arriving packets are trusted for subsequent QoS operations.
dscp	Specifies that the ToS/DSCP bits, if available in the arriving packets, are trusted for subsequent operations. For non-IP packet, Layer 2 CoS information will be trusted for traffic classification.

Default

By default, CoS is trusted.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the interface is set to trust DSCP, the DSCP of the arriving packet will be trusted for the subsequent QoS operations. First, the DSCP will be mapped to an internal CoS value, which will be subsequently used to determine the CoS queue. The DSCP to CoS map is configured by the **mls qos map dscp-cos** command. The CoS to queue map is configured by the **priority-queue cos-map** command. If the arriving packet is a non-IP packet, the CoS is trusted. The resulting CoS mapped from DSCP will also be the CoS in the transmitted packet.

When an interface is in the trust CoS state, the CoS of the arriving packet will be applied to the packet as the internal CoS and used to determine the CoS queue. The CoS queue is determined based on the CoS to Queue mapping table.

When a packet arrives at an 802.1Q VLAN tunnel port, the packet will be added with an outer VLAN tag in order to transmit through the VLAN tunnel. If the port is to trust CoS, then the inner tag CoS will be the internal CoS of the packet and the CoS value in the packet's outer VLAN tag. If the MLS QoS CoS override is configured, then the CoS specified by command **mls qos cos** will be the internal CoS of the packet and the CoS value in the packet's outer VLAN tag. If the port is to trust DSCP, then the CoS mapped from the DSCP code point will be the internal CoS of the packet and the CoS value in the packet's outer VLAN tag

When a packet is received by a port, it will be initialized to a color based on the **mls qos map dscp-color** command if the receiving port is to trust DSCP or MLS QoS mapped CoS color if the receiving port is to trust CoS.

Example

This example shows how to configure port ethernet1/0/1 to trust the DSCP mode.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# mls qos trust dscp
Switch(config-if)#
```

52-5 priority-queue cos-map

This command is used to define a Class of Service (CoS) to queue map. Use the **no** form of this command to revert to the default setting.

priority-queue cos-map *QUEUE-ID COS1* **[***COS2* **[***COS3* **[***COS4* **[***COS5* **[***COS6* **[***COS7* **[***COS8***]]]]]]]**

no priority-queue cos-map

Parameters

QUEUE-ID	Specifies the queue ID the CoS will be mapped.
COS1	Specifies the mapping CoS value.Valid values are from 0 to 7.
COS2…COS8	(Optional) Specifies the mapping CoS value.Valid values are from 0 to 7.

Default

The default priority (CoS) to queue mapping is: 0 to 2, 1 to 0, 2 to 1, 3 to 3, 4 to 4, 5 to 5, 6 to 6, 7 to 7.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a packet is received, the packet will be given an internal CoS. This internal CoS is used to select the transmit queue based on the CoS to queue map. The CoS queue with a higher number will receivea higher priority.

Example

This example shows how to assign CoS priority 3, 5 and 6 to queue 2.

```
Switch# configure terminal
Switch(config)#priority-queue cos-map 2 3 5 6
Switch(config)#
```

52-6 queue rate-limit

This command is used to specify or modify the bandwidth allocated for a queue. Use the **no** form of this commandto remove the bandwidth allocated for a queue.

queue *QUEUE-ID* **rate-limit {MIN-BANDWIDTH-KBPS MAX-BANDWIDTH-KBPS | percent MIN-PERCENTAGE MAX-PERCENTAGE}**

no queue *QUEUE-ID* **rate-limit**

Parameters

QUEUE-ID	Specifies the queue ID to set minimal guaranteed and maximum bandwidth.
MIN-BANDWIDTH-KBPS	Specifies the minimal guaranteed bandwidth in kilobits per second allocated to a specified queue.
MAX-BANDWIDTH-KBPS	Specifies the maximum bandwidth in kilobits per second for a specified queue.
MIN-PERCENTAGE	Specifies to set the minimal bandwidth by percentage. The valid range is from 1 to 100.
MAX-PERCENTAGE	Specifies to set the maximum bandwidth by percentage. The valid range is from 1 to 100.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the minimal and maximum bandwidth for a specified queue. When the minimal bandwidth is configured, the packet transmitted from the queue can be guaranteed. When the maximum bandwidth is configured, packets transmitted from the queue cannot exceed the maximum bandwidth even if the bandwidth is available.

When configuring the minimal bandwidth, the aggregate of the configured minimum bandwidth must be less than 75 percent of the interface bandwidth to make sure the configured minimal bandwidth can be guaranteed. It is not necessary to set the minimum guaranteed bandwidth for the highest strict priority queue. This is because the traffic in this queue will be serviced first if the minimal bandwidth of all queues is satisfied.

The configuration of this command can only be attached to a physical port but not a port-channel. That is the minimum guaranteed bandwidth of one CoS cannot be used across physical ports.

Example

This example shows how to configure the queue bandwidth, the minimum guaranteed bandwidth and maximum bandwidth of queue 1 of interface ethernet 1/0/1 to 100Kbps. Set the minimum guaranteed bandwidth and maximum bandwidth of queue 2 to 10%.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# queue 1 rate-limit 100
Switch(config-if)# queue 2 rate-limit percent 10
Switch(config-if)#
```

52-7 rate-limit {input | output}

This command is used to set the received bandwidth limit values for an interface. To set the transmit bandwidth limit values on an interface use the **rate-limit output** command in the interface configuration mode. Use the **no** form of this commandto disable the bandwidth limit.

rate-limit {input | output} {*NUMBER-KBPS* | **percent** *PERCENTAGE*}

no rate-limit {input | output}

Parameters

input	Specifies the bandwidth limit for ingress packets.
output	Specifies the bandwidth limit for egress packets.
NUMBER-KBPS	Specifies the number of kilobits per second as the maximum bandwidth limit.
PERCENTAGE	Specifies to set the limited rate by percentage. The valid range is 1 to 100.

Default

By default, there is no limitation.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The specified limitation cannot exceed the maximum speed of the specified interface. For the ingress bandwidth limitation, the ingress will send a pause frame or a flow control frame when the received traffic exceeds the limitation.

Example

This example shows how the maximum bandwidth limits are configured on ethernet2/0/5. The ingress bandwidth is limited to 2000Kbps.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/5
Switch(config-if)# rate-limit input 2000
Switch(config-if)#
```

52-8 show mls qos interface

This command is used to display port level QoS configurations.

show mls qos {interface *INTERFACE-ID* **[, | -] | dscp-cos-map} {cos | scheduler | trust | rate-limit | queue-rate-limit }**

Parameters

interface *INTERFACE-ID*	Specifies the interface ID to display.
,	(Optional)Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional)Specifies a range of interfaces. No space is allowed before and after the hyphen.
cos	Specifies to displays the port default CoS.
scheduler	Specifies to displays the transmit queue scheduling settings.
trust	Specifies to displays the port trust State.
rate-limit	Specifies to displays the bandwidth limitation configured for the port.
queue-rate-limit	Specifies to displays the bandwidth allocation configured for the queue.
dscp-cos-map	Specifies to displays the mapping of DSCP to CoS.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display port level QoS configurations.

Example

This example shows how to display the default CoS for ethernet 1/0/2 to ethernet 1/0/5.

```
Switch# show mls qos interface ethernet 1/0/2-5 cos

Interface  CoS   Override
---------- ----   ---------
ethernet1/0/2      3      Yes
ethernet1/0/3      4      No
ethernet1/0/4      4      No
ethernet1/0/5      3      No

Switch#
```

This example shows how to display the port trust state for ethernet 1/0/2 to ethernet 1/0/5.

```
Switch# show mls qos interface ethernet 1/0/2-5 trust

Interface   Trust State
----------- ------------
ethernet1/0/2     trust DSCP
ethernet1/0/3     trust CoS
ethernet1/0/4     trust DSCP
ethernet1/0/5     trust CoS

Switch#
```

This example shows how to display the scheduling configuration for ethernet1/0/1 to ethernet1/0/2.

```
Switch# show mls qos interface ethernet 1/0/1-2 scheduler

Interface   Scheduler Method
----------  ------------------
ethernet1/0/1      sp
ethernet1/0/2      wrr

Switch#
```

This example shows how to display the bandwidth allocation for port 1/0/1 to 1/0/4.

```
Switch# show mls qos interface ethernet 1/0/1-4 rate-limit

Interface    Rx Rate              Tx Rate             Rx Burst   Tx Burst
----------  ------------------    -----------------   ---------  --------
ethernet1/0/1    1000 kbps             No Limit            64 kbyte   No Limit
ethernet1/0/2    No Limit              2000 kbps           No Limit   2000 kbyte
ethernet1/0/3    10%(100000 kbps)      20%(200000 kbps)    64 kbyte   64 kbyte
ethernet1/0/4    2%                    2000 kbps           64 kbyte   64 kbyte

Switch#
```

This example shows how to display the CoS bandwidth allocation for ethernet 1/0/1 to 1/0/2.

```
Switch# show mls qos interface ethernet 1/0/1-2 queue-rate-limit

ethernet1/0/1
  QID   Min Bandwidth  Max Bandwidth
  ----  -------------- -------------
  0         -                -
  1         16 kbps          10%(100000 kbps)
  2         32 kbps              -
  3         2%               50%
  4         64 kbps              -
  5         64 kbps              -
  6         32 kbps              -
  7         -                128 kbps
ethernet1/0/2
  QID   Min Bandwidth  Max Bandwidth
   ----  -------------- -------------
  0         -                -
  1         16 kbps              -
  2         32 kbps              -
  3         32 kbps              -
  4         64 kbps              -
  5         64 kbps              -
  6         32 kbps              -
  7         -                128 kbps

Switch#
```

This example shows how to display the DSCP to CoS map for port 1/0/1.

```
Switch# show mls qos interface ethernet 1/0/1 dscp-cos-map

ethernet1/0/1
CoS    DSCP List
----   ----------
0      0-7
1      8-15
2      16-23
3      24-31
4      32-39
5      40-47
6      48-55
7      56-63
Switch#
```

52-9 show mls qos queueing

This command is used to display the QoS queuing information and weight configuration for different scheduler algorithm on specified interface(s).

show mls qos queuing [interface *INTERFACE-ID* **[, | -]]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies the interface ID on which the weight configuration of different scheduler.
,	(Optional)Specifies a series of interfaces, or separate a range of

	interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional)Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

When the optional keyword Interface is entered, the weight configuration for different scheduler (WRR or WDRR) on the specified interface(s) will be displayed. If the interface is not specified, only the system-wide map of CoS to queue ID is displayed.

The scheduling mode which is configured by the **mls qos scheduler** command determines which weight configuration taking effect. Use the **show mls qos interface scheduler** command to get the scheduling mode of an interface.

Example

This example shows how to display the QoS queuing information.

```
Switch# show mls qos queuing

 CoS-queue map:
   CoS   QID
   ---   ---
    0     2
    1     0
    2     1
    3     3
    4     4
    5     5
    6     6
    7     7

Switch#
```

This example shows how to display the weight configuration for the different scheduler on interface ethernet1/0/3.

```
Switch# show mls qos queuing interface ethernet 1/0/3

wrr bandwidth weights:
  CoS    Weights
  ---   -------
   0       1
   1       2
   2       3
   3       4
   4       5
   5       6
   6       7
   7       8

wdrr bandwidth weights:
  CoS    Quantum
  ---   -------
   0       1
   1       2
   2       3
   3       4
   4       5
   5       6
   6       7
   7       8

Switch#
```

52-10 wdrr-queue bandwidth

This command is used to set the queue quantum in the WDRR scheduling mode. Use the **no** form of this command to revert to the default setting.

wdrr-queue bandwidth *QUANTUM1…QUANTUM127*

no wdrr-queue bandwidth

Parameters

QUANTUM1 …QUANTUM127	Specifies the quantum (frame length count) value of every queue for weighted round-robin scheduling.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The configuration of this command takes effect when the scheduling mode is in the WDRR mode. Use the **mls qos scheduler wdrr** command to change the scheduling mode to WDRR mode.

Example

This example shows how to configure the queue quantum of the WDRR scheduling mode, queue quantum of queue 0, queue 1, queue 2, queue 3, queue 4, queue 5, queue 6, queue 7 are 1, 2, 3, 4, 5, 6, 7, 8 respectively on interface ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# mls qos scheduler wdrr
Switch(config-if)# wdrr-queue bandwidth 1 2 3 4 5 6 7 8
Switch(config-if)#
```

52-11 wrr-queue bandwidth

This command is used to set the queue weight in the WRR scheduling mode. Use the **no** form of this command to revert to the default setting.

wrr-queue bandwidth *WEIGHT1…WEIGHT127*

no wrr-queue bandwidth

Parameters

WEIGHT1 …WEIGHT127	Specifies the weight (frame count) value of every queue for weighted round-robin scheduling.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The configuration of this command takes effect when the scheduling mode is in the WRR mode. Use the **mls qos scheduler wrr** command to change the scheduling mode to WRR mode. To satisfy the behavior requirements of Expedited Forwarding (EF), the highest queue is always selected by the Per-hop Behavior (PHB) EF and the schedule mode of this queue should be strict priority scheduling. So the weight of the last queue should be zero while the Differentiate Service is supported.

Example

This example shows how to configure the queue weight of the WRR scheduling mode, queue weight of queue 0, queue 1, queue 2, queue 3, queue 4, queue 5, queue 6, queue 7 are 1, 2, 3, 4, 5, 6, 7, 8 respectively on interface ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# mls qos scheduler wrr
Switch(config-if)# wrr-queue bandwidth 1 2 3 4 5 6 7 8
Switch(config-if)#
```

53. Remote Network MONitoring (RMON) Commands

53-1 rmon collection stats

This command is used to enable RMON statistics on the configured interface. Use the **no** form of this command to disable the RMON statistics.

rmon collection stats *INDEX* **[owner** *NAME***]**

no rmon collection stats *INDEX*

Parameters

INDEX	Specifies the Remote Network Monitoring (RMON) table index. The range is from 1 to 65535.
owner *NAME*	Specifies the owner string. The maximum length is 127.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The RMON statistics group entry number is dynamic. Only the interface that is enabled for RMON statistics will have a corresponding entry in the table.

Example

This example shows how to configure an RMON statistics entry with an index of 65 and the owner name “guest” on Ethernet interface ethernet 1/0/2.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/2
Switch(config-if)# rmon collection stats 65 owner guest
Switch(config-if)#
```

53-2 rmon collection history

This command is used to enable RMON MIB history statistics gathering on the configured interface. Use the **no** form of this command to disable history statistics gathering on the interface.

rmon collection history *INDEX* **[owner** *NAME***] [buckets** *NUM***] [interval** *SECONDS***]**

no rmon collection history *INDEX*

Parameters

INDEX	Specifies the history group table index. The range is from 1 to 65535.

owner *NAME*	Specifies the owner string. The maximum length is 127.
buckets *NUM*	Specifies the number of buckets specified for the RMON collection history group of statistics. If not specified, the default is 50. The range is from 1 to 65535.
interval *SECONDS*	Specifies the number of seconds in each polling cycle. The range is from 1 to 3600.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The RMON history group entry number is dynamic. Only the interface that is enabled for RMON history statistics gathering will have a corresponding entry in the table. The configured interface becomes the data source for the created entry.

Example

This example shows how to enable the RMON MIB history statistics group on Ethernet interface 1/0/8.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/8
Switch(config-if)# rmon collection history 101 owner it@domain.com interval 2000
Switch(config-if)#
```

53-3 rmon alarm

This command is used to configure an alarm entry to monitor an interface. Use the **no** form of this commandto remove an alarm entry.

rmon alarm *INDEX VARIABLE INTERVAL* **{delta | absolute} rising-threshold** *VALUE* **[***RISING-EVENT-NUMBER***] falling-threshold** *VALUE* **[***FALLING-EVENT-NUMBER***] [owner** *STRING***]**

no rmon alarm *INDEX*

Parameters

INDEX	Specifies the alarm index. The range is from 1 to 65535.
VARIABLE	Specifies the object identifier of the variable to be sampled.
INTERVAL	Specifies the interval in seconds for the sampling of the variable and checking against the threshold. The valid range is from 1 to 2147483647.
delta	Specifies that the delta of two consecutive sampled values is monitored.
absolute	Specifies that the absolute sampled value is monitored.
rising-threshold *VALUE*	Specifies the rising threshold. The valid range is from 0 to 2147483647.
RISING-EVENT-NUMBER	(Optional)Specifies the index of the event entry that is used to notify the rising threshold crossing event. The valid range is from 1 to 65535. If not specified, no action is taken while crossing the

	ringing threshold.
falling-threshold *VALUE*	Specifies the falling threshold. The valid range is from 0 to 2147483647.
FALLING-EVENT-NUMBER	(Optional)Specifies the index of the event entry that is used to notify the falling threshold crossing event. The valid range is from 1 to 65535. If not specified, no action is taken while crossing the falling threshold.
owner *STRING*	Specifies the owner string. The maximum length is 127.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The RMON alarm facility periodically takes samples of the value of variables and compares them against the configured threshold.

Example

This example shows how to configure an alarm entry to monitor an interface.

```
Switch# configure terminal
Switch(config)#rmon alarm 783 1.3.6.1.2.1.2.2.1.12.6 30 delta rising-threshold 20 1
falling-threshold 10 1 owner Name
Switch(config)#
```

53-4 rmon event

This command is used to configure an event entry. Use the **no** form of this commandto remove an event entry.

rmon event *INDEX* **[log] [trap** *COMMUNITY***] [owner** *NAME***] [description** *STRING***]**

no rmon event *INDEX*

Parameters

INDEX	Specifies the index of the alarm entry. The valid range is from 1 to 65535.
log	(Optional) Specifies to generate log message for the notification.
trap *COMMUNITY*	(Optional) Specifies to generate SNMP trap messages for the notification. The maximum length is 127.
owner *NAME*	(Optional) Specifies the owner string. The maximum length is 127.
description *STRING*	(Optional) Specifies a description for the RMON event entry. Enter a text string with a maximum length of 127 characters.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If the log and not the trap is specified, the created entry will cause a log entry to be generated on an event occurrence. If the trap and not the log is specified, the created entry will cause an SNMP notification to be generated on an event occurrence.

If both the log and trap options are specified, the created entry will cause both the log entry and the SNMP notification to be generated on event occurrence.

Example

This example shows how to configurean event with an index of 13 to generate a log on the occurrence of the event.

```
Switch# configure terminal
Switch(config)#rmon event 13 log owner it@domain.com description ifInNUcastPkts is too
much
Switch(config)#
```

53-5 show rmon alarm

This command is used to displays the alarm configuration.

show rmon alarm

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the RMON alarm table.

Example

This example shows how to displays the RMON alarm table.

```
Switch# show rmon alarm

Alarm index 23, owned by IT
Monitors OID: 1.3.6.1.2.1.2.2.1.10.1
every 120 second(s)
Taking delta samples, last value was 2500
Rising threshold is 2000, assigned to event 12
Falling threshold is 1100, assigned to event 12
On startup enable rising or falling alarm

Switch#
```

53-6 show rmon events

This command is used to display the RMON event table.

show rmon events

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the RMON event table.

Example

This example shows how to displays the RMON event table.

```
Switch# show rmon events

Event 1, owned by manager1
  Description is Errors
  Event trigger action: log & trap sent to community manager
  Last triggered time: 13:12:15, 2014-03-12

Event 2, owned by manager2
  Description is Errors
  Event trigger action: log & trap
  Last triggered time:

Switch#
```

53-7 show rmon history

This command is used to display RMON history statistics information.

show rmon history

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the history of the statistics for all of the configured entries.

Example

This example shows how to display RMON Ethernet history statistics.

```
Switch# show rmon history

Index 23, owned by Manager, Data source is ethernet1/0/2
  Interval: 30 seconds
  Requested buckets: 50, Granted buckets: 50
  Sample #1
    Received octets: 303595962, Received packets: 357568
    Broadcast packets: 3289, Multicast  packets: 7287
    Estimated utilization: 19
    Undersized packets: 213, Oversized  packets: 24
    Fragments: 2, Jabbers: 1
    CRC alignment errors: 0, Collisions: 0
Drop events : 0
  Sample #2
    Received octets: 303596354, Received packets: 357898
    Broadcast packets: 3329, Multicast  packets: 7337
    Estimated utilization: 19
    Undersized packets: 213, Oversized  packets: 24
    Fragments: 2, Jabbers: 1
    CRC alignment errors: 0, Collisions: 0
Drop events : 0

Switch#
```

53-8 show rmon statistics

This command is used to display RMON Ethernet statistics.

show rmon statistics

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Statistics for all of the configured entries are displayed.

Example

This example shows how to display the RMON statistics.

```
Switch# show rmon statistics

Index 32, owned by it@domain.com, Data Source is ethernet 1/0/3
Received Octets : 234000, Received packets : 9706
Broadcast packets: 2266, Multicast packets: 192
    Undersized packets: 213, Oversized  packets: 24
    Fragments: 2, Jabbers: 1
    CRC alignment errors: 0, Collisions: 0
Drop events : 0
Packets in 64 octets: 256, Packets in 65-127 octets : 236
Packets in 128-255 octets : 129, Packets in 256-511 octets : 10
Packets in 512-1023 octets : 38, Packets in 1024-1518 octets : 2200

Switch#
```

53-9 snmp-server enable traps rmon

This command is used to enable the RMON trap state.

snmp-server enable traps rmon [rising-alarm | falling-alarm]

no snmp-server enable traps rmon [rising-alarm | falling-alarm]

Parameters

rising-alarm	(Optional) Specifies to configure the rising alarm trap state.
falling-alarm	(Optional) Specifies to configure the falling alarm trap state.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command enables RMON trap state.

Example

This example shows how to enable the sending of RMON traps for both the falling alarm and rising alarm.

```
Switch# configure terminal
Switch(config)#snmp-server enable traps rmon
Switch(config)#
```

53-10 show snmp-server traps rmon

This command is used to display RMON trap state

show snmp-server traps rmon

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

To display RMON trap state.

Example

This example shows how to display the RMON trap state.

```
Switch# show snmp traps rmon

Rmon Trap State:
    RMON Rising Alarm Trap: Enabled
    RMON Falling Alarm Trap: Enabled

Switch#
```

54. Router Advertisement (RA) Guard Commands

54-1 ipv6 nd raguard policy

This command is used to create an RA guard policy. The command will enter into the RA Guard Policy Configuration Mode mode. Use the no form of this command to remove an RA guard policy.

ipv6 nd raguard policy *POLICY-NAME*

no ipv6 nd raguard policy *POLICY-NAME*

Parameters

POLICY-NAME	Specifies the IPv6 RA guard policy name.

Default

None.

Command Mode

Global Configuration Mode.

Usage Guideline

Use this command to create or remove an RA guard policy. This command will enter the RA Guard Policy Configuration Mode.

Example

This example shows how to create an RA guard policy named policy1.

```
Switch# configure terminal
Switch(config)# ipv6 nd raguard policy policy1
Switch(config-ra-guard)#
```

54-2 device-role

This command is used to configure the role of the attached device. Use the no form of this command to revert to the default setting.

device-role {host | router}

no device-role

Parameters

host	Specifies to set the role of the attached device to
router	Specifies to set the role of the attached device to router.

Default

By default, this option is **host**.

Command Mode

RA Guard Policy Configuration Mode.

Usage Guideline

Use this command to set the role of the attached device. By default, the device role is **host**, and all the inbound router advertisement and redirect messages are blocked. If the device role is set to **router**, all messages, Router Solicitation (RS), Router Advertisement (RA), or redirect are allowed on this port.

Example

This example shows how to create an RA guard policy named “raguard1” and set the device as **host**.

```
Switch# configure terminal
Switch(config)# ipv6 nd raguard policy raguard1
Switch(config-ra-guard)# device-role host
Switch(config-ra-guard)#
```

54-3 match ipv6 access-list

This command is used to filter the RA messages based on the sender IPv6 address. Use the no form of this command to disable the filtering.

match ipv6 access-list *IPV6-ACCESS-LIST-NAME*

no match ipv6 access-list

Parameters

IPV6-ACCESS-LIST-NAME	Specifies a standard IPv6 access list.

Default

None.

Command Mode

RA Guard Policy Configuration Mode

Usage Guideline

Use this command to filter RA messages based on the sender IP address when the interface device role is set to **router**. If the **match ipv6 access-list** command is not configured, all RA messages are bypassed. An access list is configured using the **ipv6 access-list** command.

Example

This example shows how to create an RA guard policy and matches the IPv6 addresses in the access list named list1.

```
Switch# configure terminal
Switch(config)# ipv6 nd raguard policy raguard1
Switch(config-ra-guard)# match ipv6 access-list list1
Switch(config-ra-guard)#
```

54-4 ipv6 nd raguard attach-policy

This command is used to apply an RA guard policy on a specified interface. Use the **no** form of this command to remove the binding.

ipv6 nd raguard attach-policy [*POLICY-NAME*]

no ipv6 nd raguard

Parameters

POLICY-NAME	(Optional) SSpecifies the IPv6 RA guard policy name.

Default

None.

Command Mode

Interface Configuration Mode.

Usage Guideline

Only one RA policy can be attached. If no parameter is specified, the default policy will set the device role to **host**.

Example

This example shows how to apply the RA guard policy on port 3.

```
Switch# configure terminal
Switch(config)# ipv6 nd raguard policy raguard1
Switch(config-ra-guard)# device-role router
Switch(config-ra-guard)# match ipv6 access-list list1
Switch(config-ra-guard)# exit
Switch(config)# interface eth1/0/3
Switch(config-if)# ipv6 nd raguard attach-policy raguard1
Switch(config-if)#
```

54-5 show ipv6 nd raguard policy

This command is used to display RA guard policy information.

show ipv6 nd raguard policy [POLICY-NAME]

Parameters

POLICY-NAME	(Optional) SSpecifies the IPv6 RA guard policy name.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Usage Guideline

Use this command to display RA guard policy information. If no parameter is specified, information of all policies will be displayed for all policies.

Example

This example shows how to display the information of the RA guard policy “raguard1”.

```
Switch# show ipv6 nd raguard policy raguard1
Policy raguard1 configuration:
    Device Role: host
    Source Address Match Access List: list1
    Target: eth1/0/3
Switch
```

55. Safeguard Engine Commands

55-1 clear cpu-protect counters

This command is used to clear the CPU protect related counters.

clear cpu-protect counters {all | sub-interface | type}

Parameters

all	Specifies to clear all CPU protect counters.
sub-interface [manage | protocol | route]	Specifies to clear the CPU protect related counters of sub-interfaces. If no sub-interface is specified then the CPU protect related counters of all sub-interfaces will be cleared.
type [*PROTOCOL-NAME***]**	Specifies to clear the CPU protect related counters of the specified protocol. If no protocol name is specified, then all protocols will be cleared.

Default

None.

Command Mode

Privileged EXEC Mode.

Usage Guideline

Use this command to clear the CPU protect related counters.

Example

This example shows how to clear all CPU protect related statistics.

```
Switch# clear cpu-protect counters
all Switch#
```

55-2 cpu-protect safeguard

This command is used to enable or configure the Safeguard Engine. Use the **no** form of this command to disable the Safeguard Engine.

cpu-protect safeguard [threshold *RISING-THRESHOLD FALLING-THRESHOLD***]**

no cpu-protect safeguard

Parameters

threshold	(Optional) Specifies to configure the utilization to control when the Safeguard Engine function will activate.
RISING-THRESHOLD	(Optional) Specifies to set a percentage value of the rising CPU utilization which will trigger the Safeguard Engine function. Once the CPU utilization rises over the specified percentage, the Safeguard Engine mechanism will initiate. The valid range is from 20 to 100.
FALLING-THRESHOLD	(Optional) Specifies to set a percentage value of the falling CPU utilization which will trigger the Safeguard Engine function to cease. Once the CPU utilization falls to the specified percentage, the Safeguard Engine mechanism will shut down. The valid range is from 20 to 100.

Default

By default, Safeguard Engine is Enabled.

By default, the rising threshold of CPU utilization is 70.

By default, the falling threshold of CPU utilization is 20.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

The Safeguard Engine can help the overall operability of the device by minimizing the workload of the Switch while the attack is ongoing, thus making it capable to forward essential packets over its network in a limited bandwidth. When the CPU utilization of the Switch rises over configured rising threshold, it will enter exhausted mode. In exhausted mode, the Switch limits the bandwidth of receiving ARP and broadcast IP packets.

Example

This example shows how to enable the Safeguard Engine and configure the thresholds, which the rising and falling threshold are 60 and 40 respectively.

```
Switch# configure terminal
Switch(config)# cpu-protect safeguard threshold 60 40
Switch(config)#
```

55-3 cpu-protect sub-interface

This command is used to configure the rate limit for traffic destined for the CPU by sub-interface types. Use the no form of this command to revert to the default settings.

cpu-protect sub-interface { manage | protocol | route} pps <integer (0-1024)>

no cpu-protect sub-interface {manage | protocol | route}

Parameters

RATE	Specifies the threshold value. The unit is packets per second. When set to 0, all packets of the specified sub-interface type will be dropped.

Default

None.

Command Mode

Global Configuration Mode.

Usage Guideline

The reasons of packets that are destined to the CPU can be classified into three groups: manage, protocol and route. The sub-interface is a logical interface, which handles the CPU received packets by different groups. Generally speaking, the protocol packets should have higher priority to make sure the functions work normally. The CPU usually is not involved in the routing of packets. In few cases, such as learning new IP address or if the default route is not specified, some packets will be sent to the CPU for software routing. Use this command to limit the rate of routed packets to avoid the CPU spending too much time for routing packets.

Example

This example shows how to configure the rate limit of packets for the management sub-interface and the threshold is 1000 packets per seconds.

```
Switch# configure terminal
Switch(config)# cpu-protect sub-interface manage pps 1000
Switch(config)#
```

55-4 cpu-protect type

This command is used to configure the rate limit of traffic destined for the CPU by the protocol type. Use the no form of this command to revert to the default setting.

cpu-protect type {8021x | arp | dhcp | dns | icmpv4 | icmpv6-neighbor | icmpv6-other | igmp | lacp | snmp | ssh | stp | telnet | tftp | web} pps <integer (0 -1024)>

no cpu-protect type {8021x | arp | dhcp | dns | icmpv4 | icmpv6-neighbor | icmpv6-other | igmp | lacp | snmp | ssh | stp | telnet | tftp | web}

Parameters

PROTOCOL-	Specifies the protocol name to be configured.
RATE	Specifies the threshold value. The unit is packets per second. When set to 0, all packets of the specified protocol are dropped.

Default

None.

Command Mode

Global Configuration Mode.

Usage Guideline

The CPU must handle certain packets, such as routing protocols, Layer 2 protocols, and packets for management. If the traffic destined to the CPU overloads it, the CPU will spend much time processing unnecessary traffic and the routing processes are impacted. To mitigate the impact on the CPU, use this command to control the threshold of individual protocol packets.

The following lists the reference for the supported protocols for the CPU protect type command. According to the purpose of packets destined to CPU, the router creates three virtual sub-interfaces to process the packets:

- **manage** - The packets are destined to any router interface or system network management interface via the interactive access protocol, such as Telnet and SSH.
- **protocol** - The packets are protocol control packets which can be identified by the router.
- **route** - Other packets traversing the router for routing that must be processed by the router's CPU before it can be routed without the CPU's involvement.

Example

This example shows how to configure the threshold of ARP protocol packets as 100 packets per second.

```
Switch#configure terminal
Switch(config)# cpu-protect type arp pps 100
Switch(config)#
```

55-5 show cpu-protect sub-interface

This command is used to display the rate limit and statistics by sub-interface.

show cpu-protect sub-interface {manage | protocol | route}

Parameters

manage	Specifies the manager sub-interface to be displayed.
protocol	Specifies the protocol sub-interface to be displayed.
route	Specifies the route sub-interface to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Usage Guideline

Use this command to display the configured rate limit and drop count of the safeguard engine of a specific group. These counters are counted by the software.

Example

This example shows how to display the configured rate limit and drop count of the safeguard engine of a specific group.

```
Switch# show cpu-protect sub-interface route
Type:                        route
Rate Limit:                  N/A
Switch#
```

55-6 show cpu-protect type

This command is used to display the rate limit and statistics of CPU protection.

show cpu-protect type *PROTOCOL-NAME*

Parameters

PROTOCOL-NAME	Specifies the configured rate limit and statistics of the specified protocol to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Usage Guideline

Use this command to display the rate limit and statistics of the safeguard engine.

Example

This example shows how to display the rate limit and statistics of the safeguard engine.

```
Switch# show cpu-protect sub-interface route
Type:                       route
Rate Limit:                 N/A
Switch# show cpu-protect type arp
Type:                                   :arp
Rate Limit                              :100
Total                                   :Drop
----------------------                  :------------------------
0                                       :0
Switch#
```

56. Secure Sockets Layer (SSL) Commands

56-1 show ssl-service-policy

This command is used to display the SSL service policy.

show ssl-service-policy [*POLICY-NAME***]**

Parameters

POLICY-NAME	(Optional) Specifies the name of the SSL service policy.

Default

None.

Command Mode

Privileged EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the name of the SSL service policy is not specified, all SSL service policies will be displayed.

Example

This example shows how to display all SSL service policies.

```
Switch# show ssl-service-policy

SSL Policy Name        : policy1
  Enabled Cipher Suites:
    RSA_WITH_RC4_128_MD5,
    RSA_WITH_3DES_EDE_CBC_SHA,
    RSA_EXPORT_WITH_RC4_40_MD5
  Session Cache Timeout: 600

SSL Policy Name        : policy2
  Enabled Cipher Suites:
    RSA_WITH_RC4_128_MD5,
    RSA_WITH_3DES_EDE_CBC_SHA,
    RSA_EXPORT_WITH_RC4_40_MD5
  Session Cache Timeout: 1200

Switch#
```

56-2 ssl-service-policy

This command is used to configure the SSL service policy.

ssl-service-policy POLICY-NAME **[{ciphersuite [AES128-GCM-SHA256] [AES128-SHA][AES256-GCM-SHA384][AES256-SHA][ECDHE-RSA-AES128-GCM-SHA256][ECDHE-RSA-AES128-SHA][ECDHE-RSA-AES256-GCM-SHA384][ECDHE-RSA-AES256-SHA][ECDHE-RSA-CHACHA20-POLY1305][TLS_AES_128_GCM_SHA256][TLS_AES_256_GCM_SHA384][TLS_CHACHA20_POLY 1305_SHA256]} |{ session-cache-timeout TIME-OUT}]**

no ssl-service-policy POLICY-NAME **[{ciphersuite [AES128-GCM-SHA256] [AES128-SHA][AES256-GCM-SHA384][AES256-SHA][ECDHE-RSA-AES128-GCM-SHA256][ECDHE-RSA-AES128-SHA][ECDHE-RSA-AES256-GCM-SHA384][ECDHE-RSA-AES256-SHA][ECDHE-RSA-CHACHA20-POLY1305][TLS_AES_128_GCM_SHA256][TLS_AES_256_GCM_SHA384][TLS_CHACHA 20_POLY1305_SHA256]} |{ session-cache-timeout TIME-OUT}]**

Parameters

POLICY-NAME	Specifies the name of the SSL service policy.
ciphersuite	(Optional) Specifies the cipher suites that should be used by the secure service when negotiating a connection with a remote peer. **AES128-GCM-SHA256** Use RSA key exchange with aes 128-bit encryption and gcm encryption for message encryption and SHA 256-bit key for message digest. **AES128-SHA** Use RSA key exchange with aes 128-bit encryption and cbc encryption for message encryption and SHA key for message digest. **AES256-GCM-SHA384** Use RSA key exchange with aes 256-bit encryption and gcm encryption for message encryption and SHA 384-bit key for message digest. **AES256-SHA** Use RSA key exchange with aes 256-bit encryption and cbc encryption for message encryption and SHA key for message digest. **ECDHE-RSA-AES128-GCM-SHA256** Use ECDHE and RSA key exchange with aes 128-bit encryption and gcm encryption for message encryption and SHA 256-bit key for message digest. **ECDHE-RSA-AES128-SHA** Use ECDHE and RSA key exchange with aes 128-bit encryption and cbc encryption for message encryption and SHA key for message digest. **ECDHE-RSA-AES256-GCM-SHA384** Use ECDHE and RSA key exchange with aes 256-bit encryption and gcm encryption for message encryption and SHA 384-bit key for message digest. **ECDHE-RSA-AES256-SHA** Use ECDHE and RSA key exchange with aes 256-bit encryption and cbc encryption for message encryption and SHA key for message digest. **ECDHE-RSA-CHACHA20-POLY1305** Use ECDHE and RSA key exchange with chacha20 encryption and poly1305 encryption for message encryption and SHA 256-bit key for message digest. **TLS_AES_128_GCM_SHA256** Use null key exchange with aes 128-bit encryption and gcm encryption for message encryption and SHA 256-bit key for message digest. **TLS_AES_256_GCM_SHA384** Use null key exchange with aes 256-bit encryption and gcm encryption for message encryption and SHA 384-bit key for message digest. **TLS_CHACHA20_POLY1305_SHA256** Use null key exchange with chacha20 encryption and poly1305 encryption for message encryption and SHA 256-bit key for message digest.

session-cache-timeout *TIME-OUT*	(Optional) Specifies the timeout value in seconds for the information stored in the SSL session cache. The valid range is from 60 to 86400. When this parameter is not configured, the default session cache timeout is 600 seconds. In the **no** form of this command, the SSL session cache timeout will be reverted to the default value.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command is used to configure the SSL service policy.

Example

This example shows how to configure the SSL service policy “ssl-server” which associates the “test” trust-point.

```
Switch# configure terminal
Switch(config)# ssl-service-policy test ciphersuite AES256-SHA
Switch(config)#
```

56-3 crypto pki trustpoint

This command is used to declare the trust-point that the Switch will use. Use the no form of this command to delete all certificates and key pairs associated with the trust-point.

crypto pki trustpoint NAME

no crypto pki trustpoint NAME

Parameters

NAME Specifies to create a name for the trust-point.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to declare a trust-point, which can be a self-signed root certificate authority (CA) or a subordinate CA. Issuing this command will enter the CA-Trust-Point Configuration Mode.

Example

This example shows how to declare a trust-point "TP1" and specify it is a primary trust-point.

```
Switch# configure terminal
Switch(config)# crypto pki trustpoint TP1
Switch(ca-trustpoint)# primary
Switch(ca-trustpoint)#
```

56-4 primary

This command is used to assign a specified trust-point as the primary trust-point of the Switch. Use the no form of this command to disable the option.

primary

no primary

Parameters

None.

Default

By default, this option is disabled.

Command Mode

CA-Trust-Point Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use the primary command to specify a given trust-point as primary. This trust-point can be used as default trust point when the application doesn't explicitly specify which certificate authority (CA) trust-point should be used. Only one trust-point can be specified as the primary. The last trust-point specified as the primary will overwrite the previous one.

Example

This example shows how to declare a trust-point "TP1" and specify it is a primary trust-point.

```
Switch# configure terminal
Switch(config)# crypto pki trustpoint TP1
Switch(ca-trustpoint)# primary
Switch(ca-trustpoint)#
```

56-5 show crypto pki trustpoints

This command is used to display the trust-points that are configured in the Switch.

primary

no primary

Parameters

TRUSTPOINT (Optional) Specifies the name of the trust-point to be displayed.

Default

None.

Command Mode

Privileged EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If no parameter is specified, all trust-points will be displayed

Example

This example shows how to display all trust-points.

```
Switch# show crypto pki trustpoints
Trustpoint Name : TP1 (primary)
 Imported certificates:
 CA : tongken.ca
 local certificate : webserver.crt
 local private key : webserver.prv

Trustpoint Name : TP2
 Imported certificates:
 CA : chunagtel.ca
 local certificate : openflow.crt
local private key : openflow.prv
Switch#
```

56-6 no certificate

This command is used to delete the imported certificate.

no certificate NAME

Parameters

NAME Specifies the name of the certificate to be delete

Default

None.

Command Mode

Certificate Chain Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use the show crypto pki trustpoints command to get a name list of imported certificates. Then use this command to delete the imported certificates of a trust point. If the specified certificate is a local certificate the corresponding private key will be deleted at the same time.

Example

This example shows how to delete an imported certificate named tongken.ca of the trust point gaa.

```
Switch# show crypto pki trustpoints
Trustpoint Name : gaa (primary)
 Imported certificates:
 CA : tongken.ca
 local certificate : webserver.crt
 local private key : webserver.prv
Switch# configure terminal
Switch(config)# crypto pki certificate chain gaa
Switch(config-cert-chain)# no certificate tongken.ca
Switch(config-cert-chain)#
```

56-7 crypto pki certificate chain

This command is used to enter into the certificate chain configuration mode.

crypto pki certificate chain NAME

Parameters

NAME Specifies the name for the trust-point.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to enter into certificate chain configuration mode. If the specified trust-point name doesn’t exist, an error message will be displayed.

Example

This example shows how to enter into certificate chain configuration mode.

```
Switch# configure terminal
Switch(config)# crypto pki certificate chain TP1
Switch(trustpoint)#
```

56-8 crypto pki certificate generate

This command is used to generate new SSL certificate.

crypto pki certificate generate

Parameters

None.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to e used to generate new SSL certificate

Example

This example generate new SSL certificate.

```
Switch(config)# crypto pki certificate generate
Start generating key ...
Start generating self-signed certificate ...
Done.
Switch(config)#
```

56-9 crypto pki import pem

This command is used to import the CA certificate or the Switch certificate and keys to a trust-point from privacy enhanced mail (PEM)-formatted files.

crypto pki import TRUSTPOINT pem tftp://IP-ADDRESS/[DIRECTORY/]FILE-NAME [password PASSWORD-PHRASE] {ca | local | both}

Parameters

TRUSTPOINT	Specifies the name of the trust-point that is associated with the imported certificates and key pairs.
DIRECTORY	(Optional) Specifies the directory name where the Switch should import the certificates and key pairs in the Switch or TFTP server.
FILE-NAME	Specifies the name of the certificates and key pairs to be imported. By default, the Switch will append this name with *.ca*, *.prv* and *.crt* for CA certificate, private key and certificate respectively.
password *PASSWORD-PHRASE*	(Optional) Specifies the encrypted password phrase that is used to undo encryption when the private keys are imported. The password phrase is a string of up to 64 characters. If the password phrase is not specified, the NULL string will be used.
tftp	Specifies the source URL for a TFTP network server.
IP-ADDRESS	Specifies the IP address of the TFTP server.
ca	Specifies to import the CA certificate only.
local	Specifies to import local certificate and key pairs only.
both	Specifies to import the CA certificate, local certificate and key pairs.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command allows administrators to import certificates and key pairs in the PEM-formatted files. Proper certificates and key pairs need to be imported to the Switch according to the desired key exchange algorithm. RSA and DSA certificates/key pairs should be imported for RSA and DHS-DSS respectively. RSA and DSA certificates and keys are incompatible. An SSL client that has only an RSA certificate and key cannot establish a connection with an SSL server that has only a DSA certificate and key. The imported certificate(s) may form a certificate chain which establishes a sequence of trusted certificates from a peer certificate to the root CA certificate. The trust point CA is the certificate authority configured on the Switch as the trusted CA. Any obtained peer certificate will be accepted if it is signed by a locally trusted CA or its subordinates. If the specified trust point doesn’t exist, an error message will be prompted.

Example

This example shows how to import certificates (CA and local) and key pair files to trust-point "TP1" via TFTP.

```
Switch# crypto pki import TP1 pem tftp://10.1.1.2/name/msca password abcd1234 both
% Importing CA certificate...
Destination filename [name/msca.ca]?
Reading file from tftp://10.1.1.2/name/msca.ca
Loading name/msca.ca from 10.1.1.2:!
[OK - 1082 bytes]
% Importing private key PEM file...
Reading file from tftp://10.1.1.2/name/msca.prv
Loading name/msca.prv from 10.1.1.2:!
[OK - 573 bytes]
% Importing certificate PEM file...
Reading file from tftp://10.1.1.2/name/msca.crt
Loading name/msca.crt from 10.1.1.2:!
[OK - 1289 bytes]
% PEM files import succeeded.
Switch(config)#
```

56-10 show ssl-global-setting

This command is used to to display the SSL global settings.

show ssl-global-setting

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

To display the SSL status.

Example

This command is used to to display the SSL global settings.

```
Switch# show ssl-global-setting

ssl server state: Disable
ssl service policy name:
Switch#
```

57. Simple Network Management Protocol (SNMP) Commands

57-1 show snmp-server

This command is used to display the SNMP server's global state settings and trap related settings.

show snmp-server [traps]

Parameters

traps	(Optional) Specifies to display trap related settings.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use the **show snmp-server** command to display the SNMP server global state settings.

Use the **show snmp-server traps** command to display trap related settings.

Example

This example shows how to display the SNMP server configuration.

```
Switch# show snmp-server

SNMP Server  : Enabled
Name         : SiteA-Switch
Location     : HQ 15F
Contact      : MIS Department II
SNMP UDP Port: 50000
SNMP Response Broadcast Request: Enabled
Trap Source Interface           : vlan1

Switch#
```

This example shows how to display trap related settings.

```
Switch# show snmp-server traps

Global Trap State : Enabled
Individual Trap State:
Authentication           : Enabled
linkup                   : Enabled
linkdown                 : Enabled
coldstart                : Enabled
warmstart                : Disabled

Switch#
```

57-2 snmp-server

This command is used to enable the SNMP agent. Use the **no** form of this command to disable the SNMP agent.

snmp-server

no snmp-server

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The SNMP manager manages a SNMP agent by sending SNMP requests to agents and receiving SNMP responses and notifications from agents. The SNMP server on the agent must be enabled before the agent can be managed.

Example

This example shows how to enable the SNMP server.

```
Switch# configure terminal
Switch(config)#snmp-server
Switch(config)#
```

57-3 snmp-server contact

This command is used to configure the system contact information for the device. Use the **no** form of this command to remove the setting.

snmp-server contact *TEXT*

no snmp-server contact

Parameters

contact *TEXT*	Specifies a string for describing the system contact information. The maximum length is 255 characters The syntax is a general string that allows spaces.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command configures the system contact information for management of the device.

Example

This example shows how to configure the system contact information with the string MIS Department II.

```
Switch# configure terminal
Switch(config)#snmp-server contact "MIS Department II"
Switch(config)#
```

57-4 snmp-server enable traps

This command is used to enable the sending of trap packets globally. Use the **no** form of this command to disable the sending of trap packets.

snmp-server enable traps

no snmp-server enable traps

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command enables the device to send the SNMP notification traps globally. To configure the router to send these SNMP notifications, enter the **snmp-server enable traps** command to enable the global setting.

Example

This example shows how to enable the SNMP traps global sending state.

```
Switch# configure terminal
Switch(config)#snmp-server enable traps
Switch(config)#
```

57-5 snmp-server enable traps snmp

This command is used to enable the sending of all or specific SNMP notifications. Use the **no** form of this commandto disable sending of all or specific SNMP notifications.

snmp-server enable traps snmp [authentication] [linkup] [linkdown] [coldstart] [warmstart]

no snmp-server enable traps snmp [authentication] [linkup] [linkdown] [coldstart] [warmstart]

Parameters

authentication	(Optional) Specifies to control the sending of SNMP authentication failure notifications. An authenticationFailuretrap is generated when the device receives an SNMP message that is not properly authenticated. The authentication method depends on the version of SNMP being used. For SNMPv1 or SNMPv2c, authentication failure occurs if packets are formed with an incorrect community string. For SNMPv3, authentication failure occurs if packets are formed with an incorrect SHA/MD5 authentication key.
linkup	(Optional) Specifies to control the sending of SNMP linkUp notifications. A linkup(3) trap is generated when the device recognizes that one of the communication links has come up.
linkdown	(Optional) Specifies to control the sending of SNMP linkDown notifications. A linkDown(2) trap is generated when the device recognizes a failure in one of the communication links.
coldstart	(Optional) Specifies to control the sending of SNMP coldStart notifications.
warmstart	(Optional) Specifies to control the sending of SNMP warmStart notifications.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command controls the sending of SNMP standard notification traps. To enable the sending of notification traps, the global setting must be enabled too.

Example

This example shows how to enable the switch to send all SNMP traps to the host 10.9.18.100 using the community string defined as public.

```
Switch# configure terminal
Switch(config)#snmp-server enable traps
Switch(config)# snmp-server enable traps snmp
Switch(config)# snmp-server host 10.9.18.100 version 2c public
Switch(config)#
```

This example shows how to enable the SNMP authentication traps.

```
Switch# configure terminal
Switch(config)#snmp-server enable traps snmp authentication
Switch(config)#
```

57-6 snmp-server location

This command is used to configure the system's location information Use the **no** form of this command to remove the setting.

snmp-server location *TEXT*

no snmp-server location

Parameters

location *TEXT*	Specifies the string that describes the system location information. The maximum length is 255 characters. The syntax is a general string that allows spaces.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the system's location information on the Switch.

Example

This example shows how to configure the system's location information with the string "HQ 15F".

```
Switch# configure terminal
Switch(config)#snmp-server location "HQ 15F"
Switch(config)#
```

57-7 snmp-server name

This command is used to configure the system's name information. Use the **no** form of this command to remove the setting.

snmp-server name *NAME*

no snmp-server name

Parameters

NAME	Specifies the string that describes the SNMP server name information. The maximum length is 64 characters. This name should start with a letter, and end with a letter or a number. Hyphens are allowed to be used in between the starting and ending characters. It is recommended not to configure the name longer than 10 characters.

Default

By default, this name is “Switch”.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the system’s name information on the Switch.

Example

This example shows how to configure the system’s name to “SiteA-switch”.

```
Switch#configure terminal
Switch(config)#snmp-server name SiteA-switch
SiteA-switch(config)#
```

57-8 snmp-server service-port

This command is used to configure the SNMP UDP port number. Use the **no** form of this command to reset the UDP port number to default value.

snmp-server service-port *PORT-NUMBER*

no snmp-server service-port

Parameters

PORT-NUMBER	Specifies the UDP port number. The range is from 0 to 65535. Some numbers may conflict with other protocols.

Default

By default, this number is 161.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the SNNP UDP port number on the Switch. The agent will listen to the SNMP request packets on the configured service UDP port number.

Example

This example shows how to configure the SNMP UDP port number.

```
Switch# configure terminal
Switch(config)#snmp-server service-port 50000
Switch(config)#
```

57-9 snmp-server response broadcast-request

This command is used to enable the server to response to broadcast SNMP GetRequest packets. Use the **no** form of this command to disable the response to broadcast SNMP GetRequest packets.

snmp-server response broadcast-request

no snmp-server response broadcast-request

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enable or disable the server to response to broadcast SNMP GetRequest packet. NMS tools would send broadcast SNMP GetRequest packets to discover networks device. To support this function, the response to the broadcast get request packet needs to be enabled.

Example

This example shows how to enable the server to respond to the broadcast SNMP get request packet.

```
Switch# configure terminal
Switch(config)#snmp-server response broadcast-request
Switch(config)#
```

57-10 show snmp

This command is used to display the SNMP settings.

show snmp {community | host | view | group | engineID}

Parameters

community	Specifies to display SNMP community information.
host	Specifies to display SNMP trap recipient information.
view	Specifies to display SNMP view information.
group	Specifies to display SNMP group information.
engineID	Specifies to display SNMP local engine ID information.

Default

None.

Command Mode

Privileged EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command displays the SNMP information. When displaying SNMP community strings, the SNMPv1 or SNMPv2c user created will not be displayed.

Example

This example shows how to display SNMP community information.

```
Switch# show snmp community

Codes: ro - read only, rw - Read Write

Community         access  view
----------------- ---- ----------------------------------------------------------
System             rw   sales-divison checked with IP access control list:
SalesDvision
public             ro   RD-division checked with IP access control list: HB5
Develop           ro   RD2
private           rw   Line2 checked with IP access control list: HQ

Total Entries: 4

Switch#
```

This example shows how to display the SNMP server host setting.

```
Switch# show snmp host

Host IP Address  : 10.20.30.40
SNMP Version     : V1
Community Name   : public
UDP Port         : 50001

Host IP Address  : 10.10.10.1
SNMP Version     : V3 noauthnopriv
SNMPv3 User Name : user1
UDP Port         : 50001

Host IPv6 Address: 1:12:123::100
SNMP Version     : V3 noauthnopriv
SNMPv3 User Name : user2
UDP Port         : 162

Total Entries: 3

Switch#
```

This example shows how to display the MIB view setting.

```
Switch# show snmp view

View Name             Subtree                     View Type
------------------------------------------------------------
restricted            1.3.6.1.2.1.1               Included
restricted            1.3.6.1.2.1.11              Included
restricted            1.3.6.1.6.3.10.2.1          Included
restricted            1.3.6.1.6.3.11.2.1          Included
restricted            1.3.6.1.6.3.15.1.1          Included
CommunityView         1                           Included
CommunityView         1.3.6.1.6.3                 Excluded
CommunityView         1.3.6.1.6.3.1               Included

Total Entries: 8

Switch#
```

This example shows how to display the SNMP group setting.

```
Switch# show snmp group

GroupName: public                               SecurityModel: v1
  ReadView      : CommunityView                 WriteView     :
  NotifyView    : CommunityView
IP access control list:

GroupName: public                               SecurityModel: v2c
  ReadView      : CommunityView                 WriteView     :
  NotifyView    : CommunityView
IP access control list:

GroupName: initial                              SecurityModel: v3/noauth
  ReadView      : restricted                    WriteView     :
  NotifyView    : restricted
IP access control list:

GroupName: private                              SecurityModel: v1
  ReadView      : CommunityView                 WriteView     : CommunityView
  NotifyView    : CommunityView
IP access control list:

GroupName: private                              SecurityModel: v2c
  ReadView      : CommunityView                 WriteView     : CommunityView
  NotifyView    : CommunityView
IP access control list:

Total Entries: 5

Switch#
```

This example shows how to display the SNMP engineID.

```
Switch# show snmp engineID

Local SNMP engineID: 000000090200000000C025808

Switch#
```

57-11 show snmp user

This command is used to display information about the configured SNMP user.

show snmp user [*USER-NAME***]**

Parameters

USER-NAME	(Optional) Specifies the name of a specific user to display SNMP information.

Default

None.

Command Mode

Privileged EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

When the username argument is not specified, all configured users will be displayed. The community string created will not displayed by this command.

Example

This example shows how SNMP users are displayed.

```
Switch# show snmp user authuser

User name: authuser
  Security Model: v2c
Group Name: VacmGroupName
IP access control list: HB5

User name: authuser
  Security Model: v3 priv
Group Name: VacmGroupName
Authentication Protocol: MD5
Privacy Protocol: DES
Engine ID: 000000090200000000C025808
IP access control list:

Total Entries: 2

Switch#
```

57-12 snmp-server community

This command is used to configure the community string to access the SNMP. Use the **no** form of this command to remove the community string,

snmp-server community [0 | 7] *COMMUNITY-STRING* **[view** *VIEW-NAME***] [ro | rw] [access** *IP-ACL-NAME***]**

no snmp-server community *COMMUNITY-STRING*

Parameters

0 *COMMUNITY-STRING*	(Optional) Specifies the community string in the plain text form with a maximum of 32 alphanumeric characters. This is the default option.
7 *COMMUNITY-STRING*	(Optional) Specifies the community string in the encrypted form.
view *VIEW-NAME*	(Optional) Specifies a view name of a previously defined view. It defines the view accessible by the SNMP community.
ro	(Optional) Specifies read-only access.

rw	(Optional) Specifies read-write access.
access	Set access control list for this community
IP-ACL-NAME	(Optional) Specifies the name of the standard access list to control the user to use this community string to access to the SNMP agent. Specifies the valid user in the source address field of the access list entry.

Default

Community	View Name	Access right
private	CommunityView	Read/Write
public	CommunityView	Read Only

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command provides an easy way to create a community string for SNMPv1 and SNMPv2c management. When creating a community with the **snmp-server community** command, two SNMP group entries, one for SNMPv1 and one for SNMPv2c, which has the community name as their group names are created. If the view is not specified, it is permitted to access all objects.

Example

This example shows how a MIB view “interfacesMibView” is created and a community string “comaccess” which can do read write access the interfacesMibView view is created.

```
Switch# configure terminal
Switch(config)#snmp-server view interfacesMibView 1.3.6.1.2.1.1.2 included
Switch(config)# snmp-server community comaccess view interfacesMibView rw
Switch(config)#
```

57-13 snmp-server engineID local

This command is used to specify the SNMP engine ID on the local device. Use the **no** form of this command to revert the SNMP engine ID to the default.

snmp-server engineID local *ENGINEID-STRING*

no snmp-server engineID local

Parameters

ENGINEID-STRING	Specifies the engine ID string of a maximum of 24 characters.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

An SNMP engine ID is not displayed or stored in the running configuration. The SNMP engine ID is a unique string to identify the device. A string is generated by default. If you configure a string less than 24 characters, it will be filled with trailing zeros up to 24 characters.

Example

This example shows how to configure the SNMP engine ID to 332200000000000000000000.

```
Switch# configure terminal
Switch(config)#snmp-server engineID local 332200000000000000000000
Switch(config)#
```

57-14 snmp-server group

This command is used to configure an SNMP group. Use the **no** form of this command to remove a SNMP group or remove a group from using a specific security model.

snmp-server group *GROUP-NAME* **{v1 | v2c | v3 {auth | noauth | priv}} [read** *READ-VIEW***] [write** *WRITE-VIEW***] [notify** *NOTIFY-VIEW***] [access** *IP-ACL-NAME***]**

no snmp-server group *GROUP-NAME* **{v1 | v2c | v3 {auth | noauth | priv}}**

Parameters

GROUP-NAME	Specifies the group name of a maximum of 32 characters. The syntax is general string that does not allow space.
v1	Specifies that the group user can use the SNMPv1 security model.
v2c	Specifies that the group user can use the SNMPv2c security model.
v3	Specifies that the group user can use the SNMPv3 security model.
auth	Specifies to authenticate the packet but not encrypt it.
noauth	Specifies not to authenticate and not to encrypt the packet.
priv	Specifies to authenticate and encrypt the packet.
read *READ-VIEW*	(Optional) Specifies a read-view that the group user can access.
write *WRITE-VIEW*	(Optional) Specifies a write-view that the group user can access.
notify *NOTIFY-VIEW*	(Optional) Specifies a write-view that the group user can access. The notify view describes the object that can be reported its status via trap packets to the group user.
access *IP-ACL-NAME*	(Optional) Specifies the standard IP access control list (ACL) to associate with the group.

Default

Group Name	Version	Security Level	Read View Name	Write View Name	Notify View Name

Initial	SNMPv3	noauth	Restricted	None	Restricted
ReadGroup	SNMPv1	noauth	CommunityView	None	CommunityView
ReadGroup	SNMPv2c	noauth	CommunityView	None	CommunityView
WriteGroup	SNMPv1	noauth	CommunityView	CommunityView	CommunityView
WriteGroup	SNMPv2c	noauth	CommunityView	CommunityView	CommunityView

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

An SNMP group defines a user group by specifying the allowed security model, the read-view, the write-view, and the notification view. The security model defines that the group user is allowed to use the specified version of SNMP to access the SNMP agent,

The same group name can be created with security models SNMPv1, SNMPv2c, and SNMPv3 at the same time. For SNMPv3, it can be created for SNMPv3 auth and SNMPv3 priv at the same time.

To update the view profile for a group for a specific security mode, delete and create the group with the new view profile.

The read-view defines the MIB objects that the group user is allowed to read. If read-view is not specified, then Internet OID space 1.3.6.1 can be read.

The write-view defines the MIB objects that the group user is allowed to write. If write-view is not specified, then no MIB objects can be written.

The notification view defines the MIB objects that the system can report its status in the notification packets to the trap managers that are identified by the specified group user (act as community string). If notify-view is not specified, then no MIB objects can be reported.

Example

This example shows how to create the SNMP server group “guestgroup” for SNMPv3 access and SNMPv2c.

```
Switch# configure terminal
Switch(config)# snmp-server view interfacesMibView 1.3.6.1.2.1.2 included
Switch(config)# snmp-server group guestgroup v3 auth read interfacesMibView
Switch(config)# snmp-server group guestgroup v2c read CommunityView write
CommunityView
Switch(config)#
```

57-15 snmp-server host

This command is used to specify the recipient of the SNMP notification. Use the **no** form of this command to remove the recipient.

snmp-server host {*IP-ADDRESS* **|** *IPV6-ADDRESS***} [version {1 | 2c | 3 {auth | noauth | priv}}]** *COMMUNITY-STRING* **[port** *PORT-NUMBER***]**

no snmp-server host {*IP-ADDRESS* **|** *IPV6-ADDRESS***}**

Parameters

IP-ADDRESS	Specifies the IPv4 address of the SNMP notification host.
IPV6-ADDRESS	Specifies the IPv6 address of the SNMP notification host.
version	(Optional) Specifies the version of the SNMP used to send the traps. If not specified, the default is SNMPv1 **1** - SNMPv1. **2c** - SNMPv2c. **3** - SNMPv3.
auth	Specifies to authenticate the packet but not to encrypt it.
noauth	Specifies not to authenticate and to encrypt the packet.
priv	Specifies to both authenticate and to encrypt the packet.
COMMUNITY-STRING	Specifies the community string to be sent with the notification packet. If the version is 3, the community string is used as the username as defined in the **snmp-sever user** command.
PORT-NUMBER	Specifies the UDP port number. The default trap UDP port number is 162. The range of UDP port numbers is from 0 to 65535. Some port numbers may conflict with other protocols.

Default

By default, the version used is 1.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

SNMP notifications are sent as trap packets. The user should create at least one recipient of a SNMP notification by using the **snmp-server host** command in order for the Switch to send the SNMP notifications. Specify the version of the notification packet for the created user. For SNMPv1 and SNMPv2c, the notification will be sent in the trap protocol data unit (PDU). For SNMPv3, the notification will be sent in the SNMPv2-TRAP-PDU with the SNMPv3 header.

When specifying to send the trap packets in SNMPv1 or SNMPv2c to a specific host, the specified community string acts as the community string in the trap packets.

When specifying to send the trap packets in SNMPv3 to a specific host, whether to do authentication and encryption in the sending of the packet should be specified. The specified community string acts as the username in the SNMPv3 packet. The user must be created first using the **snmp-server user** command or **snmp-server user v3** command.

In the sending of the trap packet, the system will check the notification view associated with the specified user (or community name). If the binding variables to be sent with the trap packet are not in the notification view, the notification will not be sent to this host.

Example

This example shows how to configure the trap recipient 163.10.50.126 with version 1 with community string “comaccess”.

```
Switch# configure terminal
Switch(config)#snmp-server community comaccess rw
Switch(config)# snmp-server host 163.10.50.126 version 1 comaccess
Switch(config)#
```

This example shows how to configure the trap recipient 163.10.50.126 with version 3 authentication security level and with the username “useraccess”.

```
Switch# configure terminal
Switch(config)#snmp-server group groupaccess v3 auth read CommunityView write
CommunityView
Switch(config)# snmp-server user useraccess groupaccess v3 auth md5 12345678
Switch(config)# snmp-server host 163.10.50.126 version 3 auth useraccess
Switch(config)#
```

This example shows how to configure the trap recipient 163.10.50.126 with version 1 with the community string “comaccess”. The UDP port number is configured to 50001.

```
Switch# configure terminal
Switch(config)#snmp-server community comaccess rw
Switch(config)# snmp-server host 163.10.50.126 version 1 comaccess port 50001
Switch(config)#
```

57-16 snmp-server source-interface traps

This command is used to specify the interface whose IP address will be used as the source address for sending the SNMP trap packet. Use the **no** form of this command to revert to the default setting.

snmp-server source-interface traps *INTERFACE-ID*

no snmp-server source-interface traps

Parameters

INTERFACE-ID	Specifies the interface whose IP address will be used as the source address for sending the SNMP trap packet.

Default

The IP address of the closest interface will be used.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to specify the interface whose IP address will be used as the source address for sending the SNMP trap packet.

Example

This example shows how to configure VLAN100 as the sourcing interface for sending SNMP trap packets.

```
Switch# configure terminal
Switch(config)#snmp-server source-interface traps vlan 100
Switch(config)#
```

57-17 snmp-server user

This command is used to create an SNMP user. Use the **no** form of this command to remove an SNMP user.

snmp-server user *USER-NAME GROUP-NAME* **{v1 | v2c | v3 [encrypted] [auth {md5 | sha}** *AUTH-PASSWORD* **[priv** *PRIV-PASSWORD*]]} **[access** *IP-ACL-NAME*]

no snmp-server user *USER-NAME GROUP-NAME* **{v1 | v2c | v3}**

Parameters

USER-NAME	Specifies a username of a maximum of 32 characters. The syntax is general string that does not allow spaces.
GROUP-NAME	Specifies the name of the group to which the user belongs. The syntax is general string that does not allow spaces.
v3	Specifies that the user uses the SNMPv3 security mode.
encrypted	(Optional) Specifies that the following password is in encrypted format.
auth	(Optional) Specifies the authentication level.
md5	Specifies to use HMAC-MD5-96 authentication.
sha	Specifies to use HMAC-SHA-96 authentication.
AUTH-PASSWORD	Specifies the authentication password in the plain-text form.This password is 8 to 16 octets for MD5 and 8 to 20 octets for SHA. If the keyword **encrypted** is specified, the length is 32 for MD5 and 40 for SHA. The format is a hexadecimal value.
PRIV-PASSWORD	Specifies a privacy key used by DES. In the plain-text form, this password is 8 to 16 octets. If the keyword **encrypted** is specified, the length is fixed to 32 octets.
access *IP-ACL-NAME*	(Optional) Specifies the standard IP access control list (ACL) to associate with the user.

Default

By default, there is one user.

User Name: initial.

Group Name: initial.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

To create a SMNP user, specify the security model that the user uses and the group that the user is created for. To create an SNMPv3 user, the password used for authentication and encryption needs to be specified.

An SNMP user is unable to be deleted if it has been associated with a SNMP server host.

Example

This example shows how the plain-text password is configured for the user “user1” in the SNMPv3 group public.

```
Switch# configure terminal
Switch(config)#snmp-server user user1 public v3 auth md5 authpassword priv
privpassword
Switch(config)#
```

This example shows how the MD5 digest string is used instead of the plain text password.

```
Switch# configure terminal
Switch(config)#snmp-server user user1 public v3 encrypted auth md5
00112233445566778899AABBCCDDEEFF
Switch(config)#
```

57-18 snmp-server view

This command is used to create or modify a view entry. Use the **no** form of this command to remove a specified SNMP view entry.

snmp-server view *VIEW-NAME OID-TREE* **{included | excluded}**

no snmp-server view *VIEW-NAME*

Parameters

VIEW-NAME	Specifies the name of the view entry. The valid length is 1 to 32 characters. The syntax is general string that does not allow spaces.
OID-TREE	Specifies the object identifier of the ASN.1 sub-tree to be included or excluded from the view. To identify the sub-tree, specify a text string consisting of numbers, such as 1.3.6.2.4, or a word, such as system. Use the asterisk (*) wildcard in a single sub-identifier to specify a sub-tree family.
included	Specifies the sub-tree to be included in the SNMP view.
excluded	Specifies the sub-tree to be excluded from the SNMP view.

Default

VIEW-NAME	OID-TREE	View Type
Restricted	1.3.6.1.2.1.1	Included
Restricted	1.3.6.1.2.1.11	Included
Restricted	1.3.6.1.6.3.10.2.1	Included
Restricted	1.3.6.1.6.3.11.2.1	Included
Restricted	1.3.6.1.6.3.15.1.1	Included

CommunityView	1	Included
CommunityView	1.3.6.1.6.3	Excluded
CommunityView	1.3.6.1.6.3.1	Included

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to create a view of MIB objects.

Example

This example shows how to create a MIB view called “interfacesMibView” and define an SNMP group “guestgroup” with “InterfaceMIBView” as the read view.

```
Switch# configure terminal
Switch(config)#snmp-server view interfacesMibView 1.3.6.1.2.1.2 included
Switch(config)# snmp-server group guestgroup v3 auth read interfacesMibView
Switch(config)#
```

58. Spanning Tree Protocol (STP) Commands

58-1 clear spanning-tree detected-protocols

This command is used to restart the protocol migration.

clear spanning-tree detected-protocols {all | interface *INTERFACE-ID* | **port-channel** *<1-8>* **}**

Parameters

all	Specifies to trigger the detection action for all ports.
interface *INTERFACE-ID*	Specifies the port interface that will be triggered the detecting action.
port-channel *<1-8>*	Specifies the channel group to trigger the detection action.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Using this command the port protocol migrating state machine will be forced to the *SEND_RSTP* state. This action can be used to test whether all legacy bridges on a given LAN have been removed. If there is no STP Bridge on the LAN, the port will be operated in the configured mode, either in the RSTP or MSTP mode. Otherwise, the port will be operated in the STP mode.

Example

This example shows how to trigger the protocol migration event for all ports.

```
Switch# clear spanning-tree detected-protocols all

Clear spanning-tree detected-protocols? (y/n) [n] y

Switch#
```

58-2 show spanning-tree

This command is used to display the information of spanning tree protocol operation. This command is only for STP and RSTP.

show spanning-tree [{interface *<INTERFACE-ID>* **[, | -] | port-channel** *<1-8>***} | mpt** *INSTANCE-ID* **]**

Parameters

interface *INTERFACE-ID*	Specifies the interfaceID to display.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space before and after the comma.
-	(Optional) Specifies a range of interfaces. No space before and after the hyphen.
port-channel *<1-8>*	Specifies the particular channel group to show the information.
mpt *INSTANCE-ID*	Specifies the particular instance of Multi-process RSTP to show the information.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the SpanningTree configuration for the single spanning tree when in the RSTP or STP-compatible mode.

Example

This example shows how to display the spanning tree information when STP is enabled.

```
Switch# show spanning-tree

Global Spanning Tree Status:
  Spanning Tree: Enabled
  STP New Root Trap: Disabled
  STP Topology Change Trap: Disabled
  Protocol Mode: RSTP
  Priority: 32768
  Bridge Max Age: 20
  Bridge Hello Time: 2
  Bridge Forward Time: 15
  TX Hold Count: 6
  Max Hops: 20
  Topology Change Count: 0
                                          Priority  Link
Interface  Role       State      Cost    .Port#    Type        Edge
---------  -----      -----      ------  --------- ------      --------
ethernet1/0/3   designated forwarding 20000     128.3   p2p         non-edge
ethernet1/0/5   backup     blocking   200000    128.5   p2p         non-edge
ethernet1/0/6   backup     blocking   200000    128.6   shared      non-edge
ethernet1/0/7   root       forwarding 2000      128.7   P2p         non-edge

Switch#
```

58-3 show spanning-tree configuration interface

This command is used to display the information about STP interface related configuration.

show spanning-tree configuration interface [{*INTERFACE-ID* **[, | -] | port-channel** *<1-8>***}]**

Parameters

interface *INTERFACE-ID*	Specifies the interfaceID to display.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space before and after the comma.
-	(Optional) Specifies a range of interfaces. No space before and after the hyphen.
port-channel *<1-8>*	Specifies the particular channel group to show the information.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display Spanning Tree interface level configuration. The command can be used for all STP versions.

Example

This example shows how to display spanning tree configuration information for interface ethernet1/0/1.

```
Switch#show spanning-tree configuration interface ethernet 1/0/1

ethernet1/0/1
 Spanning tree state : Enabled
 Port path cost: 0
 Port priority: 128
 Port Identifier:  128.1
 Link type: auto
 Port fast: auto
 Guard root: Disabled
 TCN filter : Disabled
 Bpdu forward: Disabled
         Hello Time  : 2

Switch#
```

58-4 snmp-server enable traps stp

This command is used to enable the spanning tree to send SNMP notifications for STP. Use the **no** form of this command to disable the sending of notifications for STP.

snmp-server enable traps stp [new-root] [topology-chg]

no snmp-server enable traps stp [new-root] [topology-chg]

Parameters

new-root	(Optional) Specifies the sending of STP new root notification.
topology-chg	(Optional) Specifies the sending of STP topology change notification.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable the sending of notification traps. When using this command with no parameters specified, both STP notification types are enabled or disabled.

Example

This example shows how to enable the router to send all STP traps to the host 10.9.18.100 using the community string defined as public.

```
Switch# configure terminal
Switch(config)#snmp-server enable traps
Switch(config)# snmp-server enable traps stp
Switch(config)# snmp-server host 10.9.18.100 version 2c public
Switch(config)#
```

58-5 spanning-tree global state

This command is used to enable or disable the STP's global state. Use the **no** form to disable the STP's global state.

spanning-tree global state {enable | disable}

no spanning-tree global state

Parameters

enable	Specifies to enable the STP's global state.
disable	Specifies to disable the STP's global state.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command in the global configuration mode to enable the global spanning-tree function.

Example

This example shows how to enable the spanning-tree function.

```
Switch# configure terminal
Switch(config)#spanning-tree global state enable
Switch(config)#
```

58-6 spanning-tree (timers)

This command is used to configure the Global SpanningTree timer value. Use the **no** form of this command to revert to the default settings. **Global Hello Time applied on STP and RSTP mode only**

spanning-tree {hello-time *SECONDS* **| forward-time** *SECONDS* **| max-age** *SECONDS***}**

no spanning-tree {hello-time | forward-time | max-age}

Parameters

hello-time *SECONDS*	Specifies the interval that a designated port will wait between the periodic transmissionsof each configuration message. The range is from 1 to 2 seconds.
forward-time *SECONDS*	Specifies the forward delay time used by STP to transition from the listening to the learning states and learning to forwarding states. The range is from 4 to 30 seconds.
max-age *SECONDS*	Specifies the maximum message age of BPDU. The range is from 6 to 40 seconds.

Default

The default value of the hello-time is 2 seconds.

(**Global Hello Time applied on STP and RSTP mode only**)

The default value of the forward-time is 15 seconds.

The default value of the max-age is 20 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the SpanningTree timer value.

Example

This example shows how to configure the STP timers.

```
Switch# configure terminal
Switch(config)# spanning-tree hello-time 1
Switch(config)# spanning-tree forward-time 16
Switch(config)# spanning-tree max-age 21
Switch(config)#
```

58-7 spanning-tree state

This command is used to enable or disable the STP operation. Use the **no** form of this command to revert to the default setting.

spanning-tree state {enable | disable}

no spanning-tree state

Parameters

enable	Specifies to enable STP for the configured interface.
disable	Specifies to disable STP for the configured interface.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a port is spanning tree enabled, the spanning tree protocol engine will either send or process the spanning tree BPDU received by the port. The command should be used with caution to prevent bridging loops. The command does not take effect if the Layer 2 protocol tunnel is enabled for STP.

Example

This example shows how to enable Spanning Tree on Ethernet interface ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# spanning-tree state enable
Switch(config-if)#
```

58-8 spanning-tree cost

This command is used to configure the value of the port path-cost on the specified port. Use the **no** form of this command to revert to the auto-computed path cost.

spanning-tree cost *COST*

no spanning-tree cost

Parameters

COST	Specifies the path cost for the port. The range is from 1 to 200000000.

Default

The default path cost is computed from the interface's bandwidth setting.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

In the RSTP or STP-compatible mode, the administrative path cost is used by the single spanning-tree to accumulate the path cost to reach the Root. In the MSTP mode, the administrative path cost is used by the CIST regional root to accumulate the path cost to reach the CIST root.

Example

This example shows how to configure the port cost to 20000 for Ethernet interface ethernet1/0/7.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/7
Switch(config-if)# spanning-tree cost 20000
Switch(config-if)#
```

58-9 spanning-tree guard root

This command is used to enable the root guard mode.Use the **no** form of this command to revert to the default setting.

spanning-tree guard root

no spanning-tree guard root

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

BPDU guard prevents a port from becoming a root port. This feature is useful for the service provider to prevent external bridges to a core region of the network influencing the spanning tree active topology, possibly because those bridges are not under the full control of the administrator.

When a port is guarded from becoming a root port, the port will only play the role as a designated port. If the port receives the configuration BPDU with a higher priority, the port will change to the alternate port,

which is in the blocking state. The received superior factor will not participate in the STP computation. The port will listen for BPDUs on the link. If the port times out the received superior BPDU, it will change to the designated port role.

When a port changes to the alternate port state, due to the root guard, a system message will be generated. This configuration will take effect for all the spanning-tree versions.

Example

This example shows how to configure to prevent Ethernet interface ethernet1/0/1 from being a root port.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# spanning-tree guard root
Switch(config-if)#
```

58-10 spanning-tree link-type

This command is used to configure a link-type for a port. Use the **no** form of this command to revert to the default setting.

spanning-tree link-type {point-to-point | shared}

no spanning-tree link-type

Parameters

point-to-point	Specifies that the port's link type is point-to-point.
shared	Specifies that the port's link type is a shared media connection.

Default

The link type is automatically derived from the duplex setting unless explicitly configuring the link type.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A full-duplex port is considered to have a point-to-point connection; on the opposite, a half-duplex port is considered to have a shared connection .The port can't transit into forwarding state rapidly by setting link type to shared-media. Hence, auto-determined of link-type by the STP module is recommended.

This configuration will take effect for all the spanning-tree modes.

Example

This example shows how to configure the link type to point-to-point for port ethernet1/0/7.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/7
Switch(config-if)# spanning-tree link-type point-to-point
Switch(config-if)#
```

58-11 spanning-tree mode

This command is used to configure the STP mode. Use the **no** form of this command to revert to the default setting.

spanning-tree mode {mstp | rstp |stp}

no spanning-tree mode

Parameters

mstp	Specifies the Multiple Spanning Tree Protocol (MSTP).
rstp	Specifies the Rapid Spanning Tree Protocol (RSTP).
stp	Specifies the Spanning Tree Protocol (IEEE 802.1D Compatible)

Default

By default, this mode is **rstp**.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If the mode is configured as STP or RSTP, all currently running MSTP instances will be cancelled automatically. If the newly configured mode is changed from the previous one, the spanning-tree state machine will restart again, therefore all of the stable spanning-tree port states will transit into discarding states.

Example

This example shows how to configure the running version of the STP module to RSTP.

```
Switch# configure terminal
Switch(config)#spanning-tree mode rstp
Switch(config)#
```

58-12 spanning-tree portfast

This command is used to specify the port's fast mode. Use the **no** form of this command to revert to the default setting.

spanning-tree portfast {disable | edge| network}

no spanning-tree portfast

Parameters

disable	Specifies to set the port to the port fast disabled mode.
edge	Specifies to set the port to the port fast edge mode.
network	Specifies to set the port to the port fast network mode.

Default

By default, this option is **edge**.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A port can be in one of the following three port fast modes:

- **Edge mode** - The port will directly change to the spanning-tree forwarding state when a link-up occurs without waiting for the forward-time delay. If the interface receives a BPDU later, its operation state changes to the non-port-fast state.
- **Disable mode** - The port will always be in the non-port-fast state. It will always wait for the forward-time delay to change to forwarding state.
- **Network mode** - The port will remain in the non-port-fast state for three seconds. The port will change to the port-fast state if no BPDU is received and changes to the forwarding state. If the port received the BPDU later, it will change to the non-port-fast state

This command should be used with caution. Otherwise, an accidental topology loop and data-packet loop may be generated and disrupt the network operation.

Example

This example shows how to configure port ethernet1/0/7 to the port-fast edge mode.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/7
Switch(config-if)# spanning-tree portfast edge
Switch(config-if)#
```

58-13 spanning-tree port-priority

This command is used to configure the value of the STP port priority on the specified port. It is only used for RSTP and STP versions. Use the **no** form of this command to revert to the default setting.

spanning-tree port-priority *PRIORITY*

no spanning-tree port-priority

Parameters

PRIORITY	Specifies the port priority.Valid values are from 0 to 240.

Default

By default, this value is 128.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The port priority and the port number together form the Port Identifier. It will be used in the computation of the role of the port. This parameter is used only in the RSTP and STP-compatible mode. A smaller number represents a better priority.

Example

This example shows how to configure the port priority to 0 for port ethernet1/0/7.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/7
Switch(config-if)# spanning-tree port-priority 0
Switch(config-if)#
```

58-14 spanning-tree priority

This command is used to configure the bridge priority. It is only used for RSTP and STP versions. Use the **no** form of this command to restore to the default setting.

spanning-tree priority *PRIORITY*

no spanning-tree priority

Parameters

PRIORITY	Specifies that the bridge priority and bridge MAC address together forms the Spanning-Tree Bridge-ID, which is an important factor in the Spanning-Tree topology. The range is from 0 to 61440.

Default

By default, this value is 32768.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The bridge priority value is one of the two parameters used to select the Root Bridge. The other parameter is system's MAC address. The bridge's priority value must be divisible by 4096 and a smaller number represents a better priority.

This configuration will take effect on STP version and RSTP mode. In the MSTP mode, use the command **spanning-tree mst priority** to configure the priority for an MSTP instance.

Example

This example shows how to configure the STP bridge priority value to 4096.

```
Switch# configure terminal
Switch(config)#spanning-tree priority 4096
Switch(config)#
```

58-15 spanning-tree tcnfilter

This command is used to enable Topology Change Notification (TCN) filtering at the specific interface. Use the **no** form of this command to disable TCN filtering.

spanning-tree tcnfilter

no spanning-tree tcnfilter

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Enabling TC filtering on a port is useful for an ISP to prevent the external bridge to a core region of the network, causing address flushing in that region, possibly because those bridges are not under the full control of the administrator.

When a port is set to the TCN filter mode, the TC event received by the port will be ignored. This configuration will take effect for all the spanning-tree modes.

Example

This example shows how to configure TCN filtering on port ethernet1/0/7.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/7
Switch(config-if)# spanning-tree tcnfilter
Switch(config-if)#
```

58-16 spanning-tree tx-hold-count

This command is used to limit the maximum number of BPDUs that can be sent before pausing for one second. Use the **no** form of this command to revert to the default setting.

spanning-tree tx-hold-count *VALUE*

no spanning-tree tx- hold-count

Parameters

VALUE	Specifies the maximum number of BPDUs that can be sent before pausing for one second. The range is from 1 to 10.

Default

By default, this value is 6.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command specifies the number of hold BPDUs to transmit. The transmission of BPDUs on a port is controlled by a counter. The counter is incremented on every BPDU transmission and decremented once a second. The transmissions are paused for one second if the counter reaches the transmit hold count.

Example

This example shows how to configure the transmitholdcount value to 5.

```
Switch# configure terminal
Switch(config)#spanning-tree tx-hold-count 5
Switch(config)#
```

58-17 spanning-tree forward-bpdu

This command is used to enable the forwarding of the spanningtree BPDU. Use the **no** form of this command to disable the forwarding of the spanningtree BPDU.

spanning-tree forward-bpdu

no spanning-tree forward-bpdu

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If enabled, the received STP BPDU will be forwarded to all VLAN member ports in the untagged form. The command does not take effect if the Layer 2 protocol tunnel is enabled for STP.

Example

This example shows how to enable the forwarding of STP BPDUs.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# spanning-tree forward-bpdu
Switch(config-if)#
```

---

59. Storm Control Commands

59-1 snmp-server enable traps storm-control

This command is used enable or control the command to enable sending SNMP notifications for storm control. Use the **no** form of this command to disable sending SNMP notifications.

snmp-server enable traps storm-control [storm-occur] [storm-clear]

no snmp-server enable traps storm-control [storm-occur] [storm-clear]

Parameters

storm-occur	(Optional) Specifies to send a notification when a storm event is detected.
storm-clear	(Optional) Specifies to send a notification when a storm event is cleared.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command with keyword **storm-occur** and **storm-clear** enables or disables the notifications for storm control module. If no optional keywords is specified, both **storm-occur** and **storm-clear** notifications are enabled or disabled. If you enter the command with a keyword, only the specified notification type is enabled or disabled.

Example

This example shows how to enable sending trap for storm control for both storm occurred and cleared.

```
Switch#configure terminal
Switch(config)#snmp-server enable traps storm-control
Switch(config)#
```

59-2 storm-control

This command is used to configure the device to protect the device from broadcast, multicast, and DA unknown packet storm attacks. Use the **no** form of this command to restore the function to its default settings.

storm-control {{broadcast | multicast | dlf} level {pps *PPS-RISE* **[***PPS-LOW***] | kbps** *KBPS-RISE* **[***KBPS-LOW***] } | action {shutdown | drop | none}}**

no storm-control {broadcast | multicast | dlf | action}

Parameters

broadcast	Specifies to set the broadcast rate limit.
multicast	Specifies to set the multicast rate limit.
dlf	Specifies to set the DLF (Destination Lookup Failure) rate limit. When the **action** is configured as the **shutdown** mode, the unicast refers to both known and unknown unicast packets; that is, if the known and unknown unicast packets hit the specified threshold, the port will be shutdown. Otherwise, unicast refers to unknown unicast packets.
level pps *PPS-RISE* **[***PPS-LOW***]**	Specifies the threshold value in packets count per second. The range is from 0 to 2147483647. If the low PPS value is not specified, the default value is 80% of the specified risen PPS.
level kbps *KBPS-RISE* **[***KBPS-LOW***]**	Specifies the threshold value as a rate of bits per second at which traffic is received on the port. The range is from 0 to 2147483647. If the low KBPS is not specified, the default value is 80% of the specified risen KBPS.
action shutdown	Specifies to shutdown the port when the value specified for rise threshold is reached.
action drop	Specifies to discards packets that exceed the risen threshold.
action none	Specifies not to filter the storm packets.

Default

By default, the broadcast, multicast, and unicast (Destination Lookup Failure) storm controls are disabled.

The default action taken when a storm occurs is to drop storm packets.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the storm control function to protect the network from the storm of broadcast packets, multicast packets, or unknown DA flooding packets. Enter the **storm-control** command to enable storm control for a specific traffic type on the interface.

There are two ways to recover an error disabled port.

- The user can use the **errdisable recovery cause** command to enable the automatic recovery of ports that were error disabled by storm control.
- The user can manually recover the port by entering the **shutdown** command, followed by the **no shutdown** command for the port.

There is only one meter mode (percentage, kbps or pps) that can take effect on an interface. On an interface, if the later specified meter mode option is different from the previous mode, the previous configured storms will reset to their default states (disabled in this specification).

Due to hardware limitations, when the meter mode is percentage or kbps:

- The action cannot be specified to the shutdown mode.
- There are no traps and logs for the drop and none modes.

This feature is unable to give the precise suppression level of the total bandwidth in percentage (0 to 100) of a specific port interface. The current calculation formula assumes that the packet size is 64 bytes.

Example

This example shows how to enable broadcast storm control on ethernet1/0/1. It sets the threshold of ethernet3/0/1 to 500 packets per second with the shutdown action.

```
Switch# configure terminal
Switch(config)#interface ethernet1/0/1
Switch(config-if)# storm-control broadcast level pps 500
Switch(config-if)# storm-control action shutdown
```

59-3 storm-control polling

This command is used to configure the polling interval of received packet counts. Use the **no** form of this command to restore to its default settings.

storm-control polling {interval *SECONDS* **| retries {***NUMBER* **| infinite}}**

no storm-control polling {interval | retries}

Parameters

interval *SECONDS*	Specifies the polling interval of received packet counts. This value must be between 1 and 300 seconds.
retries *NUMBER*	Specifies the retry count. If the action is configured to the shutdown mode and a storm continues as long as the interval times retries values set, the port will enter the error disabled state. This value must be between 0 and 360. 0 means that a shutdown mode port will directly enter the error disabled state when a storm is detected. Infinite means that a shutdown mode port will never enter the error disabled state even if a storm was detected.

Default

The default polling interval is 5 seconds.

The default retries count value is 3.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this to specify the sample interval of received packet counts.

Example

This example shows how to specify the polling interval as 15 seconds.

```
Switch# configure terminal
Switch(config)#storm-control polling interval 15
Switch(config)#
```

59-4 show storm-control

This command is used to display the current storm control settings.

show storm-control interface *INTERFACE-ID* **[, | -] [broadcast | multicast | unicast]**

Parameters

INTERFACE-ID	Specifies the port's interface ID.
,	(Optional)Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional)Specifies a range of interfaces. No space is allowed before and after the hyphen.
broadcast	Specifies to display the current broadcast storm setting.
multicast	Specifies to display the current multicast storm setting.
unicast	Specifies to display the current unicast(DLF) storm setting.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If the interface ID is not specified, all interfaces configurations will be displayed.

If the packet type is not specified, all types of storm control settings will be displayed.

Example

This example shows how to displaythe current broadcast storm control settings.

```
Switch# show storm-control interface range ethernet 1/0/1-1/0/6 broadcast

Polling Interval       : 15 sec           Shutdown Retries       : Infinite
Trap                   : Disabled
Interface    Storm      Action    Threshold         Current    State
-----------------------------------------------------------
ethernet1/0/1     Broadcast  Drop      500/300 pps       200 pps    Forwarding
ethernet1/0/2     Broadcast  Drop      80/64 %           20 %       Forwarding
ethernet1/0/3     Broadcast  Drop      80/64 %           70 %       Dropped
ethernet1/0/4     Broadcast  Shutdown  60/50 %           20 %       Forwarding
ethernet1/0/5     Broadcast  None      60000/50000 kbps  2000 kbps  Forwarding
ethernet1/0/6     Broadcast  None      -                 -          Inactive

Total Entries: 6

Switch#
```

This example shows how to display all interface settings for the range from port 1/0/1 to port 1/0/2.

```
Switch# show storm-control interface ethernet1/0/1-2

Polling Interval       : 15 sec           Shutdown Retries       : Infinite
Trap                      : Disabled
Interface      Storm         Action      Threshold     Current    State
---------------------- ------------------------------------------
ethernet1/0/1      Broadcast     Drop         80/64 %       50%        Forwarding
ethernet1/0/1      Multicast     Drop         80/64 %       50%        Forwarding
ethernet1/0/1      Multicast    Drop         80/64 %       50%        Forwarding
ethernet1/0/2      Broadcast    Shutdown     500/300 pps   -          Error Disabled
ethernet1/0/2      Multicast    Shutdown     500/300 pps   -          Error Disabled
ethernet1/0/2      Multicast    Shutdown     500/300 pps   -          Error Disabled

Total Entries: 6

Switch#
```

Display Parameters

Interface	The interface ID.
Action	The configured action, the possible actions are: Drop, Shutdown, None.
Threshold	The configured threshold.
Current	The actual traffic rate which is currently flowing though the interface. Its unit may be percentage, kbps, PPS based on the configured meter mode. Because hardware can only counts by PPS, this value of this filed may be a rough value for percentage and kbps.
State	The current state of storm control on a given interface for a given traffic type. The possible states are: **Forwarding:** No storm event has been detected. **Dropped:** A storm event has occurred and the storm traffic exceeding the threshold is dropped. **Error Disabled:** The port is disabled due to a storm. **Link Down:** The port is physically linked down. **Inactive:** Indicates that storm control is not enabled for the given traffic type.

59-5 show snmp-server traps storm-control

This command is used to Display storm control trap state.

show snmp-server traps storm-control

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to Display storm control trap state.

Example

This command is used to Display storm control trap state.

```
Switch# show snmp-server traps storm-control
  storm occur                 : Disabled
  storm clear                 : Disabled
Switch#
```

60. Surveillance VLAN Commands

60-1 surveillance vlan

This command is used toenable the global surveillance VLAN state and configure the surveillance VLAN. Use the **no** form of this command to disable the surveillance VLAN state.

surveillance vlan *VLAN-ID*

no surveillance vlan

Parameters

VLAN-ID	Specifies the ID of the surveillance VLAN. The range is from 2 to 4094.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable the global surveillance VLAN function and to specify the surveillance VLAN on the Switch. Each switch can only have one Surveillance VLAN.

Both the **surveillance vlan** command in Global Configuration Mode and the **surveillance vlan enable** command in Interface Configuration Mode need to be enabled for a port to start the surveillance VLAN function.

When the surveillance VLAN is enabled for a port, the port will be automatically learned as surveillance VLAN untagged member, the received untagged surveillance packets will be forwarded to the surveillance VLAN. The received packets are determined as surveillance packets if the source MAC addresses of packets comply with the organizationally unique identifier (OUI) addresses configured by the **surveillance vlan mac-address** command.

A VLAN needs to be created before assigning the VLAN as the surveillance VLAN.

If the surveillance VLAN is configured, this VLAN cannot be removed using the **no vlan** command.

Example

This example shows how to enable the surveillance VLAN function and configure VLAN 1001 as a Surveillance VLAN.

```
Switch# configure terminal
Switch(config)# surveillance vlan 1001
Switch(config)#
```

60-2 surveillance vlan aging

This command is used to configure the aging time for aging out the surveillance VLAN dynamic member ports. Use the **no** form of this command to reset the aging time to the default setting.

surveillance vlan aging *MINUTES*

no surveillance vlan aging

Parameters

MINUTES	Specifies the aging time of surveillance VLAN. The range is from 1 to 65535 minutes.

Default

By default, this aging time is 720 minutes.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the aging time for aging out the surveillance device and the surveillance VLAN automatically learned member ports.

When the last surveillance device connected to the port stops sending traffic, and the MAC address of this surveillance device is aged out, the surveillance VLAN aging timer will be started. The port will be removed from the surveillance VLAN after expiration of surveillance VLAN aging timer.

If the surveillance traffic resumes during the aging time, the aging timer will be cancelled.

Example

This example shows how to configure the aging time of surveillance VLAN to 30 minutes.

```
Switch# configure terminal
Switch(config)#surveillance vlan aging 30
Switch(config)#
```

60-3 surveillance vlan enable

This command is used to enable the surveillance VLAN state of ports. Use the **no** form of this command to disable the surveillance VLAN state of ports.

surveillance vlan enable

no surveillance vlan enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for physical port and port-channel interface configuration.

The command takes effect for access ports or hybrid ports.

Use this command to enable the surveillance VLAN function for ports.

Both the **surveillance vlan** command in Global Configuration Mode and the **surveillance vlan enable** command in Interface Configuration Mode need to be enabled for a port to start the surveillance VLAN function.

When surveillance VLAN is enabled for a port, the port will be automatically learned as surveillance VLAN untagged member, the received untagged surveillance packets will be forwarded to surveillance VLAN. The received packets are determined as surveillance packets if the source MAC addresses of packets comply with the organizationally unique identifier (OUI) addresses configured by the **surveillance vlan mac-address** command.

Example

This example shows how to enable surveillance VLAN function on physical port ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)#surveillance vlan enable
Switch(config-if)#
```

60-4 surveillance vlan mac-address

This command is used to add the user-defined surveillance device OUI. Use the **no** form of this command to delete the user-defined surveillance device OUI.

surveillance vlan mac-address *MAC-ADDRESS MASK* **[component-type {vms | vms-client | video-encoder | network-storage | other} description** *TEXT***]**

no surveillance vlan mac-address *MAC-ADDRESS MASK*

Parameters

MAC-ADDRESS	Specifies the OUI MAC address.
MASK	Specifies the OUI MAC address matching bitmask.
component-type	(Optional) Specifies surveillance components that could be auto-detected by surveillance VLAN.
vms	(Optional) Specifies thesurveillance components type as Video Management Server (VMS).
vms-client	(Optional) Specifies the surveillance components type as VMS client.
video-encoder	(Optional) Specifies the surveillance components type as Video Encoder.
network-storage	(Optional) Specifies the surveillance components type as Network Storage.
other	(Optional) Specifies the surveillance components type as other IP Surveillance Devices.
description *TEXT*	(Optional) Specifies the description for the user-defined OUI with a maximum of 32 characters.

Default

OUI Address	Mask	Component Type	Description
28-10-7B-00-00-00	FF-FF-FF-E0-00-00	D-Link Device	IP Surveillance Device
28-10-7B-20-00-00	FF-FF-FF-F0-00-00	D-Link Device	IP Surveillance Device
B0-C5-54-00-00-00	FF-FF-FF-80-00-00	D-Link Device	IP Surveillance Device
F0-7D-68-00-00-00	FF-FF-FF-F0-00-00	D-Link Device	IP Surveillance Device

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to add user-defined OUI(s) for the surveillance VLAN. The OUI for surveillance VLAN are used to identify the surveillance traffic by the surveillance VLAN function.

If the source MAC addresses of the received packet matches any of the OUI pattern, the received packet is determined as a surveillance packet.

The user-defined OUI cannot be the same as the default OUI.

The default OUI cannot be deleted.

Example

This example shows how to add a user-defined OUI for surveillance devices.

```
Switch# configure terminal
Switch(config)# surveillance vlan mac-address 00-01-02-03-00-00 FF-FF-FF-FF-00-00
component-type vms description user1
Switch(config)#
```

60-5 surveillance vlan qos

This command is used to configure the CoS priority for the incoming surveillance VLAN traffic. Use the **no** form of this command to revert to the default settings.

surveillance vlan qos *COS-VALUE*

no surveillance vlan qos

Parameters

COS-VALUE	Specifies the priority of surveillance VLAN. The available value is from 0 to 7.

Default

The default value 5.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The surveillance packets arriving at the surveillance VLAN enabled port are marked to the COS specified by the command.

The remarking of COS allows the surveillance VLAN traffic to be distinguished from data traffic in quality of service.

Example

This example shows how to configure the priority of the surveillance VLAN to be 7.

```
Switch# configure terminal
Switch(config)# surveillance vlan qos 7
Switch(config)#
```

60-6 show surveillance vlan

This command is used to display the surveillance VLAN configurations.

show surveillance vlan [interface [*INTERFACE-ID* **[, | -]]]**

show surveillance vlan device [interface [*INTERFACE-ID* **[, | -]]]**

Parameters

device	Specifies to display the learned surveillance devices information
interface	(Optional) Specifies to display surveillance VLAN information of ports.
INTERFACE-ID	(Optional) Specifies the port to be displayed.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the surveillance VLAN configurations.

The **show surveillance vlan**command is used to display the surveillance VLAN global configurations.

The **show surveillance vlan interface** command is used to display the surveillance vlan configurations on the interfaces.

The **show surveillance vlan device** command is used to display the surveillance device discovered by its OUI.

Example

This example shows how to displays the surveillance VLAN global settings.

```
Switch# show surveillance vlan

 Surveillance VLAN State : Enabled
 Surveillance VLAN ID  : 100
 Surveillance VLAN CoS : 5
 Aging Time            : 30 minutes

 Surveillance VLAN OUI :

 OUI Address        Mask               Component Type   Description
 -----------------  -----------------  ---------------  --------------
 28-10-7B-00-00-00  FF-FF-FF-E0-00-00  D-Link Device    IP Surveillance Device
 28-10-7B-20-00-00  FF-FF-FF-F0-00-00  D-Link Device    IP Surveillance Device
 B0-C5-54-00-00-00  FF-FF-FF-80-00-00  D-Link Device    IP Surveillance Device
 F0-7D-68-00-00-00  FF-FF-FF-F0-00-00  D-Link Device    IP Surveillance Device

 Total OUI: 4

Switch#
```

61. Secure Shell (SSH) Commands

61-1 crypto key generate

This command is used to generate the RSA or DSA key pair.

crypto key generate {rsa [modulus MODULUS-SIZE**] | dsa}**

Parameters

rsa	Specifies to generate the RSA key pair.
modulus *MODULUS-SIZE*	(Optional) Specifies the number of bits in the modulus. For RSA, the valid values 1024 and 2048.If not specified, a message will be promoted to the user to specify the value
dsa	Specifies to generate the DSA key pair. The DSA key size is fixed as 1024 bit.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command is used to generate the RSA or DSA key pair.

Example

This example shows how to generate RSA key.

```
Switch# crypto key generate rsa
Choose the size of the key modulus in the range of 1024 or 2048. The process may take
a few minutes.
Number of bits in the modulus [1024]:

Generating RSA key...Done.


Switch#
```

61-2 crypto key zeroize

This command is used to delete the RSA or DSA key pair.

crypto key zeroize {rsa | dsa}

Parameters

rsa	Specifies to delete the RSA key pair.
dsa	Specifies to delete the DSA key pair.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command is used to delete the RSA or DSA key pair.

Example

This example shows how to delete RSA key.

```
Switch# crypto key zeroize rsa
Do you really want to remove the key? (y/n) [n] y
Switch#
```

61-3 ip ssh timeout

This command is used to configure the SSH control parameters on the Switch. Use the no form of this command to revert to the default setting.

ip ssh {timeout *SECONDS* **| authentication-retries** *NUMBER***}**

no ip ssh {timeout | authentication-retries}

Parameters

timeout *SECONDS*	Specifies the time interval that the Switch waits for the SSH client to respond during the SSH negotiation phase The range is from 30 to 600.
authentication-retries *NUMBER*	Specifies the number of authentication retry attempts. The session is closed if all the attempts fail. The range is from 1 to 32.

Default

By default, the timeout value is 120 seconds.

By default, the authentication retries is 3.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the SSH server parameters on the Switch. The authentication retry number specifies the maximum number of retry attempts before the session is closed.

Example

This example shows how to configure SSH timeout to 180 seconds.

```
Switch# configure terminal
Switch(config)# ip ssh timeout 180
Switch(config)#
```

61-4 ip ssh server

This command is used to enable the SSH server function. Use the no form of this command to disable the SSH server function.

ip ssh server

no ip ssh server

Parameters

None.

Default

By default, the SSH server is disabled. (DGS-1250-28XP default Enable)

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable the SSH server function.

Example

This example shows how to enable SSH server.

```
Switch# configure terminal
Switch(config)# ip ssh server
Switch(config)#
```

61-5 ip ssh service-port

This command is used to specify the service port for SSH. Use the no form of this command to revert to the default setting.

ip ssh service-port *TCP-PORT*

no ip ssh service-port

Parameters

TCP-PORT	Specifies the TCP port number. TCP ports are numbered between 1 and 65535. The “well-known” TCP port for the SSH protocol is 22.

Default

By default, the TCP-PORT is 22.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command configures the TCP port number for SSH server.

Example

This example shows how to configure SSH service port to 2400.

```
Switch# configure terminal
Switch(config)# ip ssh service-port 2400
Switch(config)#
```

61-6 show crypto key mypubkey

This command is used to display the RSA or DSA public key pairs.

show crypto key mypubkey {rsa | dsa}

Parameters

rsa	Specifies to display RSA public key.
dsa	Specifies to display the DSA public key.

Default

None.

Command Mode

Privileged EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to display the RSA or DSA public key pairs.

Example

This example shows how to display RSA public key.

```
Switch# show crypto key mypubkey rsa

Key pair was generated at: 01:20:11,2021-01-01
Key Size: 1024 bits
Key Data:
AAAAB3Nz aC1yc2EA AAADAQAB AAAAgQC4 zriByG80 ik+rp2Bj vPmQiosQ e1vRt08c
yarhE4A1 EafTsg+R qH90mxZH F1bmfcqd lTnFXV1m PRfgWt4M Q/SySe1N 7ScDcsFZ
SNLLyOaU sRLonwvC fq8VQVYy UD0PoolO huHkLrc9 wpZjjmNL o/kTbpzF xj9N+miz
c47A+IPG Pw==
Switch#
```

61-7 ip ssh server algorithm encryption

This command is used to set SSH algorithms encryption used for authentication encryption

ip ssh server algorithm encryption ([aes128-cbc] [aes192-cbc] [aes256-cbc] [3des-cbc] [aes128-ctr] [aes192-ctr] [aes256-ctr] [aes128-gcm@openssh.com] [aes256-gcm@openssh.com] [chacha20-poly1305@openssh.com])

no ip ssh server algorithm encryption {aes128-cbc | aes192-cbc | aes256-cbc | 3des-cbc | aes128-ctr | aes192-ctr | aes256-ctr | aes128-gcm@openssh.com | aes256-gcm@openssh.com | chacha20-poly1305@openssh.com}

Parameters

AES128-CBC	The Advanced Encryption Standard AES128 encryption algorithm with Cipher Block Chaining.
AES192-CBC	The Advanced Encryption Standard AES192 encryption algorithm with Cipher Block Chaining.
AES256-CBC	The Advanced Encryption Standard AES-256 encryption algorithm with Cipher Block Chaining.
3DES-CBC	The Triple Data Encryption Standard encryption algorithm with Cipher Block Chaining.
AES128-CTR	The Advanced Encryption Standard AES-128 encryption algorithm with CounTeR.
AES192-CTR	The Advanced Encryption Standard AES-192 encryption algorithm with CounTeR.
AES256-CTR	The Advanced Encryption Standard AES-256 encryption algorithm with CounTeR.
AES128-gcm@openssh.com	The Advanced Encryption Standard AES-128 encryption algorithm with AES-GCM mode.
AES256-gcm@openssh.com	The Advanced Encryption Standard AES-256 encryption algorithm with AES-GCM mode.
chacha20-poly1305@openssh.com	The construction used is based on that proposed for TLS , but differs in the layout of data passed to the MAC and in the addition of encryption of the packet lengths

Default

AES128-CTR/ AES192-CTR/ AES256-CTR/ aes128-gcm@openssh.com/ aes256-gcm@openssh.com/ chacha20-poly1305@openssh.com default enable.

Command Mode

Privileged EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to set SSH algorithms used for authentication encryption.

Example

This example to set SSH algorithms aes128-cbc

```
Switch# configure terminal
Switch(config)# ip ssh server algorithm encryption aes128-cbc
Switch(config)#
```

61-8 ip ssh server algorithm mac

This command is used to set SSH Data Integrity Algorithm used for SSH authentication.

ip ssh server algorithm mac ([hmac-sha1] [hmac-sha1-96] [hmac-md5] [hmac-md5-96] [hmac-sha2-256] [hmac-sha1-etm@openssh.com])

no ip ssh server algorithm mac {hmac-sha1 | hmac-sha1-96 | hmac-md5 | hmac-md5-96 | hmac-sha2-256 | hmac-sha1-etm@openssh.com}

Parameters

Hmac-sha1	The HMAC (Hash for Message Authentication Code) mechanism utilizing the Secure Hash algorithm.
Hmac-sha1-96	The HMAC (Hash for Message Authentication Code) mechanism utilizing the Secure Hash algorithm. SHA1-96 is the same thing as SHA1, both compute a 160 bit hash, it's just that SHA1-96 truncates and embeds a 96-bit hash value in the packet. SHA1-96 was really only an option designed to fix some issues with IPsec AH.
Hmac-md5	The HMAC (Hash for Message Authentication Code) mechanism utilizing the MD5 Message Digest encryption algorithm.
Hmac-md5-96	The HMAC (Hash for Message Authentication Code) mechanism utilizing the MD5 Message Digest encryption algorithm, Based on MD5, this one-way encryption uses a 96–bit hash a 16 octet key length.
Hmac-sha2-256	The HMAC (Hash for Message Authentication Code) mechanism utilizing the Secure Hash algorithm-2. 192 bits for SHA2-256
Hmac-sha1-etm@openssh.com	T the hash-based message authentication code (HMAC) that is used by OpenSSH.

Default

HMAC-SHA1, HMAC-SHA2-256 and hmac-sha1-etm@openssh.com default enable.

Command Mode

Privileged EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to set SSH Data Integrity Algorithm used for authentication encryption.

Example

This example to set SSH algorithms aes128-cbc

```
Switch# configure terminal
Switch(config)# ip ssh server algorithm mac hmac-sha1
Switch(config)#
```

61-9 ip ssh server algorithm key-exchange

This command is used to set SSH key-exchange used for SSH authentication.

ip ssh server algorithm key-exchange ([diffie-hellman-group1-sha1] [diffie-hellman-group14-sha1] [diffie-hellman-group14-sha256] [diffie-hellman-group16-sha512] [diffie-hellman-group18-sha512] [diffie-hellman-group-exchange-sha1] [diffie-hellman-group-exchange-sha256] [ecdh-sha2-nistp256] [ecdh-sha2-nistp384] [ecdh-sha2-nistp521] [curve25519-sha256] [curve25519-sha256@libssh.org])

no ip ssh server algorithm key-exchange {diffie-hellman-group1-sha1 | diffie-hellman-group14-sha1 | diffie-hellman-group14-sha256 | diffie-hellman-group16-sha512 | diffie-hellman-group18-sha512 | diffie-hellman-group-exchange-sha1 | diffie-hellman-group-exchange-sha256 | ecdh-sha2-nistp256 | ecdh-sha2-nistp384 | ecdh-sha2-nistp521 | curve25519-sha256 | curve25519-sha256@libssh.org}

Parameters

diffie-hellman-group1-sha1	One of key exchange algorithm types represents an algorithm that is used to distribute a shared key in a way that prevents outside interference.
diffie-hellman-group14-sha1	One of key exchange algorithm types represents an algorithm that is used to distribute a shared key in a way that prevents outside interference.
diffie-hellman-group14-sha256	One of key exchange algorithm types represents an algorithm that is used to distribute a shared key in a way that prevents outside interference.
diffie-hellman-group16-sha512	One of key exchange algorithm types represents an algorithm that is used to distribute a shared key in a way that prevents outside interference.
diffie-hellman-group18-sha512	One of key exchange algorithm types represents an algorithm that is used to distribute a shared key in a way that prevents outside interference.
diffie-hellman-group-exchange-sha1	One of key exchange algorithm types represents an algorithm that is used to distribute a shared key in a way that prevents outside interference.
diffie-hellman-group-exchange-sha256	One of key exchange algorithm types represents an algorithm that is used to distribute a shared key in a way that prevents outside interference.
ecdh-sha2-nistp256	One of key exchange algorithm types represents an algorithm that is used to distribute a shared key in a way that prevents

	outside interference.
ecdh-sha2-nistp384	One of key exchange algorithm types represents an algorithm that is used to distribute a shared key in a way that prevents outside interference.
ecdh-sha2-nistp521	One of key exchange algorithm types represents an algorithm that is used to distribute a shared key in a way that prevents outside interference.
curve25519-sha256	One of key exchange algorithm types represents an algorithm that is used to distribute a shared key in a way that prevents outside interference.
curve25519-sha256@libssh.org	One of key exchange algorithm types represents an algorithm that is used to distribute a shared key in a way that prevents outside interference.

Default

diffie-hellman-group14-sha1, diffie-hellman-group14-sha256, diffie-hellman-group16-sha512, diffie-hellman-group18-sha512, diffie-hellman-group-exchange-sha256, ecdh-sha2-nistp256, ecdh-sha2-nistp384, ecdh-sha2-nistp521, curve25519-sha256 and curve25519-sha256@libssh.org default enable.

Command Mode

Privileged EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to set SSH Key Exchange Algorithm used for authentication encryption.

Example

This example to set SSH Key Exchange algorithms diffie-hellman-group1-sha1

```
Switch# configure terminal
Switch(config)# ip ssh server algorithm key-exchange diffie-hellman-group1-sha1
Switch(config)#
```

61-10 ip ssh server algorithm hostkey

This command is used to set SSH Algorithm hostkey used for SSH authentication.

ip ssh server algorithm hostkey ([ssh-dss] [ssh-rsa])

no ip ssh server algorithm hostkey {ssh-dss | ssh-rsa}

Parameters

Ssh-dss	The HMAC (Hash for Message Authentication Code)

	mechanism utilizing the Digital Signature Algorithm encryption.
Ssh-rsa	The HMAC (Hash for Message Authentication Code) mechanism utilizing the RSA encryption algorithm.

Default

SSH-RSA default enable.

Command Mode

Privileged EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to set SSH server algorithm hostkey used for authentication encryption.

Example

This example to set SSH server algorithm hostkey ssh-dss

```
Switch# configure terminal
Switch(config)# ip ssh server algorithm hostkey ssh-dss
Switch(config)#
```

61-11 show ssh

This command is used to display the status of SSH server connections.

show ssh

Parameters

SID	A unique number that identifies the SSH session..
Ver	Indicates the SSH version of this session.
Cipher	The cryptographic / Hashed Message Authentication Code (HMAC) algorithm that the SSH client is using
Userid	The login username of the session
Client IP Address	The client IP address for this established SSH session

Default

None.

Command Mode

User / Privileged EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the SSH connections' status on the Switch..

Example

This example shows how to display current SSH session.

```
Switch# show ssh

SID   Ver.  Cipher                        Userid     Client IP Address
---   ----  ------------------------      ---------  -----------------
0     V2    aes256-ctr/hmac-sha1          test       192.168.0.113

Total Entries: 1
```

61-12 show ip ssh

This command is used to display the SSH server configuration.

show ip ssh

Parameters

None.

Default

None.

Command Mode

User / Privileged EXEC Mode.

Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the SSH server status on the Switch..

Example

This example shows how to display SSH server status.

```
Switch(config)# show ip ssh
IP SSH server            :Disabled
IP SSH service port      :22
SSH server mode          :V2
Authentication timeout   :120 secs
Authentication retries   :3 times
Encryption Algorithms    :chacha20-poly1305@openssh.com  aes192-ctr
                          aes256-gcm@openssh.com  aes256-ctr  aes128-cbc
                          aes128-gcm@openssh.com  aes128-ctr
MAC Algorithms           :hmac-sha1  hmac-sha1-etm@openssh.com  hmac-sha2-256
Hostkey Algorithms       :ssh-dss  ssh-rsa
Key Exchange Algorithms  :curve25519-sha256  diffie-hellman-group1-sha1
                          ecdh-sha2-nistp521  diffie-hellman-group16-sha512
                          diffie-hellman-group14-sha256
                          curve25519-sha256@libssh.org  ecdh-sha2-nistp384
                          diffie-hellman-group14-sha1
                          diffie-hellman-group-exchange-sha256
```

61-13 ssh user authentication-method

This command is used to configure the SSH authentication method for a user account. Use the no form of this command to revert to the default settings.

ssh user USERNAME authentication-method {password | publickey | hostbased host-name *HOSTNAME* **[***IP-ADDRESS* **|** *IPV6-ADDRESS***]}**

no ssh user USERNAME authentication-method

Parameters

USERNAME	Specifies the username to configure the authentication type. The user must be an existing local account. The length of the username is limited to a maximum of 32 characters.
password	Specifies to use the password authentication method for this user account. This is the default authentication method..
publickey	Specifies to use the public key authentication method for this user account.
hostbased host-name *HOSTNAME*	Specifies the allowed host name for host-based authentication. During authentication phase, the client's hostname will be checked. The range is from 1 to 255.
IP-ADDRESS	(Optional) Specifies whether to additionally check the IP address of the client for host-based authentication. If not specified, only the host name will be checked
IPV6-ADDRESS	(Optional) Specifies whether to additionally check the IPv6 address of the client for host-based authentication. If not specified, only the host name will be checked.

.

Default

Default authentication mode is password..

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

The administrator can use this command to specify authentication method for a user. The user name must be a user created by the username command. By default, the authentication method is password. The system will prompt the user to input the password. To authenticate a user via SSH public key authentication, copy the user's public key file to file system. When the user tries to log into the Switch via an SSH client (using the SSH public key method), the SSH client will automatically transmit the public key and signature with the private key to the Switch. If both the public key and signature are correct, the user is authenticated and login into the Switch is allowed.

Example

This example shows how to configure user "test" as SSH login account via password authentication mode.

```
Switch(config)# username test privilege 15 password 1234
Switch(config)# ssh user test authentication-method password
Switch(config)#
```

62. Switch Port Commands

62-1 duplex

This command is used to configure the physical port interface's duplex setting. Use the **no** form of command to revert to the default setting.

duplex {full | auto}

no duplex

Parameters

full	Specifies that the port operates in the full-duplex mode.
auto	Specifies that the port's duplex mode will be determined by auto-negotiation.

Default

The duplex mode will be set as **auto** for 1000BASE-T interfaces.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Auto-negotiation will be enabled if either the speed parameter is set to auto or the duplex parameter is set to auto. If the speed parameter is set to auto and the duplex parameter is set to the fixed mode, only the speed will be negotiated. The advertised capability will be configured to the duplex mode combined with all the possible speeds. If the speed is to set to a fixed speed and duplex is set to auto, only the duplex mode is negotiated. The advertised capability will be both full and half-duplex mode combined with the configured speeds.

Example

This example shows how to configure the interface ethernet1/0/1 to operate at a forced speed of 100Mbits and specifies that the duplex mode should be set to auto-negotiated.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# speed 100
Switch(config-if)# duplex auto
Switch(config-if)#
```

62-2 flowcontrol

This command is used to configure the flow control capability of the port interface. Use the **no** form of command to revert to the default setting.

flowcontrol {on | off}

no flowcontrol

Parameters

on	Specifies to enable a port to send PAUSE frames or process PAUSE frames from remote ports.
off	Specifies to disable the ability for a port to send or receive PAUSE frames.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command can only assure that the flow control capability has been configured in the Switch software and not guarantee the actual hardware operation. The actual hardware operation may be different to the settings that have been configured on the Switch because the flow control capability is determined by both the local port/device and the device connected at the other end of the link, not just by the local device.

If the speed is set to the forced mode, the final flow control setting will be determined by the configured flow control setting. If the speed is set to the auto mode, the final flow control setting will be based on the negotiated result between the local side setting and the partner side setting. The configured flow control setting here is the local side setting.

Example

This example shows how to enable the flow control on interface ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# flowcontrol on
Switch(config-if)#
```

62-3 speed

This command is used to configure the physical port interface's speed settings. Use the **no** form of command to revert to the default setting.

speed { 100 | 1000 | 10giga | 2.5giga |5giga | auto }

speed auto { 100 | 1000 | 10giga | 2.5giga |5giga }

no speed

Parameters

100	Specifies to force the speed to 100 Mbps.
1000	Specifies that for copper ports, it forces the speed to 1000 Mbps and the user must manually set that the port operates as master or slave. Specifies that for fiber ports (1000BASE-SX/LX), the port will

	disable the auto-negotiation.
10giga	Specifies to force the speed to 10Gbps.
2.5giga	Specifies to force the speed to 2.5Gbps.
5giga	Specifies to force the speed to 5Gbps.
auto	Specifies that for copper ports, it specifies to determine the speed and flow control via auto-negotiation with its link partner. Specifies that for fiber ports (1000BASE-SX/LX), it enables the auto-negotiation option. Auto-negotiation will start to negotiate the clock and flow control with its link partner.

Default

The speed will be set as **auto** for 1000BASE-T interfaces.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If the specified speed is not supported by the hardware, error messages will be returned.

Speed refers to force mode without Auto-negotiation enabled.

Speed auto refers to Auto negotiation mode with specified speed adversitsed.

If speed is set to 1000 Mbps, or 10 Gbps, then the duplex mode cannot be set to half-duplex. If the duplex mode is set to half-duplex, then the speed cannot be set to 1000 Mbps, or 10 Gbps.

Auto-negotiation will be enabled if either the speed parameter is set to **auto**, or the duplex parameter is set to **auto**. If the speed parameter is set to auto, and the duplex parameter is set to the fixed mode. Only the speed will be negotiated. The advertised capability will be configured to the duplex mode combined with all the possible speeds. If the speed is to set to a fixed speed and duplex is set to auto, only the duplex mode is negotiated. The advertised capability will be both full and half-duplex mode combined with the configured speeds.

For 10GBASE-R connections, if auto-negotiation is enabled, the system will automatically configure the speed (1000M or 10G) according to the type of SFP/SFP+.

Example

This example shows how to configure ethernet1/0/1 to only auto-negotiate to 10 or 100 Mbps.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# speed auto 100,1000
Switch(config-if)#
```

62-4 auto downgrade

This command is used to configure the physical port interface's auto downgrade mechanism. Use the **no** form of command to revert to the default setting.

auto downgrade enable

auto downgrade disable

Parameters

None.

Default

The default is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The feature can automatically downgrading advertised speed in case a link cannot be established at the available speed.

Example

This example shows how to configure ethernet1/0/1 to eneable auto downgrade.

```
Switch# configure terminal
Switch(config)# interface ethernet 1/0/1
Switch(config-if)# auto downgrade enable
Switch(config-if)#
```

63. System File Management Commands

63-1 boot image

This command is used to specify the file that will be used as the image file for the next boot.

boot image ***IMAGE-ID***

Parameters

IMAGE-ID	Specifies the image ID 1 or 2.

Default

By default, there is an image file as the boot image.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

When using the **boot image** command, the associated specified boot image file will be the startup boot image file for the next reboot. Use this command to assign a file as the next-boot image file. The system will check the model and checksum to determine whether the file is a valid image file.

The purpose of the **check** parameter is for checking the file information to let the user understand whether the specified file is suitable to be a boot image or not. The setting of the **boot image** command will immediately be stored in the NVRAM, which is a space separated from the start-up configuration.

The backup image is decided automatically and is the newest valid image other than the boot-up one.

Example

This example shows how to specify that the Switch should use the image file named ‘switch-image1.had’ as the boot image file for the next startup.

```
Switch# configure terminal
Switch(config)# boot imageid 1
Switch(config)#
```

63-2 reset system

This command is used to reset the system, clear the system’s configuration, then save and reboot the Switch.

reset system

Parameters

None.

Default

None.

Command Mode

Privilege EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to clear the system's configuration, including stacking information. The configuration data will revert to the default settings and then save it to the start-up configuration file and then reboot switch. Before using this command, save a backup of the configuration using the **copy** command or upload the configuration profile to the TFTP server.

Example

This example shows how to reset the system to the factory default settings.

```
Switch# reset system

This command will clear all of system configuration as factory
default setting including IP parameters and stacking information.
Clear system configuration, save, reboot? (y/n) [n]  y

Saving configurations and logs to NV-RAM...... Done.
Please wait, the switch is rebooting...
```

63-3 copy

This command is used to copy a file to another file.

copy imageid *IMAGE-ID* *tftp://LOCATION/DESTINATION-URL*

copy log *tftp://LOCATION/DESTINATION-URL*

copy running-config {startup-config| *tftp://LOCATION/DESTINATION-URL* **| config1| config2}**

copy startup-config *tftp://LOCATION/DESTINATION-URL*

copy *tftp://LOCATION/SOURCE-URL*

copy *tftp://LOCATION/SOURCE-URL* **startup-config**

Parameters

LOCATION	(Optional) Specifies the IPv4 address or IPv6 address of the TFTP server.
imageid	The imageid used for the backup
IMAGE-ID	Specifies iamge ID 1 or 2
tftp://LOCATION/DESTINATION-URL	A file name with tftp server path tftp://location/filename Command "copy tftp://LOCATION/SOURCE-URL" is used to upgrade image.
log	Backup current log file
running-config	Backup current system running confirgration

startup-config	Backup boot-up configuration
config1	Save to config1
config2	Save to config2

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to copy a file to another file in the file system. Use this command to download or upload the configuration file or the image file. Use this command to upload the system log to the TFTP server. To upload the running configuration or save the running configuration to the startup configuration, specify **running-config** as the source. To save the running configuration to the startup configuration, specify **startup-config** as the destination.

As the destination is the startup configuration, the source file is directly copied to the file specified in the **boot startup-config** command. Thus the original startup configuration file will be overwritten.

To apply a configuration file to the running configuration, specify **running-config** as the destination for the **copy** command and the configuration file will be executed immediately by using the increment method. That means that the specified configuration will merge with the current running configuration. The running configuration will not be cleared before applying of the specified configuration.

As the specified source is the system log and the specified destination is a URL, the current system log will be copied to the specified URL.

To represent a file in the remote TFTP server, the URL must be prefixed with “tftp: //”.

To download the firmware image, the user should use the **copy tftp: //** command to download the file from the TFTP server to a file in the file system. Then, use the **boot imageid** command to specify it as the boot image file.

Example

This example shows how to upload the running configuration or startup configuration to the TFTP server for storage.

```
Switch# copy running-config tftp://10.1.1.254/cfg.bin
Address of remote host [10.1.1.254]?
Destination filename [cfg.bin]?
 Accessing tftp://10.1.1.254/cfg.bin...
 Transmission start...
 Transmission finished.
 Configuration backup successful.
Switch#

Switch# copy startup-config tftp://10.1.1.254/startupcfg.bin
 Accessing tftp://10.1.1.254/startupcfg.bin
 Transmission start...
 Transmission finished.
 Configuration backup successful.
Switch#
```

This example shows how to save the system’s running configuration into the FLASH memory and uses itas the next boot configuration.

```
Switch# copy running-config startup-config

Destination filename startup-config? [y/n]:  y

Saving all configurations to NV-RAM..... Done.

Switch#

Switch# copy running-config config1
Destination filename startup-config? [y/n]: y

Saving all configurations to NV-RAM..... Done.

Switch# copy running-config config2
Destination filename startup-config? [y/n]: y
Saving all configurations to NV-RAM..... Done.
Switch#
```

This example shows how to download an image file from the TFTP server to inactive image.

```
Switch# copy tftp://10.1.1.254/image2
TFTP Firmware Upgrade processing...................Do not power off!!
Firmware upgrade successfully!
Switch#
```

This example shows how to upload an image file to the TFTP server.

```
Switch# copy imageid 2 tftp://10.1.1.254/image2
Transfering firmware...................   100%
Firmware Backup successfully!
Switch#
```

This example shows how to upload the log to the TFTP server for storage.

```
Switch# copy log tftp://10.1.1.254/log.txt
 Accessing tftp://10.1.1.254/log.txt
 Transmission start...
 Transmission finished.
 Syslog backup successful.
Switch#
```

63-4 show boot

This command is used to display the boot configuration file and the boot image setting.

show boot

Parameters

UNIT-ID	(Optional) Specifies the unit to be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display current boot configuration file and current boot image.

Example

This example shows how to display system current boot information.

```
Switch# show boot

Boot image: image1
Boot config: config1
```

63-5 show running-config

The show running-config command is one of the most essential tools for network administrators. It displays the current active configuration stored in the switch's RAM. Any changes made that have not been saved to the "startup-config" will be visible here.

show running-config [all] [interface INTERFACE-ID | port-channel <1-8> | vlan VLAN-ID] [{include | exclude | begin} <string(32)> [<string(32)> [<string(32)>]]]

Parameters

Interface INTERFACE-ID	Displays the configuration for a specific physical port (e.g., Ethernet 1/0/1).
Port-channel <1-8>	Shows the configuration for a specific logical aggregation group (EtherChannel).
Vlan VLAN-ID	Show VLAN ID Configuration settings. (Range: 1~4094)
All	Displays default values and hidden system configurations

The section in curly brackets {include | exclude | begin} allows you to filter the text output using strings (keywords):

- **include**: Only displays lines that contain the specified string (e.g., include description).
- **exclude**: Hides lines containing the specified string (useful for filtering out "noise").
- **begin**: Starts the output display from the first occurrence of the specified string and shows everything following it.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command displays the current running system configuration.

Example

This example shows how to display the content of the running configuration file.

```
Switch# show running-config all
Generate running-config..........done.

Current configuration : 81485 bytes

!-----------------------------------------------------------------------
! DGS-1250-28XP Gigabit Ethernet PoE Smart Managed Switch Configuration
!
!                       Firmware: Build V1.00.008
!         Copyright(C) 2025 D-Link Corporation. All rights reserved.
!-----------------------------------------------------------------------
command-start

!
lacp system-priority 32768
port-channel load-balance src-mac
no mvlan ipv4 enable
no mvlan ipv6 enable
no mvlan forward-unmatched
no mvlan ignore-vlan
interface vlan 1
!
ddp
ddp report-timer never
no loopback-detection
CTRL+C ESC q Quit SPACE n Next PageENTER Next Entry a All
```

63-6 do show running-config

The do show running-config command is a powerful variation of the standard configuration viewing command. The prefix do allows an administrator to execute "Executive Mode" (Privileged EXEC) commands while still remaining inside "Configuration Mode."

do show running-config [all] [interface INTERFACE-ID | port-channel <1-8> | vlan VLAN-ID] [{include | exclude | begin} <string(32)> [<string(32)> [<string(32)>]]]

Parameters

Interface INTERFACE-ID	Displays the configuration for a specific physical port (e.g., Ethernet 1/0/1).
Port-channel <1-8>	Shows the configuration for a specific logical aggregation group (EtherChannel).
Vlan VLAN-ID	Show VLAN ID Configuration settings. (Range: 1~4094)
All	Displays default values and hidden system configurations

The section in curly brackets {include | exclude | begin} allows you to filter the text output using strings (keywords):

- **include**: Only displays lines that contain the specified string (e.g., include description).
- **exclude**: Hides lines containing the specified string (useful for filtering out "noise").
- **begin**: Starts the output display from the first occurrence of the specified string and shows everything following it.

Default

None.

Command Mode

Configuration Mode / Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command displays the current running system configuration.

Example

This example shows how to display the content of the running configuration in configuration mode.

```
Switch(config)# do show running-config all
Generate running-config..........done.

Current configuration : 81485 bytes

!----------------------------------------------------------------------------
! DGS-1250-28XP Gigabit Ethernet PoE Smart Managed Switch Configuration
!
!                        Firmware: Build V1.00.008
!         Copyright(C) 2025 D-Link Corporation. All rights reserved.
!----------------------------------------------------------------------------
command-start

!
lacp system-priority 32768
port-channel load-balance src-mac
no mvlan ipv4 enable
no mvlan ipv6 enable
no mvlan forward-unmatched
no mvlan ignore-vlan
interface vlan 1
!
ddp
ddp report-timer never
no loopback-detection
CTRL+C ESC q Quit SPACE n Next PageENTER Next Entry a All
```

63-7 show startup-config

This command is used to display the content of the startup configuration file.

show startup-config

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command displays the configuration settings that the system will be initialized with.

Example

This example shows how to display the content of the startup configuration file.

```
Switch# show startup-config
!------------------------------------------------------------------------
! DGS-1250-28XP Multi-Gigabit Ethernet PoE Smart Managed Switch Configuration
!
!                        Firmware: Build V1.00.004
!         Copyright(C) 2022 D-Link Corporation. All rights reserved.
!------------------------------------------------------------------------
!
interface vlan 1
 ip address dhcp
!
interface ethernet 1/0/1
 lldp tlv-select port-description
 lldp tlv-select system-name
 lldp tlv-select system-description
 lldp tlv-select system-capabilities
 lldp med-tlv-select capabilities
!
interface ethernet 1/0/2
 lldp tlv-select port-description
 lldp tlv-select system-name
 lldp tlv-select system-description
 lldp tlv-select system-capabilities
 lldp med-tlv-select capabilities
!
CTRL+C ESC q Quit SPACE n Next PageENTER Next Entry a All
```

63-8 boot startup-config

This command is used to set the startup configuration file.

boot startup-config {config1 | config2}

Parameters

config1	The first configuration
config2	The second configuration

.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command is used to set the startup configuration file.

Example

This example shows how to set the startup configuration file.

```
Switch(config)# boot startup-config config1
Switch(config)#
```

63-9 reboot

This command is used to reboot the system.

reboot [force_agree]

Parameters

force_agree	Forcibly reboot without prompting for user input

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command is used to reboot the system.

Example

This example shows how to reboot the system.

```
Switch# reboot force_agree
Switch#
```

64. System Log Commands

64-1 clear logging

This command is used to delete log messages in the system logging buffer.

clear logging

Parameters

None.

Default

None.

Command Mode

Privilege EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command deletes all the log messages in the system logging buffer.

Example

This example shows how to delete all the log messages in the logging buffer.

```
Switch# clear logging

Clear logging? (y/n) [n] y

Switch#
```

64-2 logging buffered

This command is used to enable logging of system messages to the local message buffer. Use the **no** form of this command todisable the logging of messages to the local message buffer. Use the **default logging buffered** command to revert to default setting.

logging buffered [severity {*SEVERITY-LEVEL* **|** *SEVERITY-NAME***}] [write-delay {***SECONDS* **| infinite}]**

no logging buffered

default logging buffered

Parameters

SEVERITY-LEVEL	(Optional) Specifies the severity level of system messages. The messages at that severity level or a more severe level will be logged to message buffers. This value must be between 0 and 7. 0 is the most severe level. If not specified, the default severity level is warnings (4).

SEVERITY-NAME	(Optional)Specifies the severity level of system messages by one of the following names: emergencies, alerts, critical, errors, warnings, notifications, informational, debugging.
write-delay *SECONDS*	(Optional) Specifies to disable periodical writing of the logging buffer to the FLASH.

Default

By default, the severity level is warning (4).

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The system messages can be logged to the local message buffer or to other destinations. Messages must enter the local message buffer first before it can be further dispatched to other destinations.

This command does not take effect if the specified discriminator does not exist. Thus the default setting of the command is applied.

Specify the severity level of the messages in order to restrict the system messages that are logged in the logging buffer (thus reducing the number of messages logged). The messages which are at the specified severity level or higher will be logged to the message buffer. When the logging buffer is full, the oldest log entries will be removed to create the space needed for the new messages that are logged.

The content of the logging buffer will be saved to the FLASH memory periodically such that the message can be restored on reboot. The interval for periodically writing the logging buffer to FLASH can be specified. The content of the logged messages in the FLASH will be reloaded into the logging buffer on reboot.

Example

This example shows how to enable the logging of messages to the logging buffer and restrict logging of messages with a security level of errors or higher.

```
Switch# configure terminal
Switch(config)#logging buffered severity errors
Switch(config)#
```

64-3 logging server

This command is used to create a SYSLOG server host to log the system messages or debug output. Use the **no** form of this command to remove a SYSLOG server host.

logging server {*IP-ADDRESS* **|** *IPV6-ADDRESS***} [severity {***SEVERITY-LEVEL* **|** *SEVERITY-NAME***}] [facility** *FACILITY-TYPE***] [port** *UDP-PORT***]**

no logging server {*IP-ADDRESS* **|** *IPV6-ADDRESS***}**

Parameters

IP-ADDRESS	Specifies the IP address of the SYSLOG server host.
IPV6-ADDRESS	Specifies the IPv6 address of the log server host.
SEVERITY-LEVEL	(Optional) Specifies the severity level of system messages. The messages at that severity level or a more severe level will be

	logged to the log server. This value must be between 0 and 7. 0 is the most severe level. If not specified, the default severity level is warnings (4).
SEVERITY-NAME	(Optional)Specifies the severity level of system messages by one of the following names: emergencies, alerts, critical, errors, warnings, notifications, informational, debugging.
FACILITY-TYPE	(Optional)Specifies the facility type as a decimal value from 0 to 23. If not specified, the default facility is Kernel messages(0).
port *UDP-PORT*	(Optional) Specifies the UDP port number to be used for the SYSLOG server. Valid values are 514 (the IANA well-known port) or any value from 1024 to 65535. If not specified, the default UDP port is 514.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

System messages can be logged to the local message buffer, local console or remote hosts. Messages must enter the local message buffer first before it can be further dispatched to logging server.

The following is a table for the facility.

Numerical code	Facility
0	Kernel messages.
1	User-level messages.
2	Mail system.
3	System daemons.
4	Security/authorization messages.
5	Messages generated internally by the SYSLOG.
6	Line printer sub-system.
7	Network news sub-system.
8	UUCP sub-system.
9	Clock daemon.
10	Security/authorization messages.
11	FTP daemon.
12	NTP subsystem.
13	Log audit.
14	Log alert.
15	Clock daemon (note 2).
16	Local use 0 (local0).
17	Local use 1 (local1).
18	Local use 2 (local2).

19	Local use 3 (local3).
20	Local use 4 (local4).
21	Local use 5 (local5).
22	Local use 6 (local6).
23	Local use 7 (local7).

Example

This example shows how to enable the logging of system messages with a severity higher than warnings to the remote host 20.3.3.3.

```
Switch# configure terminal
Switch(config)#logging server  20.3.3.3 severity warnings
Switch(config)#
```

64-4 logging source-interface

This command is used to specify the interface whose IP address will be used as the source address for sending the SYSLOG packet. Use the **no** form of this command to revert to the default setting.

logging source-interface *INTERFACE-ID*

no logging source-interface

Parameters

INTERFACE-ID	Specifies the interface whose IP address will be used as the source address of the SYSLOG packet.

Default

By default, the IP address of the closest interface will be used.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the interface whose IP address will be used as the source address of the SYSLOG packet.

Example

This example shows how to configure VLAN100 as the source interface for SYSLOG packets.

```
Switch# configure terminal
Switch(config)#logging source-interface vlan 100
Switch(config)#
```

64-5 show logging

This command is used to display the system messages logged in the local message buffer.

show logging [all | [*REF-SEQ*] [increase *NN* | decrease *NN*]]

show logging info

Parameters

all	Specifies to display all log entries starting from the latest message..
REF-SEQ	Specifies to start the display from the reference sequence number.
increase *NN*	Specifies the number of messages that occurred after the specified reference sequence number. If the reference index is not specified, it starts from the eldest message in the buffer.
decrease *NN*	Specifies the number of messages that occurred prior to the specified reference sequence number. If the reference index is not specified, the message display starts from the last message written in the buffer.
info	Specifies to display the system log global setting.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the system messages logged in the local message buffer.

Each message logged in the message buffer is associated with a sequence number. As a message is logged, a sequence number starting from 1 is allocated. The sequence number will roll back to 1 when it reaches 100000.

When the user specifies to display a number of messages following the reference sequence number, the oldest messages are displayed prior to the newer messages. When the user specifies to display a number of messages prior to the reference sequence number, the newer messages are displayed prior to the later messages.

If the command is issued without options, the system will display up to 200 entries starting from the latest message.

Example

This example shows how to display the messages in the local message buffer.

```
switch# show logging

Total number of buffered messages: 2

#2 2013-08-02 16:37:36 INFO(6) Logout through Console (Username: Anonymous)
#1 2013-08-02 16:35:54 INFO(6) Port ethernet1/0/1 link up, 1000Mbps FULL duplex

switch#
```

64-6 command logging

This command is used to log the command executed. Use the **no** form of this command to turn off command logging feature.

command logging enable

no command logging enable

Parameters

None.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

The feature is used to logging the commands executed.

Example

This example shows how to logging the commands.

```
Switch(config)# command logging enable
```

65. Time and SNTP Commands

65-1 clock set

This command is used to manually set the system's clock.

clock set *HH:MM:SS DAY MONTH YEAR*

Parameters

HH:MM:SS	Specifies the current time in hours (24-hour format), minutes and seconds.
DAY	Specifies the current day (by date) in the month.
MONTH	Specifies the current month (by name, January, Jan, February, Feb, and so on).
YEAR	Specifies the current year (no abbreviation).

Default

None.

Command Mode

Privilege EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Generally, if the system is synchronized by a valid outside timing mechanism, such as SNTP, there is mp need to set the software clock. Use this command if no other time sources are available. The time specified in this command is assumed to be in the time zone specified by the configuration of the **clock timezone** command. The clock configured by this command will be applied to RTC if it is available. The configured clock will not be stored in the configuration file.

If the clock is manually set and the SNTP server is configured, the system will still try to sync the clock with the server. If the clock is manually set, but a new clock time is obtained by the SNTP server, the clock will be replaced by the new synced clock.

Example

This example shows how to manually set the software clock to 6:00 p.m. on Jul4, 2014.

```
Switch# clock set 18:00:00 4 Jul 2014
Switch#
```

65-2 clock summer-time

This command is used to configure the system to automatically switch to summer time (daylight saving time). Use the **no** form of this command to configure the Switch to not automatically switch over to summer time.

clock summer-time recurring *WEEK DAY MONTH HH:MM WEEK DAY MONTH HH:MM* **[***OFFSET***]**

clock summer-time date *DATE MONTH YEAR HH:MM DATE MONTH YEAR HH:MM* **[***OFFSET***]**

no clock summer-time

Parameters

recurring	Specifies that summer time should start and end on the specified week day of the specified month.
date	Specifies that summer time should start and end on the specified date of the specified month.
WEEK	Specifies the week of the month (1 to 4 or last).
DAY	Specifies the day of the week (sun, mon, and so on).
DATE	Specifies the date of the month (1 to 31).
MONTH	Specifies the month (1 to 12).
YEAR	Specifies the start and end years for the summer time data.
HH:MM	Specifies the time (24 hours format) in hours and minutes.
OFFSET	(Optional) Specifies the number of minutes to add during summer time. The default value is 60. The range of this offset is 30, 60, 90 and 120.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to automatically switch over to summer time. The command has two forms. One is the recurring form which is used to specify the time through the week and the day of the month. The other form is the date form which is used to specify the date of the month.

In both the date and recurring forms of the command, the first part of the command specifies when summer time begins, and the second part specifies when it ends.

Example

This example shows how to specify that summer time starts on the first Sunday in June at 2 a.m. and ends on the last Sunday in October at 2 a.m.

```
Switch# configure terminal
Switch(config)#clock summer-time recurring 1 sun jun 02:00 last sun oct 02:00
Switch(config)#
```

65-3 clock timezone

This command is used to set the time zone for display purposes. Use the **no** form of this command to revert to the default setting.

clock timezone {+ | -} *HOURS-OFFSET* **[***MINUTES-OFFSET***]**

no clock timezone

Parameters

+ | -	**+:** Specifies that time to be added to the UTC. **-:** Specifies that time to be subtracted from the UTC.
HOURS-OFFSET	Specifies the hours difference from UTC.
MINUTES-OFFSET	(Optional) Specifies the minutes difference from UTC.

Default

By default, this option is set to UTC.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The time obtained by the SNTP server refers to the UTC time. The local time will be calculated based on UTC time, time zone, and the daylight saving configuration.

Example

This example shows how to set the time zone to the Pacific Standard Time (PST), which is 8 hours ahead of UTC.

```
Switch# configure terminal
Switch(config)# clock timezone - 8
Switch(config)#
```

65-4 show clock

This command is used to display the time and date information.

show clock

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command also indicates the clock's source. The clock source can be "No Time Source" or "SNTP".

Example

This example shows how to display the current time.

```
Switch# show clock

Current Time Source     : SNTP
Current Time            : 09:17:35, 11/09/2023
Time Zone               : UTC +02:00
Daylight Saving Time    : Recurring Setting
     Offset In Minutes  : 60
     Recurring    From  : Jan First Sun 01:01
                  To    : Feb Last Sat 01:02
```

65-5 show sntp

This command is used to display information about the SNTP server.

show sntp

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display information about the SNTP server.

Example

This example shows how to display SNTP information.

```
Switch# show sntp

SNTP Status         :Enabled
SNTP Pool Interval  : 720 seconds

SNTP Server Status:

SNTP Server                                    Stratum Version Last Receive
---------------------------------------------- ------- ------- ---------------
10.0.0.11                                      8       4       00:02:02
10.0.0.12                             7       4       00:01:02 Synced
10::2                                          ------- ------- ---------------
FE80::1111vlan1                                ------- ------- ---------------
---------------------------------------------- ------- ------- ---------------

Total Entries:4

Switch#
```

65-6 sntp server

This command is used to allow the system clock to be synchronized with an SNTP time server. Use the **no** form of this commandto remove a server from the list of SNTP servers.

sntp server {*IP-ADDRESS* | *IPV6-ADDRESS***}**

no sntp server {*IP-ADDRESS* | *IPV6-ADDRESS***}**

Parameters

IP-ADDRESS	Specifies the IP address of the time server which provides the clock synchronization.
IPV6-ADDRESS	Specifies the IPv6 address of the time server.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

SNTP is a compact, client-only version of the NTP. Unlike NTP, SNTP can only receive the time from NTP servers; it cannot be used to provide time services to other systems. SNTP typically provides time within 100 milliseconds of the accurate time, but it does not provide the complex filtering and statistical mechanisms of NTP. In addition, SNTP does not authenticate traffic, although you can configure extended access lists to provide some protection.

Create multiple SNTP servers by enter this command multiple times with different SNTP server IP addresses.

Use the **no** form of this command to delete the SNTP server entry. To delete an entry, specify the information exactly the same as the originally configured setting. The time obtained from the SNTP server refers to the UTC time.

Example

This example shows how to configure a switch to allow its software clock to be synchronized with the clock by the SNTP server at IP address 192.168.22.44.

```
Switch# configure terminal
Switch(config)# sntp server 192.168.22.44
Switch(config)#
```

65-7 sntp enable

This command is used to enable the SNTP function. Use the **n**o form of this command to disable the SNTP function.

sntp enable

no sntp enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enable or disable the SNTP function.

Example

This example shows how to enable the SNTP function.

```
Switch# configure terminal
Switch(config)#sntp enable
Switch(config)#
```

65-8 sntp interval

This command is used to set the interval for the SNTP client to synchronize its clock with the server.

sntp interval *SECONDS*

no sntp interval

Parameters

SECONDS	Specifies the synchronization interval from 30 to 99999 seconds.

Default

By default, this value is 720 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to set the polling interval.

Example

This example shows how to configure the interval to 100 seconds.

```
Switch# configure terminal
Switch(config)#sntp interval 100
Switch(config)#
```

66. Time Range Commands

66-1 periodic

This command is used to specify the period of time for a time range profile. This command is used in the time-range configuration mode.

periodic {daily *HH:MM* **to** *HH:MM* **| weekly** *WEEKLY-DAY HH:MM* **to [***WEEKLY-DAY***]** *HH:MM***}**

no periodic {daily *HH:MM* **to** *HH:MM* **| weekly** *WEEKLY-DAY HH:MM* **to [***WEEKLY-DAY***]** *HH:MM***}**

Parameters

daily *HH:MM* **to** *HH:MM*	Specifies the time of the day, using the format HH:MM (for example, 18:30).
weekly *WEEK-DAY HH:MM* **to [***WEEK-DAY***]** *HH:MM*	Specifies the day of the week and the time of day in the format day HH:MM, where the day of the week is spelled out (monday, tuesday, wednesday, thursday, friday, saturday, and sunday). If the ending day of the week is the same as the starting day of the week, it can be omitted.

Default

None.

Command Mode

Time-range Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A new period can be partially overlapped with an older one. If a new period's starting and ending time is respectively the same as a previous period, an error message will be displayed and the new period will not be allowed. When specifying a period to remove, it must be the same period originally added and cannot be a partial range of a period or multiple periods configured. Otherwise, an error message will be displayed.

Example

This example shows how to create a time-range that include daily 09:00 to 12:00, 00:00 Saturday to 00:00 Monday and delete the period for daily 09:00 to 12:00.

```
Switch# configure terminal
Switch(config)#time-range rdtime
Switch(config-time-range)# periodic daily 9:00 to 12:00
Switch(config-time-range)# periodic weekly saturday 00:00 to monday 00:00
Switch(config-time-range)# no periodic daily 9:00 to 12:00
Switch(config-time-range)#
```

66-2 show time-range

This command is used to display the time range profile configuration.

show time-range [*NAME***]**

Parameters

NAME	(Optional) Specifies the name of the time-range profile to be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If the name is not specified, all configured time-range profiles will be displayed.

Example

This example shows how to display all the configured time ranges.

```
Switch#show time-range

Time Range Profile: rdtime
Daily 09:00 to 12:00
Weekly Saturday 00:00 to Monday 00:00

Time Range Profile: lunchtime
Daily 12:00 to 13:00

Total Entries: 2

Switch#
```

66-3 time-range

This command is used to enter the time range configuration mode to define a time range. Use the **no** form of this command to delete a time range.

time-range *NAME*

no time-range *NAME*

Parameters

NAME	Specifies the name of the time-range profile to be configured. The maximum length is 32 characters.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enter the time range configuration mode before using the periodic command to specify a time period. When a time-range is created without any time interval (periodic) setting, it implies that there is not any active period for the time-range.

Example

This example shows how to enter the time range configuration mode for the time-range profile, named “rdtime”.

```
Switch# configure terminal
Switch(config)#time-range rdtime
Switch(config-time-range)#
```

67. Traffic Segmentation Commands

67-1 show traffic-segmentation forward

This command is used to display the traffic segmentation for some ports or all ports.

show traffic-segmentation forward [interface *INTERFACE-ID* **[, | -]]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies ID of an interface. The acceptable interface will be physical port or port channel.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space before and after the comma.
-	(Optional) Specifies a range of interfaces. No space before and after the hyphen.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

While entering this command without any other keywords, the traffic segmentation configuration for all ports is displayed. Otherwise, only the specified interface's traffic segmentation is displayed.

Example

This example shows how to display the configuration of traffic segmentation for ethernet1/0/1.

```
Switch# show traffic-segmentation forward interface ethernet 1/0/1

Interface        Forwarding Domain
------------ -----------------------------------------
ethernet1/0/1        ethernet1/0/1, ethernet1/0/4-6

Total Entries: 1

Switch#
```

67-2 traffic-segmentation forward

This command is used to restrict the Layer 2 packet forwarding domain of packets received by the configured port. Use the **no** form of this command to remove the specification of forwarding domain.

traffic-segmentation forward interface *{ INTERFACE-ID [, | -]* | **port-channel** *<1-8>}*

no traffic-segmentation forward interface *{ INTERFACE-ID [, | -] |* **port-channel** *<1-8>}*

Parameters

INTERFACE-ID	Specifies the ID of an interface allowed. The allowed interfaces include physical port.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space before and after the comma.
-	(Optional) Specifies a range of interfaces. No space before and after the hyphen.
port-channel *<1-8>*	(Optional) Specifies the channel group.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When traffic segmentation forwarding domain is specified, packets received by the port will be restricted in Layer 2 packet forwarding to interfaces within the domain. When the forwarding domain of a port is empty, Layer 2 forwarding for packets received by the port is not restricted.

The **traffic-segmentation forward** command can be entered multiple times. The following interfaces will be appended into the forwarding domain. Use the **no** form command will remove the specified interface from the traffic segmentation forward member list.

The traffic segmentation member list can be comprised of different interface types, for example port and port-channel in the same forwarding domain. If the interfaces specified by the command include a port-channel, all the member ports of this port-channel will be included in the forwarding domain.

If the forwarding domain of an interface is empty, then there is no restriction on Layer 2 forwarding of packets received by the port.

Example

This example shows how to configure traffic segmentation. It restricts the flooding domain of ethernet1/0/1 to a set of ports, which are ethernet1/0/1 – ethernet1/0/6.

```
Switch# configure terminal
Switch(config)#interface ethernet1/0/1
Switch(config-if)# traffic-segmentation forward interface range ethernet1/0/1-6
Switch(config-if)#
```

68. Virtual LAN (VLAN) Commands

68-1 acceptable-frame

This command is used to set the acceptable types of frames by a port. Use the **no** form of this command to revert to the default settings.

acceptable-frame {tagged-only | untagged-only | admit-all}

no acceptable-frame

Parameters

tagged-only	Specifies that only tagged frames are admitted.
untagged-only	Specifies that only untagged frames are admitted.
admit-all	Specifies that all frames are admitted.

Default

For the access VLAN mode, the default option is **untagged-only**.

For the other VLAN mode, the default option is **admit-all**.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to set the acceptable types of frames by a port.

Example

This example shows how to set the acceptable frame type to **tagged-only** for port ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# acceptable-frame tagged-only
Switch(config-if)#
```

68-2 ingress-checking

This command is used to enable ingress checking for frames received by a port. Use the **no** form of this command to disable the ingress check.

ingress-checking

no ingress-checking

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable ingress checking for packets received by the interface. If ingress checking is enabled, the packet will be dropped if the received port is not a member port of the VLAN classified for the received packet.

Example

This example shows how to set ingress checking to enabled port ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# ingress-checking
Switch(config-if)#
```

68-3 show vlan

This command is used to display the parameters for all configured VLANs or one VLAN on the Switch.

show vlan [*VLAN-ID* **[, | -] | interface [***INTERFACE-ID* **[, | -]]]**

Parameters

VLAN-ID	(Optional) Specifies a list of VLANs to display the member port information. If the VLAN is not specified, all VLANs are displayed. The valid range is from 1 to 4094.
interface *INTERFACE-ID*	(Optional) Specifies the port to display the VLAN related setting.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space before and after the comma.
-	(Optional) Specifies a range of interfaces. No space before and after the hyphen.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the parameters for all configured VLANs or one VLAN on the Switch.

Example

This example shows how to display all the current VLAN entries.

```
Switch#show vlan

 VLAN 1
   Name : default
   Tagged Member Ports   :
   Untagged Member Ports : 1/0/1-1/0/28

 Total Entries : 1

Switch#
```

This example shows how to display the PVID, ingress checking, and acceptable frame type information for ports ethernet1/0/1-1/0/4.

```
Switch#show vlan interface ethernet 1/0/1-1/0/4

 ethernet1/0/1
   VLAN mode             : Hybrid
   Native VLAN           : 1
   Hybrid untagged VLAN  : 1
   Hybrid tagged VLAN    :
   Ingress checking      : Enabled
   Acceptable frame type : Admit-All
   Dynamic tagged VLAN   :

 ethernet1/0/2
   VLAN mode             : Hybrid
   Native VLAN           : 1
   Hybrid untagged VLAN  : 1
   Hybrid tagged VLAN    :
   Ingress checking      : Enabled
   Acceptable frame type : Admit-All
   Dynamic tagged VLAN   :

 ethernet1/0/3
   VLAN mode             : Hybrid
   Native VLAN           : 1
   Hybrid untagged VLAN  : 1
   Hybrid tagged VLAN    :
   Ingress checking      : Enabled
   Acceptable frame type : Admit-All
   Dynamic tagged VLAN   :

 ethernet1/0/4
   VLAN mode             : Hybrid
   Native VLAN           : 1
   Hybrid untagged VLAN  : 1
   Hybrid tagged VLAN    :
   Ingress checking      : Enabled
   Acceptable frame type : Admit-All
   Dynamic tagged VLAN   :

Switch#
```

68-4 switchport access vlan

This command is used to specify the access VLAN for an interface. Use the **no** form of this command to revert to the default setting.

switchport access vlan *VLAN-ID*

no switchport access vlan

Parameters

access vlan *VLAN-ID*	Specifies the access VLAN of the interface.

Default

By default, this access VLAN is VLAN 1.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command takes effect when the interface is set to access mode. The VLAN specified as the access VLAN does not need to exist to configure the command.

Only one access VLAN can be specified. The succeeding command overwrites the previous command.

Example

This example shows how to configurethernete interface 1/0/1 to access mode with access VLAN 1000.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# switchport mode access
Switch(config-if)# switchport access vlan 1000
Switch(config-if)#
```

68-5 switchport hybrid allowed vlan

This command is used to specify the tagged or untagged VLANs for a hybrid port. Use the **no** form of this command to revert to the default setting.

switchport hybrid allowed vlan {[add] {tagged | untagged} | remove} *VLAN-ID* **[, | -]**

no switchport hybrid allowed vlan

Parameters

add	Specifies the port will be added into the specified VLAN(s).
remove	Specifies the port will be removed from the specified VLAN(s).
tagged	Specifies the port as a tagged member of the specified VLAN(s).

untagged	Specifies the port as an untagged member of the specified VLAN(s).
VLAN-ID	Specified the allowed VLAN list or the VLAN list to be added to or removed from the allow VLAN list. If nooption is specified, the specified VLAN list will overwrite the allowed VLAN list.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is required before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is required before and after the hyphen.

Default

By default, a hybrid port is an untagged member port of VLAN 1.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

By setting the hybrid VLAN command multiple times with different VLAN IDs, a port can be a tagged member port or an untagged member port of multiple VLANs.

When the allowed VLAN is only specified as the VLAN ID, the succeeding command will overwrites the previous command. If the new untagged allowed VLAN list is overlap with the current tagged allowed VLAN list, the overlap part will change to the untagged allowed VLAN. On the other hand, if the new tagged allowed VLAN list is overlap with current untagged allowed VLAN list, the overlap part will change to the tagged allowed VLAN. The last command will take effect. The VLAN does not need to exist to configure the command.

Example

This example shows how to configure interface ethernet1/0/1 to be a tagged member of VLAN 1000 and an untagged member of VLAN 2000 and 3000.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# switchport mode hybrid
Switch(config-if)# switchport hybrid allowed vlan add tagged 1000
Switch(config-if)# switchport hybrid allowed vlan add untagged 2000,3000
Switch(config-if)#
```

68-6 switchport hybrid native vlan

This command is used to specify the native VLAN ID of a hybrid port. Use the **no** form of this command to reset the native VLAN to the default setting.

switchport hybrid native vlan *VLAN-ID*

no switchport hybrid native vlan

Parameters

vlan *VLAN-ID*	Specifies the native VLAN of a hybrid port.

Default

By default, the native VLAN of a hybrid port is VLAN 1.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When configuring the hybrid port join to its native VLAN, use the **switchport hybrid allowed vlan** command to add the native VLAN into its allowed VLAN. The specified VLAN does not need to exist to apply the command. The command takes effect when the interface is set to hybrid mode.

Example

This example shows how to configure interface ethernet1/0/1 to become a hybrid interface and configure the PVID to 20.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# switchport mode hybrid
Switch(config-if)# switchport hybrid allowed vlan add untagged 1000,20
Switch(config-if)# switchport hybrid native vlan 20
Switch(config-if)#
```

68-7 switchport mode

This command is used to specify the VLAN mode for the port. Use the **no** form of this command to revert to the default setting.

switchport mode {access | hybrid | trunk}

no switchport mode

Parameters

access	Specifies the port as an access port.
hybrid	Specifies the port as a hybrid port.
trunk	Specifies the port as a trunk port.

Default

By default, this option is **hybrid**.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a port is set to access mode, this port will be an untagged member of the access VLAN configured for the port. When a port is set to hybrid mode, the port can be an untagged or tagged member of any VLAN configured.

When a port is set to trunk mode, this port is either a tagged or untagged member port of its native VLAN and can be a tagged member of other VLANs configured. The purpose of a trunk port is to support the switch-to-switch connection.

When the switch-port mode is changed, the VLAN related setting associated with previous mode will be lost.

Example

This example shows how to set the interface ethernet1/0/1 as a trunk port.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# switchport mode trunk
Switch(config-if)#
```

68-8 switchport trunk allowed vlan

This command is used to configure the VLANs that are allowed to receive and send traffic on the specified interface in a tagged format. Use the **no** form of this command to revert to the default setting.

switchport trunk allowed vlan {all | [add | remove | except] *VLAN-ID* **[, | -]}**

no switchport trunk allowed vlan

Parameters

all	Specifies that all VLANs are allowed on the interface.
add	Specifies to add the specified VLAN list to the allowed VLAN list.
remove	Specifies to remove the specified VLAN list from the allowed VLAN list.
except	Specifies that all VLANs except the VLANs in the exception list are allowed.
VLAN-ID	Specifies the allow VLAN list or the VLAN list to be added to or removed from the allow VLAN list.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is required before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is required before and after the hyphen.

Default

By default, all VLANs are allowed.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the interface is set to trunk mode. If a VLAN is allowed on a trunk port, the port will become the tagged member of the VLAN. When the allowed VLAN option is set to **all**, the port will be automatically added to all the VLAN created by the system.

Example

This example shows how to configure interface ethernet1/0/1 as a tagged member of VLAN 1000.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport trunk allowed vlan add 1000
Switch(config-if)#
```

68-9 switchport trunk native vlan

This command is used to specify the native VLAN ID of a trunk mode interface. Use the **no** interface command to reset to the native VLAN ID to the default setting.

switchport trunk native vlan {*VLAN-ID* **| tag}**

no switchport trunk native vlan [tag]

Parameters

VLAN-ID	Specifies the native VLAN for a trunk port.
tag	Specifies to enable the tagging mode of the native VLAN.

Default

By default, the native VLAN is 1, untagged mode.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command only takes effect when the interface is set to trunk mode. When a trunk port native VLAN is set to tagged mode, normally the acceptable frame type of the port should be set to “tagged-only” to only accept tagged frames. When a trunk port works in the untagged mode for a native VLAN, transmitting untagged packet for a native VLAN and tagged packets for all other VLANs and the acceptable frame types of the port has to be set to “admit-all” in order to function correctly.

The specified VLAN does not need to exist to apply the command.

Example

This example shows how to configure interface ethernet1/0/1 as a trunk interface and configures the native VLAN to 20.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport trunk native vlan 20
Switch(config-if)#
```

68-10 vlan

This command is used to add VLANs and enter the VLAN configuration mode. Use the **no** form of this command to remove VLANs.

vlan *VLAN-ID* **[, | -]**

no vlan *VLAN-ID* **[, | -]**

Parameters

VLAN-ID	Specifies the ID of the VLAN to be added, removed or configured. The valid VLAN ID range is from 1 to 4094. VLAN ID 1 cannot be removed.
,	Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is required before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is required before and after the hyphen.

Default

The VLAN ID 1 exists in the system as the default VLAN.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **vlan** global configuration command to create VLANs. Entering the **vlan** command with a VLAN ID enters the VLAN configuration mode. Entering the VLAN ID of an existing VLAN does not create a new VLAN, but allows the user to modify the VLAN parameters for the specified VLAN. When the user enters the VLAN ID of a new VLAN, the VLAN will be automatically created.

Use the **no vlan** command to remove a VLAN. The default VLAN cannot be removed. If the removed VLAN is a port's access VLAN, the port's access VLAN will be reset to VLAN 1.

Example

This example shows how to add new VLANs, assigning the new VLANs with the VLAN IDs 1000 to 1005.

```
Switch# configure terminal
Switch(config)#vlan 1000-1005
Switch(config-vlan)#
```

68-11 name

This command is used to specify the name of a VLAN. Use the **no** form of this command to reset the VLAN name to the default VLAN name.

name *VLAN-NAME*

no name

Parameters

VLAN-NAME	Specifies the VLAN name, with a maximum of 32 characters. The VLAN name must be unique within the administrative domain.

Default

The default VLAN name is VLANx, where x represents four numeric digits (including the leading zeros) that are equal to the VLAN ID.

Command Mode

VLAN Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the name of a VLAN. The VLAN name must be unique within the administrative domain.

Example

This example shows how to configure the VLAN name of VLAN 1000 to be “admin-vlan”.

```
Switch# configure terminal
Switch(config)#vlan 1000
Switch(config-vlan)# name admin-vlan
Switch(config-vlan)#
```

69. Virtual LAN (VLAN) Tunnel Commands

69-1 dot1q inner ethertype

This command is used to specify the system's inner TPID. Use the **no** form of this command to revert to the default setting.

dot1q inner ethertype *VALUE*

no dot1q inner ethertype

Parameters

VALUE	Specifies the system's inner TPID. The value is in the hexadecimal form. The range is 0x1 to 0xFFFF.

Default

The default inner TPID is 0x8100.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

The command is used to configure the inner TPID of the system. The inner TPID is used to decide if the ingress packet is C-tagged. The Inner TPID is per system configurable.

Example

This example shows how to configure the inner TPID to 0x9100.

```
Switch# configure terminal
Switch(config)# dot1q inner ethertype 0x9100
Switch(config)#
```

69-2 dot1q tunneling ethertype

This command is used to specify the outer TPID for the service VLAN tag. Use the **no** form of this command to revert to the default setting.

dot1q tunneling ethertype *VALUE*

no dot1q tunneling ethertype

Parameters

VALUE	Specifies the outer TPID for the service VLAN tag. The value is in the hexadecimal form. The range is 0x1 to 0xFFFF.

Default

By default, this option is 0x8100.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

An 802.1Q tunnel port behaves as an UNI port of a service VLAN. The trunk ports which are tagged members of the service VLAN behave as the NNI ports of the service VLAN.

Only configure the 802.1Q tunneling Ethernet type on ports that are connected to the provider bridge network, which receives and transmits the service VLAN tagged frames. If the tunnel Ethernet type is configured, the specified value will be the TPID in the outer VLAN tag of the transmitted frames out of this port. The specified TPID is also used to identify the service VLAN tag for the received frame on this port.

Example

This example shows how to configure the 802.1Q tunneling TPID on port 1 to 0x88a8.

```
Switch# configure terminal
Switch(config)# interface
eth1/0/1 Switch(config-if)#
switchport mode trunk

Switch(config-if)# dot1q tunneling ethertype 0x88a8

Switch(config-if)#
```

69-3 switchport vlan mapping

This command is used to specify the VLAN translation entry for a trunk port or to specify the service VLAN mapping entry for a dot1q tunnel port. Use the **no** form of this command to remove the VLAN translation entry or the service VLAN mapping entry.

switchport vlan mapping original-vlan *ORIGINAL-VLAN* **[, | -] {[***ORIGINAL-INNER-VLAN***] resultant-vlan**

RESULTANT-VLAN **[***RESULTANT-INNER-VLAN***] | dot1q-tunnel** *DOT1Q-TUNNEL-VLAN***} [priority** *COS-*

*VALUE***] [egress_priorty {copy** | *COS-VALUE***}]**

no switchport vlan mapping original-vlan *ORIGINAL-VLAN* **[, | -] [***ORIGINAL-INNER-VLAN***]**

Parameters

ORIGINAL-VLAN	Specifies the original VLAN ID that will be matched for incoming packets. The range is from 1 to 4094.
,	(Optional) Specifies a series of VLANs or separates a range of VLANs from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.

ORIGINAL-INNER-VLAN	(Optional) Specifies that the original inner VLAN is used to match the inner VID for incoming packets on the trunk mode port. The range is from 1 to 4094.
RESULTANT-VLAN	Specifies the translated service VLAN ID. The range is from 1 to 4094. The service VLAN will replace the original VLAN for matched packets.
RESULTANT-INNER-VLAN	(Optional) Specifies the new inner VLAN that will replace original inner VLAN on trunk mode port.
DOT1Q-TUNNEL-VLAN	Specifies the service VLAN ID that will be added for matched packets on the dot1q-tunnel mode port.
COS-VALUE	(Optional) Specifies the priority for the rule. If not specified, the priority of the service VLAN tag will be set to 0.
egress_priorty	(Optional) Specifies the egress CTag priority on the dot1q-tunnel interface. **copy** - Specifies to copy the service VLAN priority to the egress CTag priority. *COS-VALUE* – Specifies the priority for the rule.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

The command only takes effect for the port or port-channel that is set to 802.1Q tunnel mode or trunk mode.

If the **dot1q-tunnel** parameter is specified in this command, once the C-VLAN tag of the incoming packet matches the specified original VLAN, the specified S-VLAN is added to make the packet becomes double tagged. Specify a VLAN range to map multiple original VLANs to single S-VLAN. This rule can be configured on an 802.1Q tunnel port. Otherwise, the rule will not take effect (its status is inactive).

If the *RESULTANT-VLAN* parameter is specified in this command, the rule performs VLAN translation. Once the VLAN tag of the incoming packet matches the specified original VLAN, the specified S-VLAN replaces original VLAN. The VLAN translation is one-to-one mapping, i.e. you cannot configure multiple original VLANs map to single S-VLAN. The VLAN translation can be configured on both 802.1q tunnel or trunk port.

Optional, configure a 2:1 VLAN translation rule by specifying the *ORIGINAL-INNER-VLAN* parameter. In this case, the outer and inner tag of the incoming packets is used to match the VLAN translation rule. The outer VLAN of the matched packet is replaced by translated service VLAN and the original inner VLAN is not modified.

Configure a 2:2 VLAN translation rule by specifying the *RESULTANT-INNER-VLAN* parameter. In this case, the original inner VLAN of the matched packet will be replaced by the specified new inner VLAN.

Usually, the 2:1 and 2:2 VLAN translations are configured on trunk ports.

When VLAN mapping entries are configured on a trunk port, the packet handling behavior is different from an ordinary trunk port. When a packet arrives at the port, its VLAN is translated to a new VLAN. Then, the learning and subsequent operations are based on the translated VLAN. For packets egress from the port, the VLAN of the packet will be translated back to the original VLAN before the packet is transmitted.

When configuring VLAN mapping entries to translate an original VLAN to an S-VLAN, the user cannot configure another VLAN mapping entry to translate other original VLANs to the S-VLAN or configure the VLAN mapping rule bundling C-VLANs to the S-VLAN, and vice versa.

If there is no VLAN mapping entry or rule that matches the incoming tagged packet and the VLAN mapping miss drop option is enabled on the port, the packet will be dropped. If the VLAN mapping miss drop option is disabled, the port-based service VLAN will be assigned for the unmatched packet.

Example

This example shows how to configure VLAN mapping entries for a trunk port.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport vlan mapping original-vlan 100 resultant-vlan 1100
Switch(config-if)# switchport vlan mapping original-vlan 200 resultant-vlan 1200
Switch(config-if)#
```

This example shows how to configure VLAN mapping entries for an 802.1Q tunnel port.

```
Switch# configure terminal
Switch(config)# interface eth1/0/2
Switch(config-if)# switchport mode dot1q-tunnel
Switch(config-if)# switchport vlan mapping original-vlan 600 resultant-vlan 1600
Switch(config-if)# switchport vlan mapping original-vlan 700 dot1q-tunnel 1700
Switch(config-if)# switchport access vlan 1600
Switch(config-if)# switchport hybrid allow vlan add  untagged 1700
Switch(config-if)#
```

69-4 dot1q-tunnel insert dot1q-tag

This command is used to specify the dot1q VLAN tag insertion. Use the **no** form of this command to remove the dot1q VLAN tag insertion.

dot1q-tunnel insert dot1q-tag *DOT1Q-VLAN*

no dot1q-tunnel insert dot1q-tag

Parameters

DOT1Q-VLAN	Specifies the dot1q VLAN ID that is inserted to the untagged packets which are received on the dot1q tunnel port.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

If this command is configured, when the untagged packets are received on the 802.1Q tunnel port, the specified dot1q VLAN tag will be inserted into it as inner tag.

Example

This example shows how to configure an interface port 1 to insert the inner tag with VLAN 10.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# switchport mode dot1q-tunnel
Switch(config-if)# dot1q-tunnel insert dot1q-tag 10
Switch(config-if)#
```

69-5 vlan mapping miss drop

This command is used to enable the dropping of VLAN mapping unmatched packets. Use the **no** form of this command to disable the VLAN mapping miss dropping.

vlan mapping miss drop

no vlan mapping miss drop

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

This command is available for physical port and port-channel interfaces that are set to 802.1Q tunnel mode. If the VLAN mapping miss dropping option is enabled on the receiving port, when the original VLAN of the received packets cannot match the VLAN mapping entries or rules on this port, the received packets will be dropped.

Example

This example shows how to configure an interface port 1 to enable VLAN mapping miss dropping.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# switchport mode dot1q-tunnel
Switch(config-if)# vlan mapping miss drop
Switch(config-if)#
```

69-6 dot1q-tunnel trust inner-priority

This command is used to set the trusting dot1q priority. Use the **no** form of this command to remove the setting.

dot1q-tunnel trust inner-priority

no dot1q-tunnel trust inner-priority

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

When the trusting dot1q priority option, on a dot1q tunnel port, is enabled the priority of the dot1q VLAN tag in the received packets will be copied to the service VLAN tag.

Example

This example shows how to configure the interface port 1 to trust inner priority.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# switchport mode dot1q-tunnel
Switch(config-if)# dot1q-tunnel trust inner-priority
Switch(config-if)#
```

69-7 vlan mapping profile

This command is used to create a VLAN mapping profile or enter the VLAN mapping profile configuration mode. Use the **no** form of this command to remove the VLAN mapping profile.

vlan mapping profile *ID* **[type [ethernet] [ip] [ipv6]]**

no vlan mapping profile *ID*

Parameters

ID	Specifies the ID of the VLAN mapping profile. A lower ID has a higher priority. The ID range is from 1 to 1000.
type	(Optional) Specifies the profile types. Different profiles can match different fields. **ethernet:** The profile can match Layer 2 fields. **ip:** The profile can match Layer 3 IP fields. **ipv6:** The profile can match IPv6 destination or source addresses.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

A VLAN mapping profile can be used to provide flexible and powerful flow-based VLAN translation. For creating a VLAN mapping profile, users must specify the type to decide which fields can be matched by the profile rules.

Example

This example shows how to create a VLAN mapping profile for matching Ethernet fields.

```
Switch# configure terminal
Switch(config)# vlan mapping profile 1 type ethernet
Switch(config-vlan-map)#
```

69-8 vlan mapping rule

This command is used to configure the VLAN mapping rules of the profile. Use the **no** form of this command to remove the previous configured rules.

rule [*SN***] match [src-mac** *MAC-ADDRESS***] [dst-mac** *MAC-ADDRESS***] [priority** *COS-VALUE***] [inner-vid** *VLAN-ID***] [ether-type** *VALUE***] [src-ip** *NETWORK-PREFIX***] [dst-ip** *NETWORK-PREFIX***] [src-ipv6** *IPV6- NETWORK-PREFIXIPREFIX-LENGTH***] [dst-ipv6** *IPV6-NETWORK-PREFIXIPREFIX-LENGTH***] [dscp** *VALUE***] [src-port** *VALUE***] [dst-port** *VALUE***] [ip-protocol** *VALUE***] {dot1q-tunnel } outer-vid** *VLAN-ID* **[priority** *COS-VALUE***] [inner-vid** *VLAN-ID***]**

no rule *SN* **[- | ,]**

Parameters

SN	(Optional) Specifies the sequence number of the VFP rule. If not specified, the SN begins from 10 and the increment is 10. The SN range is from 1 to 10000
src-mac *MAC-ADDRESS*	(Optional) Specifies the source MAC address.
dst-mac *MAC-ADDRESS*	(Optional) Specifies the destination MAC address.
priority *COS-VALUE*	(Optional) Specifies the 802.1p priority.
inner-vid *VLAN-ID*	(Optional) Specifies the inner VLAN ID.
ether-type *VALUE*	(Optional) Specifies the Ethernet type.
src-ip *NETWORK-PREFIX*	(Optional) Specifies the source IPv4 address.
dst-ip *NETWORK-PREFIX*	(Optional) Specifies the destination IPv4 address.

src-ipv6 *IPV6-NETWORK-PREFIXIPREFIX-LENGTH*	(Optional) Specifies the source IPv6 address.
dst-ipv6 *IPV6-NETWORK-PREFIXIPREFIX-LENGTH*	(Optional) Specifies the destination IPv6 address.
dscp *VALUE*	(Optional) Specifies the DSCP value.
src-port *VALUE*	(Optional) Specifies the source TCP/UDP port number.
dst-port *VALUE*	(Optional) Specifies the destination TCP/UDP port number.
ip-protocol *VALUE*	(Optional) Specifies the Layer 3 protocol value.
dot1q-tunnel	Specifies that the outer-VID will be added for matched packets.
outer-vid *VLAN-ID*	Specifies the new outer VLAN ID.
priority *COS-VALUE*	(Optional) Specifies the 802.1p priority in the new outer TAG. If not specified, the priority of the new outer tag is 0.
inner-vid *VLAN-ID*	(Optional) Specifies the new inner VLAN ID.

Default

None.

Command Mode

VLAN Mapping Profile Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use this command to configure the VLAN mapping rules of the profile. If a profile is applied on an interface, the Switch matches the incoming packets according to the rules of the profile. If the packets match a rule, the action of the rule will be taken. The action may be adding or replacing the outer-VID. Optionally, specify the priority of the new outer-TAG or specify the packets new inner-VID.

The match order depends on the rule's sequence number of the profile and stopped when first matched. If the sequence number is not specified, it will be allocated automatically. The sequence number begins from 10 and the increment is 10. Multiple different types of profiles could be configured onto one interface.

Example

This example shows how to configure rules for VLAN mapping profile 1.

```
Switch# configure terminal
Switch(config)# vlan mapping profile 1 type ip
Switch(config-vlan-map)# rule 10 match src-ip 100.1.1.0/24 dot1q-tunnel outer-vid 100
Switch(config-vlan-map)# rule 20 match dst-ip 200.1.1.0/24 dot1q-tunnel outer-vid 200
Switch(config-vlan-map)#
```

69-9 switchport vlan mapping profile

This command is used to apply the VLAN mapping rules of a profile to the specified interface. Use the **no** form of this command to remove the association.

switchport vlan mapping profile *PROFILE-ID*

no switchport vlan mapping profile *PROFILE-ID*

Parameters

PROFILE-ID	(Optional) Specifies the ID of the VLAN mapping profile.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use this command to apply the VLAN mapping profile to the specified interface. The interface can be a physical port or a port-channel interface which is set to the dot1q tunnel mode.

If a profile is applied on an interface, the Switch tests the incoming packets according to the rules of the profile. If the packets match a rule, the action of the rule will be taken.

Setting the port to a mode other than the dot1q-tunnel mode will lead to the VLAN mapping profile configuration to be removed.

Example

This example shows how to configure a VLAN mapping profile and apply it to the 802.1Q tunnel port 1. The customer packets that come from 100.1.1.0/24 will be added to S-VLAN 100 and the packets that go to 200.1.1.0/24 will be added to S-VLAN 200.

```
Switch# configure terminal
Switch(config)# vlan mapping profile 1 type ip
Switch(config-vlan-map)# rule 10 match src-ip 100.1.1.0/24 dot1q-tunnel outer-vid 100
Switch(config-vlan-map)# rule 20 match dst-ip 200.1.1.0/24 dot1q-tunnel outer-vid 200
Switch(config-vlan-map)# exit
Switch(config)# interface eth1/0/1
Switch(config-if)# switchport vlan mapping profile 1
Switch(config-if)#
```

69-10 show dot1q ethertype

This command is used to display TPID settings.

show dot1q ethertype [*INTERFACE-ID* **[- | ,]]**

Parameters

INTERFACE-ID	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

Use this command to display the service VLAN tag Ethernet type.

Example

This example shows how to display the 802.1Q TPID setting for all interfaces.

```
Switch#show dot1q ethertype
↵
802.1q inner Ethernet Type is 0x8100
eth1/0/1↵
802.1q tunneling Ethernet Type is 0x88a8
eth1/0/2↵
802.1q tunneling Ethernet Type is 0x88a8↵
↵
Switch#↵
```

69-11 show dot1q-tunnel

This command is used to display the dot1q VLAN tunneling configuration on interfaces.

show dot1q-tunnel [interface *INTERFACE-ID* **[, | -]]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies the interfaces that will be displayed. If not specified, display all 802.1Q tunnel ports.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

This command is used to display the 802.1Q tunneling configuration on interfaces.

Example

T This example shows how to display all 802.1Q tunnel ports configuration.

```
Switch# show dot1q-tunnel
↵
dot1q Tunnel Interface: eth1/0/1
Trust inner priority       : Enabled
  VLAN mapping miss drop    : Disabled
  VLAN mapping profiles      : 1, 2, 3
↵
dot1q Tunnel Interface: eth1/0/2
Trust inner priority       : Disabled
VLAN mapping miss drop    : Enabled
Insert dot1q tag           : VLAN 10
↵
Switch#
```

69-12 show vlan mapping

This command is used to display the VLAN mapping configuration.

show vlan mapping [interface *INTERFACE-ID* **[, | -]]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies the interfaces that will be displayed. If not specified, display the all VLAN mappings.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

Use this command to display VLAN mapping configurations.

Example

This example shows how to display all VLAN mappings.

```
Switch#show vlan mapping

Interface       Original VLAN  Translated VLAN     Priority  Status
----------------
eth1/0/1        1              dot1q-tunnel 10     0         Active
eth1/0/1        2              dot1q-tunnel 11     5         Active
eth1/0/2        10             Translate 100       0         Active
eth1/0/2        20             Translate 200       0         Active
eth1/0/3        30/3           Translate 300       0         Active
eth1/0/3        40/1           Translate 400/2     2         Active

Total entries: 6

Switch#
```

69-13 show vlan mapping profile

This command is used to display the configured VLAN mapping profile information.

show vlan mapping profile [*ID*]

Parameters

ID	(Optional) Specifies the ID of the VLAN mapping profile. If not specifies, display all configured VLAN mapping profiles.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1

Usage Guideline

Use this command to display configured VLAN mapping profile information.

Example

This example shows how to display all VLAN mappings.

```
Switch# show vlan mapping profile
↵
VLAN mapping profile:1  type:ip
rule 10 match src-ip 100.1.1.0/24, action dot1q-tunnel outer-vid 100, priority 0
rule 20 match dst-ip 200.1.1.0/24, action dot1q-tunnel outer-vid 200, priority 1
rule 30 match src-ip 192.1.1.0/24, action dot1q-tunnel outer-vid 300, priority 0
Total Entries: 3
VLAN mapping profile:2  type:ethernet
rule 10 match src-mac 00-00-00-00-00-01,action translate outer-vid 40, priority 2
rule 20 match inner-vid 5, action translate outer-vid 10, priority 0
Total Entries: 2
↵
Switch#
```

70. Voice VLAN Commands

70-1 voice vlan

This command is used to enable the global voice VLAN state and configure the voice VLAN. Use the **no** form of this command to disable the voice VLAN state.

voice vlan *VLAN-ID*

no voice vlan

Parameters

VLAN-ID	Specifies the ID of the voice VLAN. The valid range is from 2 to 4094.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enable the global voice VLAN function and to specify the voice VLAN on a switch. The switch has only one voice VLAN.

Both the **voice vlan** command in the global configuration and the **voice vlan enable** command in the interface configuration mode need to be enabled for a port to start the voice VLAN function.

When the voice VLAN is enabled for a port, the received voice packets will be forwarded in the voice VLAN. The received packets are determined as voice packets if the source MAC addresses of packets comply with the organizationally unique identifier (OUI) addresses configured by the **voice vlan mac-address** command.

The VLAN to be specified as the voice VLAN needs to pre-exist before configuration. If the voice VLAN is configured, then the voice VLAN cannot be removed with the **no vlan** command.

Example

This example shows how to enable the voice VLAN function and configure VLAN 1000 as the voice VLAN.

```
Switch# configure terminal
Switch(config)#voice vlan 1000
Switch(config)#
```

70-2 voice vlan aging

This command is used to configure the aging time for aging out the voice VLAN's dynamic member ports. Use the **no** form of this command to revert to the default setting.

voice vlan aging *MINUTES*

no voice vlan aging

Parameters

MINUTES	Specifies the aging time of the voice VLAN. The valid range is from 1 to 65535 minutes.

Default

By default, this value is 720 minutes.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the aging time for aging out the voice device and the voice VLAN automatically learned member ports. When the last voice device connected to the port stops sending traffic and the MAC address of this voice device is aged out from FDB, the voice VLAN aging timer will be started. The port will be removed from the voice VLAN after the expiration of the voice VLAN aging timer. If voice traffic resumes during the aging time, the aging timer will be cancelled.

Example

This example shows how to configure the aging time of the voice VLAN to 30 minutes.

```
Switch# configure terminal
Switch(config)#voice vlan aging 30
Switch(config)#
```

70-3 voice vlan enable

This command is used to enable the voice VLAN state of ports. Use the **no** form of this command to disable the voice VLAN'sport state.

voice vlan enable

no voice vlan enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command takes effect for access ports or hybrid ports. Use the **voice vlan enable** command to enable the voice VLAN function for ports. Both the **voice vlan** command in the global configuration and

the **voice vlan enable** command in the interface configuration mode need to be enabled for a port to start the voice VLAN function.

Example

This example shows how to enable the voice VLAN function on the physical port ethernet1/0/1.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# voice vlan enable
Switch(config-if)#
```

70-4 voice vlan mac-address

This command is used to add the user-defined voice device OUI. Use the **no** form of this command to delete the user-defined voice device OUI.

voice vlan mac-address *MAC-ADDRESS MASK* **[description** *TEXT***]**

no voice vlan mac-address *MAC-ADDRESS MASK*

Parameters

MAC-ADDRES	Specifies the OUI MAC address.
MASK	Specifies the OUI MAC address matching bitmask.
description *TEXT*	(Optional) Specifies the description for the user defined OUI with a maximum of 32 characters.

Default

The default OUI is listed in the following table:

OUI	Vendor
00:E0:BB	3COM
00:03:6B	Cisco
00:E0:75	Veritel
00:D0:1E	Pingtel
00:01:E3	Siemens
00:60:B9	NEC/Philips
00:0F:E2	Huawei-3COM
00:09:6E	Avaya

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to add a user-defined OUI for the voice VLAN. The OUI for the voice VLAN is used to identify the voice traffic by using the voice VLAN function. If the source MAC addresses of the received packet matches any of the OUI patterns, the received packet is determined as a voice packet.

The user-defined OUI cannot be the same as the default OUI. The default OUI cannot be deleted.

Example

This example shows how to add a user-defined OUI for voice devices.

```
Switch# configure terminal
Switch(config)#voice vlan mac-address 00-02-03-00-00-00 FF-FF-FF-00-00-00 description
User1
Switch(config)#
```

70-5 voice vlan mode

This command is used to enable the automatic learning of the port as voice VLAN member ports. Use the **no** form of this command to disable the automatic learning.

voice vlan mode {manual | auto {tag | untag}}

no voice vlan mode

Parameters

manual	Specifies that voice VLAN membership will be manually configured.
auto	Specifies that voice VLAN membership will be automatically learned.
tag	Specifies to learn voice VLAN tagged members.
untag	Specifies to learn voice VLAN untagged members.

Default

By default, this option is set to **untag** and **auto**.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure automatic learning or manual configuration of voice VLAN member ports.

If auto-learning is enabled, the port will automatically be learned as a voice VLAN member. This membership will be automatically be aged out. When the port is working in the **auto tagged** mode and the port captures a voice device through the device's OUI, it will join the voice VLAN as a tagged member automatically. When the voice device sends tagged packets, the switch will change its priority. When the voice device sends untagged packets, it will forward them in port's PVID VLAN.

When the port is working in **auto untagged** mode, and the port captures a voice device through the device's OUI, it will join the voice VLAN as an untagged member automatically. When the voice device sends tagged packets, the switch will change its priority. When the voice device sends untagged packets, it will forward them in voice VLAN.

When the switch receives LLDP-MED packets, it checks the VLAN ID, tagged flag, and priority flag. The switch should follow the tagged flag and priority setting.

If auto learning is disabled, the user should use the **switchport hybrid vlan** command to configure the port as a voice VLAN tagged or untagged member port.

Example

This example shows how to configure physical port ethernet1/0/1 to be in the **auto tag** mode.

```
Switch# configure terminal
Switch(config)#interface ethernet 1/0/1
Switch(config-if)# voice vlan mode auto tag
Switch(config-if)#
```

70-6 voice vlan qos

This command is used to configure the CoS priority for the incoming voice VLAN traffic. Use the **no** form of this command to revert to the default setting.

voice vlan qos *COS-VALUE*

no voice vlan qos

Parameters

COS-VALUE	Specifies the priority of the voice VLAN. This value must be between 0 and 7.

Default

By default, this value is 5.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The voice packets arriving at the voice VLAN enabled port are marked to the CoS specified by the command. The remarking of CoS allows the voice VLAN traffic to be distinguished from data traffic in quality of service.

Example

This example shows how to configure the priority of the voice VLAN to be 7.

```
Switch# configure terminal
Switch(config)#voice vlan qos 7
Switch(config)#
```

70-7 show voice vlan

This command is used to display the voice VLAN configurations.

show voice vlan [interface [*INTERFACE-ID* **[, | -]]]**

show voice vlan {device | lldpmed device} [interface *INTERFACE-ID* **[, | -]]**

Parameters

interface	(Optional) Specifies to display voice VLAN information of ports.
INTERFACE-ID	(Optional) Specifies the interface to display.
,	(Optional)Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional)Specifies a range of interfaces. No space is allowed before and after the hyphen.
device	(Optional) Specifies to display the voice devices learned by OUI.
lldp-med device	(Optional) Specifies to display the voice devices learned by LLDP-MED.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the voice VLAN configurations.

Example

This example shows how to display the voice VLAN global settings.

```
Switch# show voice vlan

Voice VLAN ID          : 1000
Voice VLAN CoS         : 7
Aging Time              : 30 minutes
Member Ports            : ethernet1/0/1-1/0/5
Dynamic Member Ports : ethernet1/0/1-1/0/3
Voice VLAN OUI:

OUI Address        Mask                Description
----------------   -----------------   -------------
00-01-E3-00-00-00  FF-FF-FF-00-00-00    Siemens
00-03-6B-00-00-00  FF-FF-FF-00-00-00    Cisco
00-09-6E-00-00-00  FF-FF-FF-00-00-00    Avaya
00-0F-E2-00-00-00  FF-FF-FF-00-00-00    Huawei&3COM
00-60-B9-00-00-00  FF-FF-FF-00-00-00    NEC&Philips
00-D0-1E-00-00-00  FF-FF-FF-00-00-00    Pingtel
00-E0-75-00-00-00  FF-FF-FF-00-00-00    Veritel
00-E0-BB-00-00-00  FF-FF-FF-00-00-00    3COM
00-02-03-00-00-00  FF-FF-FF-00-00-00    User1

 Total OUI: 9

Switch#
```

This example shows how to display the voice VLAN information of ports.

```
Switch# show voice vlan interface ethernet 1/0/1-5

Interface     State       Mode
------------  ----------  ------------
ethernet1/0/1      Enabled     Auto/Tag
ethernet1/0/2      Enabled     Manual
ethernet1/0/3      Enabled     Manual
ethernet1/0/4      Enabled     Auto/Untag
ethernet1/0/5      Disabled    Manual

Switch#
```

This example shows how to display the learned voice devices on ports ethernet1/0/1-1/0/2.

```
Switch# show voice vlan device interface ethernet 1/0/1-2

Interface  Device Address     Start Time         Status
---------  ------------------ -----------------  -------
ethernet1/0/1   00-03-6B-00-00-01  2012-03-19 09:00   Active
ethernet1/0/1   00-03-6B-00-00-02  2012-03-20 10:09   Aging
ethernet1/0/1   00-03-6B-00-00-05  2012-03-20 12:04   Active
ethernet1/0/2   00-03-6B-00-00-0a  2012-03-19 08:11   Aging
ethernet1/0/2   33-00-61-10-00-11  2012-03-20 06:45   Aging

Total Entries: 5

Switch#
```

This example shows how to display the learned LLDP-MED voice devices on ports ethernet1/0/1-1/0/2.

```
Switch# show voice vlan lldpmed device interface ethernet 1/0/1-2

Index                 : 1
Interface             : ethernet1/0/1
Chassis ID Subtype : MAC Address
Chassis ID            : 00-E0-BB-00-00-11
Port ID Subtype      : Network Address
Port ID               : 172.18.1.1
Create Time           : 2012-03-19 10:00
Remain Time           : 108 Seconds

Index                 : 2
Interface             : ethernet1/0/2
Chassis ID Subtype : MAC Address
Chassis ID            : 00-E0-BB-00-00-12
Port ID Subtype      : Network Address
Port ID               : 172.18.1.2
Create Time           : 2012-03-20 11:00
Remain Time           : 105 Seconds

Total Entries: 2

Switch#
```

Appendix A - System Log Entries

The following table lists all possible entries and their corresponding meanings that will appear in the System Log of this switch.

DHCP Auto Config

Log Description	Severity
Configuration saved to flash.	informational
Configuration download was unsuccessful!.(TFTP Server IP:%s, filename:%s)	critical
Check Configuration fail by DHCP Auto Configuration.	informational
Restore Configuration fail by DHCP Auto Configuration.	informational
Configuration successfully downloaded by DHCP Auto Configuration.(TFTP Server IP:<ipaddr>)	informational
Can not connect the DHCP server	informational

System

Log Description	Severity
System started up	Critical
System warm start	Critical
System cold start	Critical

Configuration/Firmware/Log

Log Description	Severity
Firmware upgrade successful via http.	Informational
Firmware upgrade failure via http!	Warning
Firmware upgrade successful via tftp.	Informational
Firmware upgrade failure via tftp!	Warning
Firmware backup successful via http.	Informational
Firmware backup failure via http!	Warning
Firmware backup successful via tftp.	Informational
Firmware backup failure via tftp!	Warning
Configuration restore successful via http.	Informational
Configuration restore failure via http!	Warning
Configuration restore successful via tftp.	Informational

Configuration restore failure via tftp!	Warning
Configuration backup successful via http.	Informational
Configuration backup failure via http!	Warning
Configuration backup successful via tftp.	Informational
Configuration backup failure via tftp!	Warning
Log message successfully backup System log backup successful via http.	Informational
System log backup failure via http!	Warning
System log backup successful via tftp.	Informational
System log backup failure via tftp!	Warning
Configuration save successful.	Informational
Configuration save failure!	Warning

Interface

Log Description	Severity
Port <portNum> link up, <link state>	Informational
Port <portNum> link down	Informational

LACP

Log Description	Severity
Trunk group< group_id > link up.	Informational
Trunk group< group_id > link down.	Informational
Port <port_id> attach to Trunk group< group_id >.	Informational
Port <port_id> detach from Trunk group< group_id >.	Informational

LBD

Log Description	Severity
Port <portNum> LBD loop occurred. Port blocked.	Critical
Port <portNum> LBD loop occurred. Port blocked at VID <Vid>.	Critical
Port <portNum> LBD port recovered. Loop detection restarted.	Informational
Port <portNum> LBD Port at VID <Vid> recovered. Loop detection restarted.	Informational
Port <portNum> LBD loop occurred. Port not blocked as a result of NONE action mode.	Critical

Port <portNum> LBD port VID <Vid> loop occurred. Port not blocked as a result of NONE action mode.	Critical

Login/Logout Console

Log Description	Severity
Successful login through console(User: {USER})	Informational
Console session timed out(User: {USER})	Informational
Logout through console(User: {USER})	Informational
Login through console failed(User: {USER})	Warning

STP

Log Description	Severity
Topology changed [(port:< portNum>)]	Informational
New Root bridge selected(MAC: <macaddr> Priority :<value>)	Informational
Spanning Tree Protocol is enabled	Informational
Spanning Tree Protocol is disabled	Informational
Topology changed (instance:{UINT.1} port:<portNum>)	Informational

Peripheral

Log Description	Severity
Fan <fanid> failed.	Critical
Fan <fanid> back to normal.	Critical
Temperature recover.	Critical
Temperature exceeds the thresholds.	Critical
Fan control mode changed from {STRING} to {STRING}.	Informational
Fan control mode returns to normal.	Warning

PoE

Log Description	Severity
PoE Port {PORT.1} power short circuit!	Warning
PoE Port {PORT.1} power over load!	Warning
PoE Port {PORT.1} power denied!	Warning
PoE Port {PORT.1} power thermal shutdown!	Warning
PoE Port {PORT.1} power on!	Information
PoE Port {PORT.1} power off!	Information
PoE Port {PORT.1} mps absent!	Information
PoE Port {PORT.1} classfication failed!	Information

PoE power usage threshold is exceed!	Information
PoE over max power budget!	Information

Port Security

Log Description	Severity
Port security violation (Port: <portNum>)	Warning

SNMP

Log Description	Severity
SNMP request received with invalid community string!	Warning
SNMP request received with invalid user name !	Warning

Storm Control

Log Description	Severity
{STRING} storm is occurring on {PORT.1}	Warning
{STRING} storm is cleared on {PORT.1}	Warning
Port {PORT.1} is currently shut down due to the {STRING} storm.	Warning

Telnet

Log Description	Severity
Successful login through Telnet (User:<username>,IP: <ipaddr>)	Informational
Login failed through Telnet (IP: <ipaddr>)	Warning
Logout through Telnet (IP: <ipaddr>)	Informational
Telnet session timed out (IP: <ipaddr>)	Informational

Web

Log Description	Severity
Successful login through Web (IP: <ipaddr>)	Informational
Login failed through Web (IP: <ipaddr>)	Warning
Logout through Web (IP: <ipaddr>)	Informational
Web session timed out (IP: <ipaddr>)	Informational
Successful login through Web(SSL) (IP: <ipaddr>)	Informational
Login failed through Web(SSL) (IP: <ipaddr>)	Warning

IP and Password Changed

Log Description	Severity
Password was changed	Informational

CPU Utilization

Log Description	Severity
Safeguard Engine enters EXHAUSTED mode.	Warning
Safeguard Engine enters NORMAL mode.	Informational

IMPB

Log Description	Severity
Unauthenticated IP-MAC address and discarded by ip mac port binding (IP: <ipaddr>, MAC: <macaddr>, Port <portNum>)	Warning

802.1x

Log Description	Severity
802.1x Authentication fails because the user name is unknown.	Warning
802.1x Authentication fails from (Username:<username>, Port: <portNum>, MAC: <macaddr>)	Warning
802.1x Authentication succeeds from (Username: <username>, Port: <portNum>, MAC: <macaddr>)	Informational
802.1x Authentication fails from Port: <portNum> , VLAN <vid> because the client MAC: <macaddr> duplicates with a static mac address entry	Warning

Radius Assignment

Log Description	Severity
Invalid vlan assignment by radius with vlan <vlan-id>, port <port id>	Warning
Invalid bandwidth assignment by radius with type <TX/RX> rate <rate setting>, port <port id>	Warning
Invalid port default 802.1p assignment by radius with 802.1p: <802.1p> , port <port id>	Warning
The port <port id> is set to 802.1X mac based, it does not support radius assignment.	Warning
The port <port id> is set to a router port of igmp snooping, it does not support radius assignment.	Warning

Gratutious ARP

Log Description	Severity
Conflict IP was detected with this device. (IP:<ipaddr>, MAC: <macaddr>, Port: <portNum>, Interface: <interfaceName>)	Informational

DHCPv4 Snooping

Log Description	Severity
A DHCP Server frame is received from a distrust port <portNum>	Informational
A DHCP Client <macaddr> get IP Address <ipaddr> from DHCP server successfully from a distrust port <portNum>	Warning

DAI(Dynamic ARP Inspection)

Log Description	Severity
legal ARP request/reply packets(IP: <ipaddr>, MAC: <macaddr>, VLAN <Vid>, on port <portNum>.	Informational
illegal ARP request/reply packets(IP: <ipaddr>, MAC: <macaddr>, VLAN <Vid>, on port <portNum>.	Warning

IPDB

Log Description	Severity
A Dynamic/Learned binding entry with Mac <macaddr>, Port <portNum>, IP Address <ipaddr> and VLAN <Vid> is expired	Warning
A DHCP Client <macaddr> from a distrust port <portNum> would like to add a learnt binding entry but the dhcp binding entry is full	Warning
A DHCP Client <macaddr> from a distrust port <portNum> would like to add a learnt binding entry but the free policy entry is empty	Warning
A DHCP Client <Vid> <ipaddr> <macaddr> from a distrust port <portNum> would like to add a learnt binding entry but this Mac Address had been bound by {802.1x|Static Unicast Address} with different information.	Warning
A DHCP Client <macaddr> would like to get IP Address <ipaddr> from a distrust port <portNum> but port is incorrect	Warning

DDM

Log Description	Severity
Optical transceiver {PORT.1} {STRING} warning threshold exceeded !	Warning
Optical transceiver {PORT.1} {STRING} alarm threshold exceeded !	critical
Optical transceiver {PORT.1} {STRING} back to normal !	Warning

SSH

Log Description	Severity

Successful login through SSH(User: {USER}, IP: {IPVX})	informational
SSH session timed out(User: {USER}, IP: {IPVX})	informational
Logout through SSH(User: {USER}, IP: {IPVX})	informational
Login failed through SSH(User: {USER}, IP: {IPVX})	Warning
SSH server is enabled.	informational
SSH server is disabled.	informational

IP Interface

Log Description	Severity
Interface {STRING} IP address was changed. New IP: {IPV4}	informational
Interface {STRING} add {IPV6} IPv6 address.	informational
Interface {STRING} delete {IPV6} IPv6 address.	informational
Duplicate address {IPV6} on {STRING} via receiving Neighbor Advertisement Messages	informational
Duplicate address {IPv6} on {STRING} via receiving Neighbor Solicitation Messages	informational

PD Alive Check

Log Description	Severity
PD alive check failed. (Port: {PORT.1}, PD: {IPV4})!	Warning
PD alive check failed. (Port: {PORT.1}, PD: {IPV6})!	Warning

Reboot Schedule

Log Description	Severity
Reboot scheduled in {STRING} minute.	informational

Surveillance Mode

Log Description	Severity
Surveillance log backup successful via http.	informational
Surveillance log backup failure via http!"	Warning
ASV: New surveillance device detected (Port {PORT.1}, MAC {MACA})	informational
ASV: Port {PORT.1} add into surveillance VLAN {VLAN}	informational
ASV: Port {PORT.1} remove from surveillance VLAN {VLAN}	informational
ASV: Add IPC (IP {IPV4}, MAC {MACA})	informational
ASV: Remove IPC (IP {IPV4}, MAC {MACA})	informational
ASV: Add NVR (IP {IPV4}, MAC {MACA})	informational
ASV: Remove NVR (IP {IPV4}, MAC {MACA})	informational

ASV: Mode change from (Standard Mode) to (Surveillance Mode)	informational
ASV: Mode change from (Surveillance Mode) to (Standard Mode)	informational

MAC Authentication

Log Description	Severity
MAC-based Access Control host login success (MAC: {MACA}, Port: {PORT.1}, VID: {VLAN})	informational
MAC-based Access Control host aged out (MAC: {MACA}, Port: {PORT.1}, VID: {VLAN})	informational
MAC-based Access Control host login fail (MAC: {MACA}, Port: {PORT.1}, VID: {VLAN})	Critical

Appendix B - Trap Entries

The following table lists all possible trap log entries and their corresponding meanings that will appear in the switch.

ID	EVENTS/STRING	OBJECT ID
13.1.1	**Standard**	**OID**
13.1.1.1	coldStart	1.3.6.1.6.3.1.1.5.1
13.1.1.2	warmStart	1.3.6.1.6.3.1.1.5.2
13.1.1.3	authenticationFailure	1.3.6.1.6.3.1.1.5.5
13.1.1.4	linkDown	1.3.6.1.6.3.1.1.5.3
13.1.1.5	linkup	1.3.6.1.6.3.1.1.5.4
13.1.1.6	risingAlarm	1.3.6.1.2.1.16.0.1
13.1.1.7	fallingAlarm	1.3.6.1.2.1.16.0.2
13.1.1.8	lldpXMedTopologyChangeDetected	1.0.8802.1.1.2.1.5.4795.0.1
13.1.2.	**Loop Back Detection**	
13.1.2.1	lbdLoopOccur	1.3.6.1.4.1.171.11.177.1000.4.4.4.0.1
13.1.2.2	lbdLoopRecover	1.3.6.1.4.1.171.11.177.1000.4.4.4.0.2
13.1.3.	**Port Security**	
13.1.3.1	portSecurityViolation	1.3.6.1.4.1.171.11.177.1000.5.8.2.2.1
13.1.4.	**LLDP**	
13.1.4.1	lldpRemoteTableChanged	1.3.6.1.4.1.171.11.177.1000.4.7.12.0.1
13.1.4.2	lldpChasisIdMatched	1.3.6.1.4.1.171.11.177.1000.4.7.12.0.2
13.1.4.3	lldpSystenameMatched	1.3.6.1.4.1.171.11.177.1000.4.7.12.0.3
13.1.4.4	lldpManagementaddressMatched	1.3.6.1.4.1.171.11.177.1000.4.7.12.0.4
13.1.4.5	lldpPVIDNotMatched	1.3.6.1.4.1.171.11.177.1000.4.7.12.0.5
13.1.4.6	lldpVlannameNotMatched	1.3.6.1.4.1.171.11.177.1000.4.7.12.0.6
13.1.4.7	lldpProtocolIDNotMatched	1.3.6.1.4.1.171.11.177.1000.4.7.12.0.7
13.1.4.8	lldpLAstatusNotMatched	1.3.6.1.4.1.171.11.177.1000.4.7.12.0.8
13.1.4.9	lldpMaxFrameSizeNotMatched	1.3.6.1.4.1.171.11.177.1000.4.7.12.0.9
13.1.4.10	lldpMAUTypeNotMatched	1.3.6.1.4.1.171.11.177.1000.4.7.12.0.10
13.1.5.	**Storm Control**	
13.1.5.1	stormCtrlTrapsStormOccur	1.3.6.1.4.1.171.11.177.1000.8.16.1.1.6.0.1
13.1.5.2	stormCtrlTrapsStormClear	1.3.6.1.4.1.171.11.177.1000.8.16.1.1.6.0.2
13.1.6.	**DDM**	
13.1.6.1	ddmAlarmTrap	1.3.6.1.4.1.171.11.177.1000.9.2.5.0.1
13.1.6.2	ddmWarningTrap	1.3.6.1.4.1.171.11.177.1000.9.2.5.0.2
13.1.6.3	ddmNotifyInfoIfIndex	1.3.6.1.4.1.171.11.177.1000.9.2.5.0.3
13.1.6.4	ddmNotifyInfoComponent	1.3.6.1.4.1.171.11.177.1000.9.2.5.0.4
13.1.6.5	ddmNotifyInfoAbnormalLevel	1.3.6.1.4.1.171.11.177.1000.9.2.5.0.5
13.1.6.6	ddmNotifyInfoThresholdExceedOrRecover	1.3.6.1.4.1.171.11.177.1000.9.2.5.0.6
13.1.7.	**Spanning Tree Protocol**	
13.1.7.1	stpNewRootTrap	1.3.6.1.4.1.171.11.177.1000.4.3.6.0.1
13.1.7.2	stpTopologyChgTrap	1.3.6.1.4.1.171.11.177.1000.4.3.6.0.2
13.1.8.	**DHCP Server Screening**	
13.1.8.1	dhcpSerScrAttackDetect	1.3.6.1.4.1.171.11.177.1000.8.7.3.0.1

13.1.9.	**Port Error Disable**	
13.1.9.1	errDisNotifyPortDisabledAssert	1.3.6.1.4.1.171.11.177.1000.2.13.8.0.1
13.1.9.2	errDisNotifyPortDisabledClear	1.3.6.1.4.1.171.11.177.1000.2.13.8.0.2
13.1.9.3	errDisNotifyVlanDisabledAssert	1.3.6.1.4.1.171.11.177.1000.2.13.8.0.3
13.1.9.4	errDisNotifyVlanDisabledClear	1.3.6.1.4.1.171.11.177.1000.2.13.8.0.4
13.1.16	**peripheral**	
13.1.16.1	envTrapFanFailed	1.3.6.1.4.1.171.11.177.1000.2.2.6.0.1
13.1.16.2	envTrapFanRecover	1.3.6.1.4.1.171.11.177.1000.2.2.6.0.2
13.1.16.3	envTrapFanLowSpeed	1.3.6.1.4.1.171.11.177.1000.2.2.6.0.3
13.1.16.4	envTrapFanHighSpeed	1.3.6.1.4.1.171.11.177.1000.2.2.6.0.4
13.1.16.5	envTrapTemperatureExceed	1.3.6.1.4.1.171.11.177.1000.2.2.6.0.5
13.1.16.6	envTrapTemperatureRecover	1.3.6.1.4.1.171.11.177.1000.2.2.6.0.6
13.1.16.7	envTrapFanModeChange	1.3.6.1.4.1.171.11.177.1000.2.2.6.0.7
13.1.16.8	envTrapFanModeRecover	1.3.6.1.4.1.171.11.177.1000.2.2.6.0.8
13.1.17	**PoE**	
13.1.17.1	poePowerOn	1.3.6.1.4.1.171.11.177.1000.2.39.3.1
13.1.17.2	poePowerOff	1.3.6.1.4.1.171.11.177.1000.2.39.3.2
13.1.17.3	poeShortCircuit	1.3.6.1.4.1.171.11.177.1000.2.39.3.3
13.1.17.4	poeOverload	1.3.6.1.4.1.171.11.177.1000.2.39.3.4
13.1.17.5	poePowerDenied	1.3.6.1.4.1.171.11.177.1000.2.39.3.5
13.1.17.6	poeThermalShutdown	1.3.6.1.4.1.171.11.177.1000.2.39.3.6
13.1.17.7	poeMpsAbsent	1.3.6.1.4.1.171.11.177.1000.2.39.3.7
13.1.17.8	poeClassficationFault	1.3.6.1.4.1.171.11.177.1000.2.39.3.8
13.1.17.9	poeInGuardBandMode	1.3.6.1.4.1.171.11.177.1000.2.39.3.9
13.1.17.10	poeExceedUsageThreshold	1.3.6.1.4.1.171.11.177.1000.2.39.3.10
13.1.18	**PD Alive Check**	
13.1.18.1	poePdAliveCheckTrapNotify	1.3.6.1.4.1.171.11.177.1000.2.39.4.2.0.1
13.1.19	**LACP**	
13.1.19.1	Port <port_id> attach to Trunk group< group_id >.	1.3.6.1.4.1.171.11.177.1000.4.5.2.2.1.4.0
13.1.19.2	Port <port_id> detach from Trunk group< group_id >.	1.3.6.1.4.1.171.11.177.1000.4.5.2.2.1.4.2
13.1.20	**Reboot Schedule**	
13.1.20.1	rebootPeriod5MinTrap	1.3.6.1.4.1.171.11.190.1000.2.50.25.1
13.1.20.2	rebootPeriod1MinTrap	1.3.6.1.4.1.171.11.190.1000.2.50.25.2
13.1.21	**SafeGuard**	
13.1.21.1	safeGuardChgToExhausted	1.3.6.1.4.1.171.11.190.1000.8.13.20.1
13.1.21.2	safeGuardChgToNormal	1.3.6.1.4.1.171.11.190.1000.8.13.20.2
13.1.22	**MAC Authentication**	
13.1.22.1	macAccCtrlAuthState	1.3.6.1.4.1.171.11.190.1000.8.10.3.0.1
13.1.23	**CPU Protect**	
13.1.23.1	cpuProtectTrapList	1.3.6.1.4.1.171.11.190.1000.8.22.2.0

Appendix C - RADIUS Attributes Assignment

The RADIUS Attributes Assignment on the DGS-1250 is used in the following modules: Console, Telnet, SSH, Web, 802.1X.

The description that follows explains the following RADIUS Attributes Assignment types:

- Privilege Level
- Ingress/Egress Bandwidth
- 802.1p Default Priority
- VLAN
- CoA

To assign the Privilege Level by the RADIUS server, the proper parameters should be configured on the RADIUS server. The table below shows the parameters for the bandwidth. The parameters of the

Vendor-Specific attributes are:

Vendor-Specific Attribute	Description	Value	Usage
Vendor-ID	Defines the vendor.	171 (DLINK)	Required
Vendor-Type	Defines the attribute.	1	Required
Attribute-Specific Field	Used to assign the privilege level of the user to operate the switch.	User 3, Operator 4 and Admin 5	Required

If the user has configured the privilege level attribute of the RADIUS server (for example, level 5) and the Console, Telnet, SSH, and Web authentication is successful, the device will assign the privilege level (according to the RADIUS server) to this access user. However, if the user does not configure the privilege level attribute and authenticates successfully, the device will not assign any privilege level to the access user. If the privilege level is configured less than the minimum supported value or greater than the maximum supported value, the privilege level will be ignored.

D-Link User-Level map DGS-1250 series User-Level info

Privilege shown in RADIUS server	Privilege used in switch FW	User Level
3	1	User
4	12	Operator
5	15	Administrator

To assign the **Ingress/Egress Bandwidth** by the RADIUS server, the proper parameters should be configured on the RADIUS Server. The table below shows the parameters for bandwidth.

The parameters of the Vendor-Specific attributes are:

Vendor-Specific Attribute	Description	Value	Usage
Vendor-ID	Defines the vendor.	171 (DLINK)	Required

Vendor-Type	Defines the attribute.	2 (for ingress bandwidth) 3 (for egress bandwidth)	Required
Attribute-Specific Field	Used to assign the bandwidth of a port.	Unit (Kbits)	Required

If the user has configured the bandwidth attribute of the RADIUS server (for example, ingress bandwidth 1000Kbps), and 802.1X authentication is successful, the device will assign the bandwidth (according to the RADIUS server) to the port. However, if the user does not configure the bandwidth attribute and authenticates successfully, the device will not assign any bandwidth to the port. If the bandwidth attribute is configured on the RADIUS server with a value of “0”, the effective bandwidth will be set “no_limited”, and if the bandwidth is configured less than “0” or greater than maximum supported value, the bandwidth will be ignored.

To assign the **802.1p Default Priority** by the RADIUS server, the proper parameters should be configured on the RADIUS server. The table below shows the parameters for 802.1p default priority.

The parameters of the Vendor-Specific attributes are:

Vendor-Specific Attribute	**Description**	**Value**	**Usage**
Vendor-ID	Defines the vendor.	171 (DLINK)	Required
Vendor-Type	Defines the attribute.	4	Required
Attribute-Specific Field	Used to assign the 802.1p default priority of the port.	0 to 7	Required

If the user has configured the 802.1p priority attribute of the RADIUS server (for example, priority 7) and 802.1X authentication is successful, the device will assign the 802.1p default priority (according to the RADIUS server) to the port. However, if the user does not configure the priority attribute and authenticates successfully, the device will not assign a priority to this port. If the priority attribute is configured on the RADIUS server is a value out of range (>7), it will not be set to the device.

To assign the **VLAN** by the RADIUS server, the proper parameters should be configured on the RADIUS server. To use VLAN assignment, RFC3580 defines the following tunnel attributes in RADIUS packets.

The table below shows the parameters for a VLAN:

RADIUS Tunnel Attribute	**Description**	**Value**	**Usage**
Tunnel-Type	This attribute indicates the tunneling protocol(s) to be used (in the case of a tunnel initiator) or the tunneling protocol in use (in the case of a tunnel terminator).	13 (VLAN)	Required
Tunnel-Medium-Type	This attribute indicates the transport medium	6 (802)	Required

	being used.		
Tunnel-Private-Group-ID	This attribute indicates group ID for a particular tunneled session.	ASCII (VID)	Required

To assign the **CoA** by the RADIUS server, the proper parameters should be configured on the RADIUS server. The table below shows the parameters for CoA.

The parameters of the Vendor-Specific attributes are:

RADIUS Tunnel Attribute	Description	Value	Usage
Vendor-ID	Defines the vendor.	171 (DLINK)	Required
Vendor-Type	Defines the attribute.	23 (need to register it)	Required
Attribute-Specific Field	Used to assign the Dlink-AV-Pair.	disable-host-port bounce-host-port	Required

RADIUS CoA is used to change client authorizations in the following use cases:

- Session termination with port shutdown: The RADIUS server CoA disable port command administratively shuts down the authentication port that is hosting a session, resulting in session termination. This command is useful when a host is known to cause problems on the network and network access needs to be immediately blocked for the host. To restore network access on the port, re-enable it using a non- RADIUS mechanism. This command is carried in a standard CoA-Request message that has this new vendor-specific attribute (VSA): Dlink-AV-Pair = disable-host-port.
- Session termination with port bounce: When a CoA message is used to change the VLAN for an authenticated host, end devices such as printers do not have a mechanism to detect the VLAN change, so they do not renew the lease for their DHCP address in the new VLAN. The port bounce feature can be used to force the end device to initiate DHCP re-negotiation by causing a link flap on the authenticated port. The port is bounced if the following VSA attribute-value pair is received in the CoA message from the RADIUS server: Dlink-AV-Pair = bounce-host-port.

Appendix D - IETF RADIUS Attributes Support

Remote Authentication Dial-In User Service (RADIUS) attributes carry specific authentication, authorization, information and configuration details for the request and reply. This appendix lists the RADIUS attributes currently supported by the switch.

RADIUS attributes are supported by the IETF standard and Vendor-Specific Attribute (VSA). VSA allows the vendor to create an additionally owned RADIUS attribute. For more information about D-Link VSA, refer to the **RADIUS Attributes Assignment** Appendix.

IETF standard RADIUS attributes are defined in the RFC 2865 Remote Authentication Dial-In User Service (RADIUS), RFC 2866 RADIUS Accounting, RFC 2868 RADIUS Attributes for Tunnel Protocol Support, and RFC 2869 RADIUS Extensions.

The following table lists the IETF RADIUS attributes supported by the D-Link switch.

RADIUS Authentication Attributes:

Number	IETF Attribute
1	User-Name
2	User-Password
18	Reply-Message
24	State
26	Vendor-Specific
27	Session-Timeout
29	Termination-Action
64	Tunnel-Type
65	Tunnel-Medium-Type
79	EAP-Message
80	Message-Authenticator
81	Tunnel-Private-Group-ID

Appendix E - ERPS Information

Only hardware-based ERPS (external PHY) supports the fast link drop interrupt feature with a recovery time of 50ms.

Model Name	ERPS	Port 1 to 24	Port 25 to 28
DGS-1250-28X	Hardware-based		
	Software-based	V	V

Model Name	ERPS	Port 1 to 24	Port 25 to 28
DGS-1250-28XP	Hardware-based		
	Software-based	V	V

Model Name	ERPS	Port 1 to 48	Port 49 to 52
DGS-1250-52X	Hardware-based		
	Software-based	V	V

Model Name	ERPS	Port 1 to 48	Port 49 to 52
DGS-1250-52XP	Hardware-based		
	Software-based	V	V