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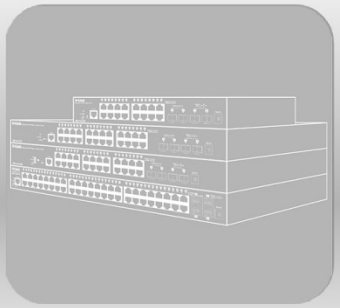


CLI Reference Guide

Product Model: DGS-1510 Series

Gigabit Ethernet SmartPro Switch

Release 1.10

Table of Contents

1. Introduction

This manual's command descriptions are based on the software release 1.10. The commands listed here are the subset of commands that are supported by the DGS-1510 Series SmartPro 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-1510 Series SmartPro 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-1510 Series Gigabit Ethernet SmartPro Switch Hardware Installation Guide*
- *DGS-1510 Series Gigabit Ethernet SmartPro Switch Web UI Reference Guide*

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 line are 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-1510-28P 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 three pre-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.
VLAN Configuration Mode	For applying settings to a VLAN.
IP Access-List Configuration Mode	For specifying filtering criteria for an IP access list.

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

By default, there is no user account created on this switch. For security reasons, it is highly recommended to create user accounts to manage and control access to this switch's interface. This section will assist a user with creating a user account by means of the Command Line Interface.

Observe the following example.

```
Switch>enable
Switch#configure terminal
Switch(config)#username admin password admin
Switch(config)#username admin privilege 15
Switch(config)#line console
Switch(config-line)#login local
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 admin password admin** creates a user account with the username of *admin* and a password of *admin*.
- The command **username admin privilege 15** assigns a privilege level value of 15 to the user account admin.
- The command **line console** allows us to access the console interface's Line Configuration Mode.
- The command **login local** tell the Switch that users need to enter locally configured login credentials to access the console interface.

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-1510-28P Gigabit Ethernet SmartPro Switch

                              Command Line Interface
                             Firmware: Build 1.10.001
          Copyright(C) 2014 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'll 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'll 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-1510 Series doesn't 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	Deletes the character under the cursor and shifts the remainder of the line to the left.
Backspace	Deletes the character to the left of the cursor and shifts the remainder of the line to the left.
Left Arrow	Moves the cursor to the left.
Right Arrow	Moves the cursor to the right.
CTRL+R	Toggles the 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
# AAA

configure terminal
# AAA START
 no aaa new-model
# AAA END
end

# PRIVMGMT
configure terminal
# COMMAND LEVEL START
# COMMAND LEVEL END
# LEVEL START
# LEVEL END
# ACCOUNT START
# ACCOUNT END
# LOGIN START
# LOGIN END
 end

# CLI


# BASIC
CTRL+C ESC q Quit SPACE n Next Page ENTER 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 # DEVICE
# DEVICE

Switch#
```

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

```
Switch#show running-config | exclude # DEVICE
Building configuration...

Current configuration : 34703 bytes

#------------------------------------------------------------------------------
#                 DGS-1510-28P Gigabit Ethernet SmartPro Switch
#                                Configuration
#
#                            Firmware: Build 1.10.001
#           Copyright(C) 2014 D-Link Corporation. All rights reserved.
#------------------------------------------------------------------------------


# STACK

end
end

configure terminal
end


# AAA

CTRL+C ESC q Quit SPACE n Next Page ENTER 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              rename              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
<cr>

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

2-2 enable

This command is used to enter the Privileged EXEC Mode.

enable [*PRIVILEGE-LEVEL***]**

Parameters

PRIVILEGE-LEVEL	(Optional) Specifies to set the privilege level for the user. The privilege level is between 1 and 15. If **not** specified, level 15 will be used.

Default

None.

Command Mode

User EXEC Mode.

Privilege EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Execute this command if the current level is lower than the command level. If the privileged level requires a password, enter it in the field provided. However, only three attempts are allowed. Failure to access this level returns the user to the current level.

Example

This example shows how to enter the Privileged EXEC Mode.

```
Switch# enable 15
password:***
Switch#
```

2-3 disable

This command is used to downgrade to a level lower user level than the privileged level.

disable [*PRIVILEGE-LEVEL***]**

Parameters

PRIVILEGE LEVEL	Specifies the privilege level to enter. If not specified, level 1 is used.

Default

None.

Command Mode

User EXEC Mode.

Privilege EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to enter the privilege level, which is lower than the current level. When using this command to enter the privilege level, that has a password configured, no password is needed.

Example

This example shows how to logout.

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

2-4 configure terminal

This command is used to enter the Global Configuration Mode.

configure terminal

Parameters

None.

Default

None

Command Mode

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)#
```

2-5 login (EXEC)

This command is used to configure a login username.

login

Parameters

None.

Default

None.

Command Mode

User EXEC Mode.

Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to change the login account. Three attempts are allowed to login to the Switch's interface. When using Telnet, if all attempts fail, access will return to the command prompt. If no information is entered within 60 seconds, the session will return to the state when logged out.

Example

This example shows how to login with username “user1”.

```
Switch# login

Username: user1
Password: xxxxx

Switch#
```

2-6 login (Line)

This command is used to set the line login method. Use the **no** form of the command to disable the login.

login [local]

no login

Parameters

login	Specifies that the line login method will be login.
local	Specifies that the line login method will be local.

Default

By default, there is no login details configured for the **console** line.

By default, there is a login method (by password) configured for the **Telnet** line.

By default, there is a login local method (by username and password) configured for the **SSH** line.

Command Mode

Line Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

For Console and Telnet access, when AAA is enabled, the line uses rules configured by the AAA module. When AAA is disabled, the line uses the following authentication rules:

- When login is disabled, the user can enter the line at Level 1.
- When the **by password** option is selected, after inputting the same password as the command password, the user enter the line at level 1. If the password wasn’t previously configured an error message will be displayed and the session will be closed.
- When the **username and password** option is selected, enter the username and password configured by the **username** command.

For SSH access, there are three authentication types:

- SSH public key,
- Host-based authentication, and
- Password authentication.

The SSH public key and host-based authentication types are independent from the login command in the line mode. If the authentication type is password, the following rules apply:

- When AAA is enabled, the AAA module is used.
- When AAA is disabled, the following rules are used:
  - When login is disabled, the username and password is ignored. Enter the details at Level 1.
  - When the **username and password** option is selected, use the username and password setup by the username command.
  - When the **password** option is selected, the username is ignored but a password is required using the password command to enter the line at level 1.

Example

This example shows how to enter the Line Configuration Mode and to create a password for the line user. This password only takes effect once the corresponding line is set to login.

```
Switch# configure terminal
Switch(config)# line console
Switch(config-line)# password loginpassword
Switch(config-line)#
```

This example shows how to configure the line console login method as “login”.

```
Switch# configure terminal
Switch(config)# line console
Switch(config-line)# login
Switch(config-line)#
```

This example shows how to enter the login command. The device will check the validity of the user from the **password create** command. If correct, the user will have access at the particular level.

```
Switch#login

Password:*************

Switch#
```

This example shows how to create a username “useraccount” with the password of “pass123” and use Privilege 12.

```
Switch# configure terminal
Switch(config)# username useraccount privilege 12 password 0 pass123
Switch(config)#
```

This example shows how to configure the login method as login local.

```
Switch# configure terminal
Switch(config)# line console
Switch(config-line)# login local
Switch(config-line)#
```

2-7 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
```

2-8 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 eth1/0/1
Switch(config-if)#end
Switch#
```

2-9 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 eth1/0/1
Switch(config-if)#exit
Switch(config)#
```

2-10 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#
```

2-11 show environment

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

show environment [fan | power | temperature]

Parameters

fan	(Optional) Specifies to display the Switch fan detailed status.
power	(Optional) Specifies to display the Switch power 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 a specific type is not specified, all types of environment information will be displayed.

Example

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

```
Switch#show environment

Detail Temperature Status:
Unit     Temperature Descr/ID          Current/Threshold Range
-----   ----------------------------------------------------
1        Central Temperature/1         27C/11~79C
Status code: * temperature is out of threshold range

Detail Fan Status:
-------------------------------------------------------------
  Right Fan 1 (OK)     Right Fan 2 (OK)

Detail Power Status:
Unit    Power Module      Power Status
-----   ---------------   -------------
1       Power 1           in-operation

Switch#
```

Display Parameters

Power status	**in-operation:** The power rectifier is in normal operation. **failed:** The power rectifier not working normally. **empty:** The power rectifier is not installed.

2-12 show unit

This command is used to display information about system units.

show unit [*UNIT-ID***]**

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

Unit         Model Descr                              Model Name
----  ----------------------------------------  ------------------
 1     No module description                     DGS-1510-28P

Unit         Serial-Number                Status        Up Time
----  --------------------------------  ---------  -----------------
 1                                       ok         0DT6H32M18S

Unit   Memory     Total       Used        Free
----  --------  ----------  ----------  ----------
 1     DRAM      131072 K     66567 K     64505 K
 1     FLASH      29937 K      7799 K     22138 K

Switch#
```

2-13 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 5 second, 1 minute, and 5 minute intervals.

Example

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

```
Switch#show cpu utilization

CPU Utilization

Five seconds -   8 %         One minute -   7 %         Five minutes -   7 %


Switch#
```

2-14 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

This example shows how to displays version information about the Switch.

```
Switch#show version

System MAC Address: 00-01-02-03-04-00

Unit ID    Module Name            Versions
-------  ------------------  ---------------------
   1      DGS-1510-28P        H/W:A1
                              Bootloader:1.00.006
                              Runtime:1.10.001


Switch#
```

2-15 snmp-server enable traps environment

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

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

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

Parameters

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

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 unit 1 thermal 1 high 100 low 20
Switch(config)#
```

2-16 environment temperature threshold

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

environment temperature threshold unit *UNIT-ID* **thermal** *THREMAL-ID* **[high** *VALUE***] [low** *VALUE***]**

no environment temperature threshold unit *UNIT-ID* **thermal** *THREMAL-ID* **[high] [low]**

Parameters

unit *UNIT-ID*	Specifies the unit ID.
thermal *THERMAL-ID*	Specifies the thermal sensor's ID.

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 unit 1 thermal 1 high 100 low 20
Switch(config)#
```

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 eth1/0/1
Switch#
```

3-2 dot1x control-direction

This command is used to configure the direction of the traffic on a controlled port as unidirectional (in) or bidirectional (both). Use the **no** form of the command to reset to the default setting.

dot1x control-direction {both | in}

no dot1x control-direction

Parameters

both	Specifies to enable bidirectional control for the port.
in	Specifies to enable in direction control for the port.

Default

By default, this option is bidirectional mode.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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.

Suppose that port control is set to **auto**. If the control direction is set to **both**, then the port can receive and transmit EAPOL packets only. All user traffic is blocked before authentication. If the control direction is set to **in**, then in addition to receiving and transmitting EAPOL packets, the port can transmit user traffic but not receive user traffic before authentication.

Example

This example shows how to configure the controlled direction of the traffic through Ethernet eth1/0/1 as unidirectional.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# dot1x control-direction in
Switch(config-if)#
```

3-3 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 disabled.

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 eth1/0/1
Switch(config-if)# dot1x default
Switch(config-if)#
```

3-4 dot1x port-control

This command is used to control the authorization state of a port. Use the **no** 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 eth1/0/1
Switch(config-if)# dot1x port-control force-unauthorized
Switch(config-if)#
```

3-5 dot1x forward-pdu

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

dot1x forward-pdu

no dot1x forward-pdu

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. 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 eth1/0/1
Switch(config-if)# dot1x forward-pdu
Switch(config-if)#
```

3-6 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 eth1/0/1
Switch#
```

3-7 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 process. Use the **no** form of the command to reset 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 eth1/0/1
Switch(config-if)# dot1x max-req 3
Switch(config-if)#
```

3-8 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 eth1/0/1
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 eth1/0/1
Switch(config-if)# no dot1x pae authenticator
Switch(config-if)#
```

3-9 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 eth1/0/1
Switch#
```

3-10 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 return 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)#
```

3-11 dot1x timeout

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

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 Switch will 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 server timeout value, supplicant timeout value, and the TX period on Ethernet port 1/0/1 to be 15, 15, and 10 seconds, respectively.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
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)#
```

3-12 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                   : Enabled

Switch#
```

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

```
Switch# show dot1x interface eth1/0/1

Interface                  : eth1/0/1
PAE                        : Authenticator
Control Direction          : Both
Port Control               : Auto
Tx Period                  : 30 sec
Supp Timeout               : 30 sec
Server Timeout             : 30 sec
Max-req                    : 2 times
Forward PDU                : Disabled

Switch#
```

3-13 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 eth1/0/1

eth1/0/1 dot1x diagnostic information are following:
EntersConnecting                      : 20
EAP-LogoffsWhileConnecting            : 0
EntersAuthenticating                  : 0
SuccessesWhileAuthenticating          : 0
TimeoutsWhileAuthenticating           : 0
FailsWhileAuthenticating              : 0
ReauthsWhileAuthenticating            : 0
EAP-StartsWhileAuthenticating         : 0
EAP-LogoffsWhileAuthenticating        : 0
ReauthsWhileAuthenticated             : 0
EAP-StartsWhileAuthenticated          : 0
EAP-LogoffsWhileAuthenticated         : 0
BackendResponses                      : 0
BackendAccessChallenges               : 0
BackendOtherRequestsToSupplicant      : 0
BackendNonNakResponsesFromSupplicant  : 0
BackendAuthSuccesses                  : 0
BackendAuthFails                      : 0

Switch#
```

3-14 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 eth1/0/1

eth1/0/1 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#
```

3-15 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 eth1/0/1

eth6/0/1 session statistic counters are following:
SessionOctetsRX                       : 0
SessionOctetsTX                       : 0
SessionFramesRX                       : 0
SessionFramesTX                       : 0
SessionId                             :
SessionAuthenticationMethod           : Remote Authentication Server
SessionTime                           : 0
SessionTerminateCause                 :SupplicantLogoff
SessionUserName                       :

Switch#
```

3-16 snmp-server enable traps dot1x

This command is used to enable sending SNMP notifications for 802.1X authentication. Use the **no** form of the 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 access list entries in an access list. Use the **no** form of the command to reset to the default setting.

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

no access-list resequence

Parameters

NAME	Specifies the name of the access list to be configured. It can be a maximum of 32 characters.
NUMBER	Specifies the number of the access list to be configured.
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 extended access-list R&D
Switch(config-ip-ext-acl)# 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 the command to disable the ACL hardware counter function.

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

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

Parameters

access-group *ACCESS-LIST-NAME*	Specifies the name of the access list to be configured.
access-group *ACCESS-LIST-NUMBER*	Specifies the number of the access list to be configured.
vlan-filter *ACCESS-MAP-NAME*	Specifies the name of the access map 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 action

This command is used to configure the forward, drop, or redirect action of the sub-map in the VLAN access-map sub-map configuration mode. Use the **no** command to reset to the default action.

action {forward | drop | redirect *INTERFACE-ID***}**

no action

Parameters

forward	Specifies to forward the packet when matched.
drop	Specifies to drop the packet when matched.
redirect *INTERFACE-ID*	Specifies the interface ID for the redirection action. Only physical ports are allowed to be specified.

Default

By default, the action is **forward**.

Command Mode

VLAN Access-map Sub-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

One sub-map has only one action. The action configured later overwrites the previous action. A VLAN access map can contain multiple sub-maps. The packet that matches a sub-map (a packet permitted by the associated access-list) will take the action specified for the sub-map. No further checking against the next sub-maps is done. If the packet does not match a sub-map, then the next sub-map will be checked.

Example

This example shows how to configure the action in the sub-map.

```
Switch# show vlan access-map
VLAN access-map vlan-map 20
  match mac address: ext_mac(ID: 6856)
  action: forward
Switch# configure terminal
Switch(config)# vlan access-map vlan-map 20
Switch(config-access-map)# action redirect eth1/0/5
Switch(config-access-map)# end
Switch# show vlan access-map
VLAN access-map vlan-map 20
  match mac address:  ext_mac(ID: 6856)
  action: redirect eth1/0/5
Switch#
```

4-4 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***] | vlan-filter [***ACCESS-MAP-NAME***]}**

Parameters

access-group *ACCESS-LIST-NAME*	Specifies the name of the access list to be cleared.
access-group *ACCESS-LIST-NUMBER*	Specifies the number of the access list to be configured.
vlan-filter *ACCESS-MAP-NAME*	Specifies the name of the access map to be cleared.

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#
```

4-5 expert access-group

This command is used to apply a specific expert ACL to an interface. Use the **no** 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 access list 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 eth1/0/2
Switch(config-if)# expert access-group exp_acl in
Switch(config-if)# end
Switch# show access-group interface eth1/0/2
eth1/0/2:
  Inbound expert access-list : exp_acl(ID: 8999)
Switch#
```

4-6 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** 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 access list. For extended expert access lists, 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 access list 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#
```

4-7 ip access-group

This command is used to specify the IP access list 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 access list to be applied. The maximum length is 32 characters.
NUMBER	Specifies the number of the IP access list 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 access list “Strict-Control” as an IP access group for an Ethernet port 6/0/2.

```
Switch# configure terminal
Switch(config)# interface eth6/0/2
Switch(config-if-gi)#ip access-group Strict-Control
The remaining applicable IP related access entries are 526
Switch(config-if-gi)#
```

4-8 ip access-list

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

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 access list 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 access lists. The characters used in the name are case sensitive. If the access list 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 access list, 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)# 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)# permit host 172.16.65.193 any
Switch(config-ip-acl)#
```

4-9 ipv6 access-group

This command is used to specify the IPv6 access list to be applied to an interface. Use the **no** 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 access list to be applied.
NUMBER	Specifies the number of the IPv6 access list 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 access list “ip6-control” as an IP access group for eth3/0/3.

```
Switch# configure terminal
Switch(config)# interface eth3/0/3
Switch(config-if)# ipv6 access-group ip6-control in
The remaining applicable IPv6 related access entries are 156
Switch(config-if)#
```

4-10 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 access list.

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 access list 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 access lists. The characters used in the name are case sensitive. If the access list 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 access list, named ip6-control.

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

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

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

4-11 list-remark

This command is used to add remarks for the specified ACL. Use the **no** command to delete 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 extended access-list 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#
```

4-12 mac access-group

This command is used to specify a MAC access list to be applied to an interface. Use the **no** 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 access list to be applied.
NUMBER	Specifies the number of the MAC access list 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 access list daily-profile to Ethernet port 5/0/1.

```
Switch# configure terminal
Switch(config)# interface eth5/0/1
Switch(config-if-gi)# mac access-group daily-profile in
The remaining applicable MAC access entries are 204
Switch(config-if-gi)#
```

4-13 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** command to delete a MAC access list.

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

no mac acces-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 access list 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 access list 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)#
```

4-14 match ip address

This command is used to associate an IP access list for the configured sub-map. The **no** form of this command removes the match entry.

match ip address {*ACL-NAME* **|** *ACL-NUMBER***}**

no match ip address

Parameters

ACL-NAME	Specifies the name of the ACL access list to be configured. The name can be up to 32 characters.
ACL-NUMBER	Specifies the number of the IP ACL access list to be configured.

Default

None.

Command Mode

VLAN Access-map Sub-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to associate an IP access list with the configured sub-map. One sub-map can only be associated with one access list (IP access list, IPv6 access list or MAC access list). IP sub-map just checks IP packets. The newer command overwrites the previous setting.

Example

This example shows how to configure the match content in the sub-map.

```
Switch# configure terminal
Switch(config)# vlan access-map vlan-map 20
Switch(config-access-map)# match ip address sp1
Switch(config-access-map)# end
Switch# show vlan access-map

VLAN access-map vlan-map 20
  match ip address:  sp1(ID: 1999)
  action: forward

Switch#
```

4-15 match ipv6 address

This command is used to associate IPv6 access lists for the configured sub-maps. The **no** form of this command removes the match entry.

match ipv6 address {*ACL-NAME* **|** *ACL-NUMBER***}**

no match ipv6 address

Parameters

ACL-NAME	Specifies the name of the IPv6 ACL access list to be configured. The name can be up to 32 characters.
ACL-NUMBER	Specifies the number of the IPv6 ACL access list to be configured.

Default

None.

Command Mode

VLAN Access-map Sub-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to associate an IPv6 access list with the configured sub-map. One sub-map can only be associated with one access list (IP access list, IPv6 access list or MAC access list). IPv6 sub-map just checks IPv6 packets. The later command overwrites the previous setting.

Example

This example shows how to set the match content in the sub-map.

```
Switch# configure terminal
Switch(config)# vlan access-map vlan-map 20
Switch(config-access-map)# match ipv6 address sp1
Switch(config-access-map)# end
Switch# show vlan access-map

VLAN access-map vlan-map 20
  match ipv6 address:  sp1(ID: 12999)
  action: forward

Switch#
```

4-16 match mac address

This command is used to associate MAC access lists for the configured sub-maps. The **no** form of this command removes the match entry.

match mac address {*ACL-NAME* **|** *ACL-NUMBER***}**

no match mac address

Parameters

ACL-NAME	Specifies the name of the ACL MAC access list to be configured. The name can be up to 32 characters.
ACL-NUMBER	Specifies the number of the ACL MAC access list to be configured.

Default

None.

Command Mode

VLAN Access-map Sub-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to associate a MAC access list with the configured sub-map. One sub-map can only be associated with one access list (IP access list, IPv6 access list or MAC access list). MAC sub-map just check non-IP packets. The later command overwrites the previous setting.

Example

This example shows how to set the match content in the sub-map.

```
Switch# configure terminal
Switch(config)# vlan access-map vlan-map 30
Switch(config-access-map)# match mac address ext_mac
Switch(config-access-map)# end
Switch# show vlan access-map

VLAN access-map vlan-map 20
  match ip address:  sp1(ID: 3999)
  action: forward
VLAN access-map vlan-map 30
  match mac address:  ext_mac(ID: 7999)
  action: forward

Switch#
```

4-17 permit | deny (expert access-list)

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

Extended Expert ACL:

[*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***]**

[*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***]**

[*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***]**

[*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) Specifiese 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.
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)# deny tcp host 192.168.4.12 host 0013.0049.8272 any any
Switch(config-exp-nacl)# end
Switch# show access-lists

Extended Expert access list exp_acl(ID: 9999)
  10 deny tcp host 192.168.4.12 host 0013.0049.8272 any any

Switch#
```

4-18 permit | deny (ip access-list)

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

Extended Access List:

[*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***]**

[*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***]**

[*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***]**

[*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***]**

[*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:

[*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) Specifiese the packet fragment's filtering.
time-range *PROFILE-NAME*	(Optional) Specifies the name of the time period profile associated with the access list 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 extended access-list Strict-Control
Switch(config-ip-ext-acl)# permit tcp any 10.20.0.0 0.0.255.255
Switch(config-ip-ext-acl)# permit tcp any host 10.100.1.2
Switch(config-ip-ext-acl)# permit tcp any any eq 80
Switch(config-ip-ext-acl)# 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)# permit any 10.20.0.0 0.0.255.255
Switch(config-ip- acl)# permit any host 10.100.1.2
Switch(config-ip- acl)#
```

4-19 permit | deny (ipv6 access-list)

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

Extended IPv6 Access List:

[*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***]**

[*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***]**

[*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***]**

[*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***]**

[*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:

[*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) Specifiese 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)# permit tcp any ff02::0:2/16
Switch(config-ipv6-ext-acl)# permit tcp any host ff02::1:2
Switch(config-ipv6-ext-acl)# permit tcp any any eq 80
Switch(config-ipv6-ext-acl)# 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)# permit any ff02::0:2/16
Switch(config-ipv6-acl)# permit any host ff02::1:2
Switch(config-ipv6-acl)#
```

4-20 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 command to remove an entry

[*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 hexidecimal 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-NAME*	(Optional) Specifies the name of time period profile associated with the access list 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)# permit 00:80:33:00:00:00  00:00:00:ff:ff:ff any
Switch(config-mac-ext-acl)# permit 00:f4:57:00:00:00 00:00:00:ff:ff:ff any
Switch(config-mac-ext-acl)#
```

4-21 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 access lists that are applied to all of the interfaces.

```
Switch# show access-group

eth1/0/1:
  Inbound mac access-list : simple-mac-acl(ID: 7998)
  Inbound ip access-list  : simple-ip-acl(ID: 1998)

Switch#
```

4-22 show access-list

This command is used to display the access list 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 access lists.
mac	(Optional) Specifies to display a listing of all MAC access lists.
ipv6	(Optional) Specifies to display a listing of all IPv6 access lists.
expert	(Optional) Specifies to display a listing of all expert access lists.
NAME | *NUMBER*	Specifies to display the contents of the specified access list.
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 access list 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 access list 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): eth1/0/5-eth1/0/8

Switch#
```

4-23 show vlan access-map

This command is used to display the VLAN access-map configuration information.

show vlan access-map [*MAP-NAME***]**

Parameters

MAP-NAME	(Optional) Specifies the name of the VLAN access map being configured. The name can be up to 32 characters.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If no access-map name is specified, all VLAN access-map information will be displayed. If the user enables the ACL hardware counter for an access-map, the counter will be displayed based on each sub-map.

Example

This example shows how to display the VLAN access-map.

```
Switch# show vlan access-map

VLAN access-map vlan-map 10
  match ip access list: stp_ip1(ID: 1888)
action: forward
VLAN access-map vlan-map 20
  match mac access list:  ext_mac(ID: 6995)
  action: redirect  eth1/0/5

Switch#
```

This example shows how to display the contents of the VLAN access-map if its hardware counter is enabled.

```
Switch# show vlan access-map

VLAN access-map vlan-map 10
  match ip access list: stp_ip1(ID: 1888)
action: forward
Counter enable on VLAN(s): 1-2
match count: 8541 packets
VLAN access-map vlan-map 20
  match mac access list:  ext_mac(ID: 6995)
action: redirect  eth1/0/5
Counter enable on VLAN(s): 1-2
match count: 5647 packets

Switch#
```

4-24 show vlan filter

This command is used to display the VLAN filter configuration of VLAN interfaces.

show vlan filter [access-map *MAP-NAME* **| vlan** *VLAN-ID***]**

Parameters

MAP-NAME	(Optional) Specifies the name of the VLAN access map. The name can be up to 32 characters.
VLAN-ID	(Optional) Specifies the VLAN ID.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

The **show vlan filter access-map** command is used to display the VLAN filter information by access map. The command **show vlan filter vlan** is used to display the VLAN filter information by VLAN.

Example

This example shows how to display VLAN filter information.

```
Switch# show vlan filter

VLAN Map aa
  Configured on VLANs: 5-127,221-333
VLAN Map bb
  Configured on VLANs: 1111-1222

Switch#

Switch# show vlan filter vlan 5

VLAN ID 5
  VLAN Access Map: aa

Switch#
```

4-25 vlan access-map

This command is used to create a sub-map of a VLAN access map and enter the VLAN access-map sub-map configure mode. The **no** form of this command used to delete an access-map or its sub-map.

vlan access-map *MAP-NAME* **[***SEQUENCE-NUM***]**

no vlan access-map *MAP-NAME* **[***SEQUENCE-NUM***]**

Parameters

MAP-NAME	Specifies the name of the VLAN access map to be configured. The name can be up to 32 characters.
SEQUENCE-NUM	(Optional) Specifies the sequence number of the sub-map. The valid

range is from 1 to 65535.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A VLAN access map can contain multiple sub-maps. For each sub-map, one access list (IP access list, IPv6 access list or MAC access list) can be specified and one action can be specified. After a VLAN access map is created, the user can use the **vlan filter** command to apply the access map to VLAN(s).

A sequence number will be assigned automatically if the user does not assign it manually, and the automatically assigned sequence number starts from 10, and increase 10 per new entry.

The packet that matches the sub-map (that is packet permitted by the associated access-list) will take the action specified for the sub-map. No further check against the next sub-maps is done. If the packet does not match a sub-map, then the next sub-map will be checked.

Using the **no** form of this command without specify sequence numbers, will delete all sub-map information of the specified access-map.

Example

This example shows how to create a VLAN access map.

```
Switch# configure terminal
Switch(config)# vlan access-map vlan-map 20
Switch(config-access-map)#
```

4-26 vlan filter

This command is used to apply a VLAN access map in a VLAN. Use the **no** command to remove a VLAN access map from the VLAN.

vlan filter *MAP-NAME* **vlan-list** *VLAN-ID-LIST*

no vlan filter *MAP-NAME* **vlan-list** *VLAN-ID-LIST*

Parameters

MAP-NAME	Specifies the name of the VLAN access map.
VLAN-ID-LIST	Specifies the VLAN ID list.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A VLAN can only be associated with one VLAN access map.

Example

This example shows how to apply the VLAN access-map “vlan-map” in VLAN 5.

```
Switch# configure terminal
Switch(config)# vlan filter vlan-map vlan-list 5
Switch(config-access-map)# end
Switch# show vlan filter

VLAN Map vlan-map
  Configured on VLANs: 5

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 the 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)# 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 prompt

This command is used to customize the CLI prompt. Use **no** form of this command to revert back to the default settings.

prompt *STRING*

no prompt

Parameters

STRING	Specifies a string to customize the CLI prompt. The prompt will be composed based on the specified characters or the following control characters. The space character in the string is ignored. • % h - Specifies to encode the SNMP server name. • %s - Specifies to have space. • %% - Specifies to encode the % symbol.

Default

By default, the string encoes the SNMP server name.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to customize the CLI prompt.

If the user selects to encode the SNMP server name as the prompt, only the first 15 characters are encoded.

The privileged level character will appear as the last character of the prompt. The character is defined as follows.

- **>** - Represents user level.
- # - Represents privileged user level.

Example

This example shows how to change the prompt to “BRANCH A”.

```
Switch#configure terminal
Switch(config)#prompt BRANCH%sA
BRANCH A(config)#
```

This example shows how to set the command prompt back to the default setting.

```
BRANCH A#configure terminal
BRANCH A(config)#no prompt
Switch(config)#
```

5-3 enable password

This command is used to setup enable password to enter different privileged levels. Use the **no** form of the command to return the password to the empty string.

enable password [level *PRIVILEGE-LEVEL***] [0| 7]** *PASSWORD*

no enable password [level *PRIVILEGE-LEVEL***]**

Parameters

level *PRIVILEGE-LEVEL*	Specifies the privilege level for the user. The privilege level is between 1 and 15. If this argument is not specified in the command or the no form of the command, the privilege level defaults to 15 (traditional enable privileges).
0 *PASSWORD*	Specifies the password the user must enter to gain access to the Switch. The password can contain embedded spaces. The password is case-sensitive. This is the default option. The plain-text password maximum length is 32. (The range is 1-32)
7 *PASSWORD*	Specifies the password in the encrypted form based on SHA-I. For the encrypted form password, the length is fixed to 35 bytes long. The password is case-sensitive. The syntax is Encrypted Password.

Default

By default, no password is set. It is an empty string.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

The exact password for a specific level needs to be used to enter the privilege level. Each level has only one password to enter the level.

Example

This example shows how to create an **enable** password at the privilege level 15 of “MyEnablePassword”.

```
Switch# configure terminal
Switch(config) #enable password MyEnablePassword
Switch# disable
Switch# enable
Password:****************
Switch# show privilege
Current privilege level is 15
Switch#
```

5-4 ip http server

This command is used to enable the HTTP server. Use the **no** form of the 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
Switch(config)#
```

5-5 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 the command to disable 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 keyword is 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: 12.

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)#
```

5-6 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 the 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)# permit 226.1.1.1 255.255.255.255
Switch(config-ip-acl)# exit
Switch(config)# ip http access-class http-filter
Switch(config)#
```

5-7 ip http service-port

This command is used to specify the HTTP service port. Use the **no** form of the command to return 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 the HTTP TCP port number to 8080.

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

5-8 ip http timeout-policy idle

This command is used to to set idle timeout of a http server connection in seconds. Use the **no** form of the command to set 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. Use the **no** form to set the value to 180.

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)#
```

5-9 ip telnet server

This command is used to enable a Telnet server. Use the **no** form of the 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)#
```

5-10 ip telnet service port

This command is used to specify the service port for Telnet. Use the **no** form of the command to return the service port to 23.

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)#
```

5-11 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 line.
telnet	Specifies the Telnet terminal line
ssh	Specifies the SSH terminal line

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 SSH terminal line and configures its access class as ”vty-filter”.

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

5-12 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 the command to disable the encryption.

service password-encryption

no service password-encryption

Parameters

None.

Default

By default, this option is disabled.

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 encryption option, 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 of the password before stored in the configuration file.

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

5-13 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: 24 lines
Width: 80 columns
Default Length: 24 lines
Default Width: 80 columns
Baud rate: 9600 bps

Switch#
```

5-14 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#
```

5-15 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#
```

5-16 show ip http secure-server

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

show ip http secure-server

Parameters

None.

Default

By default, the state is disabled.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information about the SSL status.

Example

This example shows how to display information about the SSL status.

```
Switch#show ip http secure-server

ip http secure-server state :  disable
Switch#
```

5-17 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

Type      User-Name           Privilege Login-Time          IP address
------------------------------------------------------------------------------
* console Anonymous           15        2M57S

Total Entries: 1

Switch#
```

5-18 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 default terminal length 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 **no** form of this command to revert back to the default settings.

terminal length *NUMBER*

no terminal length

terminal length default *NUMBER*

no terminal length default

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 24.

Command Mode

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

Use the Global Configuration Mode for the **terminal length default** command.

Command Default Level

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

Level: 12 (for the **terminal length default** 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.

The **terminal length default** command is available in the global configuration mode. The command setting does not affect the current existing terminal sessions but affects the new terminal sessions that are activated later. Only the default terminal length value can be saved.

Example

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

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

5-19 terminal speed

This command is used to setup the terminal speed. Use the **no** form of the command to reset to the default setting.

terminal speed *BPS*

no terminal speed

Parameters

BPS	Specifies the console rate in bits per second (bps).

Default

By default, this value is 115200.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the terminal connection speed. Some baud rates available on the devices connected to the port might not be supported on the Switch.

Example

This example shows how to configure the serial port baud rate to 9600 bps.

```
Switch# configure terminal
Switch(config)# terminal speed 9600
Switch(config)#
```

5-20 session timeout

This command is used to configure the line session timeout value. Use the **no** form of the command to reset it to the default settings.

session-timeout *MINUTES*

no session-timeout

Parameters

MINUTES	Specifies the timeout length in minutes. 0 represents never timeout.

Default

By default, this value is 3 minutes.

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)#
```

5-21 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

terminal width default *NUMBER*

no terminal width default

Parameters

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

Default

By default, this value is 80 characters.

Command Mode

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

Use the Global Configuration Mode for the **terminal width default** command.

Command Default Level

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

Level: 12 (for the **terminal width default** 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.

The **terminal width default** command is available in the global configuration mode. The command setting does not affect the current existing terminal sessions but affect the new terminal sessions that are activated later and just the global terminal width value can be saved.

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

Length: 24 lines
Width: 80 columns
Default Length: 24 lines
Default Width: 80 columns
Baud rate: 9600

Switch# terminal width 120
Switch# show terminal

Length: 24 lines
Width: 120 columns
Default Length: 24 lines
Default Width: 80 columns
Baud rate: 9600

Switch #
```

5-22 username

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

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

no username [*NAME***]**

Parameters

NAME	Specifies the user name with a maximum of 32 characters.
privilege *LEVEL*	Specifies the privilege level for each user. The privilege level must be between 1 and 15.
nopassword	Specifies that there will be no password associated with this account.
password	Specifies the password for the user.
0	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 plain text.
7	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.
PASSWORD	Specifies the password string based on the type.

Default

By default, no username-based authentication system is established.

If not specified, use 1.

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 password encryption option 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 an administrative 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)#
```

5-23 password

This command is used to create a new password. Use the **no** form of the command to remove the password.

password [0 | 7] *PASSWORD*

no password

Parameters

0	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 plain text.
7	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.
PASSWORD	Specifies the password for the user.

Default

None.

Command Mode

Line Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command is used to create a new user password. Only one password can be used for each type of line.

Example

This example shows how to create a password for the console line.

```
Switch# configure terminal
Switch(config)# line console
Switch(config-line)# password 123
Switch(config-line)#
```

6. ARP Spoofing Prevention Commands

6-1 ip arp spoofing-prevention

This command is used to configure an ARP Spoofing Prevention (ASP) entry of the gateway used for preventing ARP poisoning attacks. Use the **no** form of the command to delete an ARP spoofing prevention entry.

ip arp spoofing-prevention *GATEWAY-IP GATEWAY-MAC* **interface** *INTERFACE-ID* **[,|-]**

no ip arp spoofing-prevention *GATEWAY-IP* **[interface** *INTERFACE-ID* **[,|-]]**

Parameters

GATEWAY-IP	Specifies the IP address of the gateway.
GATEWAY-MAC	Specifies the MAC address of the gateway. The MAC address setting will replace the last configuration for the same gateway IP address.
INTERFACE-ID	Specifies the interface that will be activated or removed from active interface list (in the **no** form of this command). An ARP entry won't be checked, if the receiving port is not included in the specified interface list.
,	(Optional) Specifies a number 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

By default, no entries exist.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the ARP spoofing prevention (ASP) entry to prevent spoofing of the MAC address of the protected gateway. When an entry is created, ARP packets whose sender IP address matches the gateway IP address, of an entry, but its sender MAC address field does not match the gateway MAC address, of the entry, will be dropped by the system. The ASP will bypass the ARP packets whose sender IP address doesn’t match the configured gateway IP address.

If an ARP address matches a configured gateway’s IP address, MAC address, and port list, then bypass the Dynamic ARP Inspection (DAI) check no matter if the receiving port is ARP ‘trusted’ or ‘untrusted’.

Only physical ports and port channel interfaces are valid interface to be specified.

Example

This example shows how to configure an ARP spoofing prevention entry with an IP address of 10.254.254.251 and MAC address of 00-00-00-11-11-11 and activate the entry at port eth2/0/10 and port channel 3.

```
Switch#configure terminal
Switch(config)# ip arp spoofing-prevention 10.254.254.251 00-00-00-11-11-11 interface
eth2/0/10
Switch(config)# ip arp spoofing-prevention 10.254.254.251 00-00-00-11-11-11 interface
port-channel 3
Switch(config)#
```

6-2 show ip arp spoofing-prevention

This command is used to display the configuration of ARP spoofing prevention.

show ip arp spoofing-prevention

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display all ARP spoofing prevention entries.

Example

This example shows how to display all ARP spoofing prevention entries.

```
Switch# show ip arp spoofing-prevention

IP              MAC               Interfaces
--------------- ----------------- --------------------------
10.254.254.251  00-00-00-11-11-11 eth2/0/10

Total Entries: 1

Switch#
```

Display Parameters

IP	The IP address of the gateway.
MAC	The MAC address of the gateway.
Interfaces	The interfaces on which the ARP spoofing prevention is active.

7. Asymmetric VLAN Commands

7-1 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
```

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

8-1 aaa accounting commands

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

aaa accounting commands *LEVEL* **{default |** *LIST-NAME***} start-stop** *METHOD1* **[***METHOD2...***]**

no aaa accounting commands *LEVEL* **{default |** *LIST-NAME***}**

Parameters

LEVEL	Specifies to do accounting for all configure commands at the specified privilege level. Valid privilege level entries are 1 to 15.
default	Specifies to configure the default method list for accounting.
LIST-NAME	Specifies the name of the method list. This name can be up to 32 characters long.
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 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 tacacs+** command. **none** – Specifies no 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 method list for accounting of commands.

Example

This example shows how to create a method list for accounting of the privilege level of 15 using TACACS+ and sends the accounting messages at the start and end time of access.

```
Switch#configure terminal
Switch(config)#aaa accounting commands 15 list-1 start-stop group tacacs+
Switch(config)#
```

8-2 aaa accounting exec

This command is used to configure the method list used for exec accounting for a specific line. Use the **no** form of the command to disable the accounting exec.

aaa accounting exec {default | *LIST-NAME***} start-stop** *METHOD1* **[***METHOD2...***]**

no aaa accounting exec {default | *LIST-NAME***}**

Parameters

default	Specifies to configure the default method list for EXEC accounting.
LIST-NAME	Specifies the name of the method list. This name can be up to 32 characters long.
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 method list for EXEC accounting.

Example

This example shows how to create a method list for accounting of user activities using RADIUS, which will send accounting messages at the start and end time of access.

```
Switch#configure terminal
Switch(config)#aaa accounting exec list-1 start-stop group radius
Switch(config)#
```

8-3 aaa accounting network

This command is used to account user activity in accessing the network. Use the **no** command to remove the accounting method list.

aaa accounting network default start-stop *METHOD1* **[***METHOD2...***]**

no aaa accounting network default

Parameters

network	Specifies to perform accounting of network related service requests.
start-stop	Specifies to send accounting messages at both the start time and the end time of access. Users are allowed of access the network regardless of whether the start accounting message enables the accounting successfully.
default	Specifies to configure the default method list for network accounting.
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 no 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)#
```

8-4 aaa accounting system

This command is used to account system events. Use the **no** command to remove the accounting method list.

aaa accounting system default start-stop *METHOD1* **[***METHOD2...***]**

no aaa accounting system default

Parameters

system	Specifies to perform accounting for system-level events.
start-stop	Specifies to send accounting messages at both the start time and the end time of access. Users are allowed to access the network regardless of whether the start accounting message enables the accounting successfully.
default	Specifies to configure the default method list for system accounting.
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 no 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 system-events such as reboot, reset events. 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 system events using RADIUS and sends the accounting messages while system event occurs:

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

8-5 aaa authentication enable

This command is used to configure the default method list used for determining access to the privileged EXEC level. Use the **no** command to remove the default method list.

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

no aaa authentication enable 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. **enable** – Specifies to use the local enable password for authentication. **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** - Normally, the method is listed as the last method. The user will pass the authentication if it is not denied by previous method 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 determining access to the privileged EXEC level when users issue the **enable [privilege LEVEL]** command. The authentication with the RADIUS server will be based on the privilege level and take either “enable12” or “enable15” as the user name.

Example

This example shows how to set the default method list for authenticating. The method tries the server group “group2”.

```
Switch#configure terminal
Switch(config)# aaa authentication enable default group group2
Switch(config)#
```

8-6 aaa authentication dot1x

This command is used to configure the default method list used for 802.1X authentication. Use the **no** 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 pass authentication if it is not denied by previous method 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)#
```

8-7 aaa authentication jwac

This command is used to configure the default method list used for JWAC authentication. Use the **no** command to remove the default method list.

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

no aaa authentication jwac 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 pass authentication if it is not denied by previous method

	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 JWAC authentication. Initially, the default method list is not configured. The authentication of JWAC 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 jwac default group radius
Switch(config)#
```

8-8 aaa authentication login

This command is used to configure the method list used for login authentication. Use the **no** command to remove a login method list.

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

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

Parameters

default	Specifies to configure the default method list for login authentication.
LIST-NAME	Specifies the name of the method list other than the default method list. This name can be up to 32 characters long.
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 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** - Normally, the method is listed as the last method. The user will pass authentication if it is not denied by previous method's authentication.

Default

No AAA authentication method list is configured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to configure the authentication method list used for login authentication. Multiple method lists can be configured. The default keyword is used to define the default method list.

If authentication uses the default method list but the default method list does not exist, then the authentication will be performed via the local database.

The login authentication authenticates the login user name and password, and also assigns the privilege level to the user based on the database.

A method list is a sequential list describing the authentication methods to be queried in order to authenticate a user. Method lists enable you to designate one or more security protocols to be used for authentication, thus ensuring a backup system for authentication in case the initial method fails. The switch system uses the first listed method to authenticate users. If that method fails to respond, the switch system selects the next authentication method listed in the method list. This process continues until there is successful communication with a listed authentication method or all methods defined in the method list are exhausted.

It is important to note that the switch system attempts authentication with the next listed authentication method only when there is no response from the previous method. If authentication fails at any point in this cycle, meaning that the security server or local username database responds by denying the user access, the authentication process stops and no other authentication methods are attempted.

Example

This example shows how to set the default login methods list for authenticating of login attempts.

```
Switch#configure terminal
Switch(config)# aaa authentication login default group group2 local
Switch(config)#
```

8-9 aaa authentication mac-auth

This command is used to configure the default method list used for MAC authentication. Use the **no** command to remove the default method list.

aaa authentication mac-auth default *METHOD1* **[***METHOD2...***]**

no aaa authentication mac-auth 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 pass authentication if it is not denied by previous method 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 MAC authentication. Initially, the default method list is not configured. The authentication of MAC request will be performed based on the local database.

Example

This example shows how to set the default methods list for authenticating mac-auth users.

```
Switch#configure terminal
Switch(config)# aaa authentication mac-auth default group radius
Switch(config)#
```

8-10 aaa authentication web-auth

This command is used to configure the default method list used for Web authentication. Use the **no** command to remove the default method list.

aaa authentication web-auth default *METHOD1* **[***METHOD2...***]**

no aaa authentication web-auth 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 pass authentication if it is not denied by previous method 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 Web authentication. Initially, the default method list is not configured. The authentication of the web-auth request will be performed based on the local database.

Example

This example shows how to set the default method list for authenticating web-auth users.

```
Switch#configure terminal
Switch(config)# aaa authentication web-auth default group radius
Switch(config)#
```

8-11 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 the command to remove a RADIUS server group

aaa group server radius *GROUP-NAME*

no aaa group server radius *GROUP-NAME*

Parameters

GROUP-NAME	Specifies the 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)#
```

8-12 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 the command to remove a TACACS+ server group

aaa group server tacacs+ *GROUP-NAME*

no aaa group server tacacs+ *GROUP-NAME*

Parameters

GROUP-NAME	Specifies the 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 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 by using the AAA authentication and AAA accounting command.

Example

This example shows how to create a TACACS+ server group with two entries.

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

8-13 aaa new-model

This command is used to enable AAA for the authentication or accounting function. Use the **no** form of the command to disable 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 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)#
```

8-14 accounting commands

This command is used to configure the method list used for command accounting via a specific line. Use the **no** form of the command to disable do accounting command.

accounting commands *LEVEL* **{default |** *METHOD-LIST***}**

no accounting commands *LEVEL*

Parameters

LEVEL	Specifies to do accounting for all **configure** commands at the specified privilege level. Valid privilege level entries are 1 to 15.
default	Specifies to do accounting based on the default method list.
METHOD-LIST	Specifies the name of the method list to use.

Default

By default, this option is disabled.

Command Mode

Line Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

For accounting via the method list to take effect, enable AAA first by using the **aaa new-model** command. Create the method list first by using the **aaa accounting commands** command. If the method list does not exist, the command does not take effect. The user can specify different method lists to account commands at different levels. A level can only have one method list specified.

Example

This example shows how to enable the command accounting level 15 configure command issued via the console using the accounting method list named “cmd-15” on the console.

```
Switch# configure terminal
Switch(config)# aaa accounting commands 15 cmd-15 start-stop group tacacs+
Switch(config)# line console
Switch(config-line)# accounting commands 15 cmd-15
Switch(config-line)#
```

8-15 accounting exec

This command is used to configure the method list used for EXEC accounting for a specific line. Use the **no** form of the command to disable the accounting EXEC option.

accounting exec {default | *METHOD-LIST***}**

no accounting exec

Parameters

default	Specifies to use the default method list.
METHOD-LIST	Specifies the name of the method list to use.

Default

By default, this option is disabled.

Command Mode

Line Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

For accounting via the method list to take effect, enable AAA first by using the **aaa new-model** command. Create the method list first by using the **aaa accounting exec** command. If the method list does not exist, the command does not take effect.

Example

This example shows how to configure the EXEC accounting method list with the name of “list-1”. It uses the RADIUS server. If the security server does not response, it does not perform accounting. After the configuration, the EXEC accounting is applied to the console.

```
Switch#configure terminal
Switch(config)# aaa accounting exec list-1 start-stop group radius
switch(config)# line console
switch(config-line)# accounting exec list-1
Switch(config-line)#
```

8-16 clear aaa counters servers

This command is used to clear the authentication and accounting (AAA) server statistic counters.

clear aaa counters servers {all | radius {*IP-ADDRESS* **|** *IPV6-ADDRESS* **| all} | tacacs {***IP-ADDRESS* **|** *IPV6-ADDRESS* **| all} | sg** *NAME***}**

Parameters

all	Specifies to clear server counter information related to all server hosts.
radius *IP-ADDRESS*	Specifies to clear server counter information related to a RADIUS IPv4 host.
radius *IPV6-ADDRESS*	Specifies to clear server counter information related to a RADIUS IPv6 host.
radius all	Specifies to clear server counter information related to all RADIUS hosts.
tacacs *IP-ADDRESS*	Specifies to clear server counter information related to a TACACS IPv4 host.
tacacs *IPV6-ADDRESS*	Specifies to clear server counter information related to a TACACS IPv6 host.
tacacs all	Specifies to clear server counter information related to all TACACS hosts.
sg *NAME*	Specifies to clear server counter information related to all hosts in a server group.

Default

None.

Command Mode

Privilege EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to clear the statistics counter related to AAA servers.

Example

This example shows how to clear AAA server counters.

```
Switch# clear aaa counters servers all
Switch#
```

This example shows how to clear AAA server counters information for all hosts in the server group “server-farm”.

```
Switch# clear aaa counters servers sg server-farm
Switch#
```

8-17 ip http authentication aaa login-authentication

This command is used to specify an AAA authentication method list for the authentication of the HTTP server users. Use the **no** form of the command to reset to use the default method list.

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

no ip http authentication aaa login-authentication

Parameters

default	Specifies to authenticate based on the default method list.
METHOD-LIST	Specifies the name of the method list to use.

Default

By default, this **default** option is used.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

For authentication via the method list to take effect, enable AAA first by using the **aaa new-model** command. Create the method list first by using the **aaa authentication login** command. If the method list does not exist, the command does not take effect, and the authentication will be done via the default login method list.

Example

This example shows how to configure HTTP sessions to use the method list “WEB-METHOD” for login authentication.

```
Switch# configure terminal
Switch(config)# aaa authentication login WEB-METHOD group group2 local
Switch(config)# ip http authentication aaa login-authentication WEB-METHOD
Switch(config)#
```

8-18 ip http accounting exec

This command is used to specify an AAA accounting method for HTTP server users. Use the **no** form of the command to reset to the default setting.

ip http accounting exec {default | *METHOD-LIST***}**

no ip http accounting exec

Parameters

default	Specifies to do accounting based on the default method list.
METHOD-LIST	Specifies the name of the method list to use.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

For accounting via the method list to take effect, enable AAA first by using the **aaa new-model** command. Create the method list first by using the **aaa accounting exec** command. If the method list does not exist, the command does not take effect.

Example

This example shows how to specify that the method configured for AAA should be used for accounting for HTTP server users. The AAA accounting method is configured as the RADIUS accounting method.

```
Switch# configure terminal
Switch(config)# aaa accounting exec list-1 start-stop group radius
Switch(config)# ip http accounting exec list-1
Switch(config)#
```

8-19 login authentication

This command is used to configure the method list used for login authentication via a specific line. Use the **no** form of the command to reset back to the default method list.

login authentication {default | *METHOD-LIST***}**

no login authentication

Parameters

default	Specifies to authenticate based on the default method list.
METHOD-LIST	Specifies the name of the method list to use.

Default

By default, the default method list is used.

Command Mode

Line Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

For authentication via the method list to take effect, enable AAA first by using the **aaa new-model** command. Create the method list first by using the **aaa authentication login** command. If the method list does not exist, the command does not take effect and the authentication will be done via the default login method list.

When **aaa new-model** is enabled, the default method list is used for authentication.

Example

This example shows how to set the local console line to use the method list “CONSOLE-LINE-METHOD” for login authentication.

```
Switch#configure terminal
Switch(config)# aaa authentication login CONSOLE-LINE-METHOD group group2 local
Switch(config)# line console
Switch(config-line)# login authentication CONSOLE-LINE-METHOD
Switch(config-line)#
```

8-20 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 the command to revert back 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)#
```

8-21 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***] [acct-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-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.
acct-port *PORT-NUMBER*	(Optional) Specifies the UDP destination port number for sending accounting packets. The range is 0 to 65535. Set the port number to zero if the server host is not for accounting purposes. The default value is 1813.
timeout *SECONDS*	Specifies the server time-out value. The range of timeout is between 1 and 255 seconds. If not specified, the default value is 5 seconds.
retransmit *COUNT*	(Optional) Specifies the retransmit times of requests to the server when no response is received. The value is from 0 to 20. Use 0 to disable the retransmission. If not specified, the default value is 2
0	(Optional) Specifies the password in clear text form. This is the default option.
7	(Optional) Specifies the password in the encrypted form.
key *KEY-STRING*	Specifies the key used to communicate with the server. The key can between 1 and 32 clear text 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 acct-port 1501 timeout
8 retransmit 3 key ABCDE
Switch(config)# radius-server host 172.19.10.101 auth-port 1600 acct-port 1601 timeout
3 retransmit 1 key ABCDE
Switch(config)#
```

8-22 server (RADIUS)

This command is used to associate a RADIUS server host with a RADIUS server group. Use the **no** form of the 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)#
```

8-23 server (TACACS+)

This command is used to associate a TACACS+ server with a server group. Use the **no** form of the 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** and **aaa accounting** 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)#
```

8-24 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#
```

8-25 tacacs-server host

This command is used to create a TACACS+ server host. Use the **no** form of this command to remove 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 TACACS+ server.
IPV6-ADDRESS	Specifies the IPv6 address of the TACACS+ server.
port *PORT-NUMBER*	(Optional) Specifies the UDP destination port number for sending request packets. The default port number is 49. The range is 1 to 65535.
timeout *SECONDS*	(Optional) Specifies the time-out value. This value must be between 1 and 255 seconds. The default value is 5 seconds.
0	(Optional) Specifies the password in the clear text form. This is the default option.
7	(Optional) Specifies the password in the encrypted form.
key *KEY-STRING*	Specifies the key used to communicate with the server. The key can be from 1 to 254 clear text characters.

Default

No TACACS+ server host 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 addresses.

```
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)#
```

8-26 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, Acct-Port 1646
State is UP
                              Auth.   Acct.
Round Trip Time:              10      10
Access Requests:               4      NA
Access Accepts:                0      NA
Access Rejects:                4      NA
Access Challenges:             0      NA
Acct Request:                 NA       3
Acct Response:                NA       3
Retransmissions:               0       0
Malformed Responses:           0       0
Bad Authenticators:            0       0
 Pending Requests:             0       0
 Timeouts:                     0       0
 Unknown Types:                0       0
 Packets Dropped:              0       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.

8-27 show tacacs statistics

This command is used to display the interoperation condition with each TACACS+ server.

show tacacs statistics

Parameters

None.

Default

None.

Command Mode

Privilege EXEC Mode or and 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: 172.19.192.80/49, State is UP
Socket Opens: 0
Socket Closes: 0
Total Packets Sent: 0
Total Packets Recv: 0
Reference Count: 0
```

Display Parameters

TACACS+ Server	IP address of the TACACS+ server.
Socket Opens	Number of successful TCP socket connections to the TACACS+ server.
Socket Closes	Number of successfully closed TCP socket attempts.

Total Packets Sent	Number of packets sent to the TACACS+ server.
Total Packets Recv	Number of packets received from the TACACS+ server.
Reference Count	Number of authentication requests from the TACACS+ server.

9. Basic IPv4 Commands

9-1 arp

This command is used to add a static entry in the Address Resolution Protocol (ARP) cache. Use the **no** 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)#
```

9-2 arp timeout

This command is used to set the ARP aging time for the ARP table. Use the **no** command to revert to 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** command to revert to 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)#
```

9-3 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#
```

9-4 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** command to remove the configuration of an IP address or disable DHCP on the interface.

ip address {*IP-ADDRESS SUBNET-MASK* **[secondary] | 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.
secondary	(Optional) Specifies that the configured address is a secondary IP address. If this keyword is not specified, the configured address is the primary 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.

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 and 192.31.7.17 and 192.31.8.17 are secondary addresses for VLAN 100.

```
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 secondary
Switch(config-if)# ip address 192.31.8.17 255.255.255.0 secondary
Switch(config-if)#
```

9-5 ip proxy-arp

This command is used to enable the proxy ARP option for an interface. Use the **no** command to revert to the default setting.

ip proxy-arp

no ip proxy-arp

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 configure the proxy ARP state for an interface. When proxy ARP is enabled, the system will respond to ARP requests for IP addresses within the local connected subnets. Proxy ARP can be used in the network where hosts have no default gateway configured.

Example

This example shows how to enable proxy the ARP feature on the interface of VLAN 100.

```
Switch# configure terminal
Switch(config)# interface vlan100
Switch(config-if)# ip proxy-arp
Switch(config-if)#
```

9-6 ip local-proxy-arp

This command is used to enable the local proxy ARP feature on an interface. Use the **no** form of the command to revert to the default setting.

ip local-proxy-arp

no ip local-proxy-arp

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 local proxy ARP function on an interface. This command is used in the primary VLAN of a private VLAN domain to enable routing of packets among secondary VLANs or isolated ports within the domain. The command only take effects when **ip proxy arp** is enabled.

Example

This example shows how to enable local proxy ARP on VLAN100.

```
Switch# configure terminal
Switch(config)# interface vlan100
switch(config-if)# ip local-proxy-arp
switch(config-if)#
```

9-7 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#
```

9-8 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#
```

9-9 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 vlan1

Interface vlan1 is enabled, Link status is up
  IP address is 10.90.90.90/8 (Manual)
  ARP timeout is 60 minutes.
  Proxy ARP is disabled
  IP Local Proxy ARP is disabled
  gratuitous-send is disabled, interval is 0 seconds

Total Entries: 1

Switch#
```

10. Basic IPv6 Commands

10-1 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#
```

10-2 ipv6 address

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

ipv6 address {*IPV6-ADDRESS***|***PREFIX-LENGTH* **|** *PREFIX-NAME SUB-BITS***|***PREFIX-LENGTH* **|** *IPV6-ADDRESS* **link-local}**

no ipv6 address {*IPV6-ADDRESS***|***PREFIX-LENGTH* **|** *PREFIX-NAME SUB-BITS***|***PREFIX-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.

PREFIX-NAME	Specifies the name of the prefix with a maximum of 32 characters. The syntax allows characters for general strings, but does not allow spaces.
SUB-BITS	Specifies the sub-prefix part and host part of the IPv6 address.
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 vlan2
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 vlan2
Switch(config-if)# no ipv6 address 3ffe:22:3:44::55/64
```

This example shows how to configure an IPv6 address based on a general prefix obtained by the DHCPv6 client. The global address will be configured after the general prefix is obtained via the DHCPv6 client. Suppose the obtained general prefix is 2001:2:3/48 and the final constructed IPv6 address is 2001:2:3:4:5::3/64.

```
Switch# configure terminal
Switch(config)# interface vlan2
Switch(config-if)# ipv6 address dhcp-prefix  1:2:3:4:5::3/64
```

This example shows how to remove a generation of IPv6 address based on the DHCPv6 obtained prefix.

```
Switch# configure terminal
Switch(config)# interface vlan2
Switch(config-if)# no ipv6 address dhcp-prefix 0:0:0:2::3/64
```

10-3 ipv6 address eui-64

This command is used to configure an IPv6 address on the interface using the EUI-64 interface ID. Use the **no** form of the command to delete an IPv6 address formed by the EUI-64 interface ID.

ipv6 address *IPV6-PREFIXIPREFIX-LENGTH* **eui-64**

no ipv6 address *IPV6-PREFIXIPREFIX-LENGTH* **eui-64**

Parameters

IPV6-PREFIX	Specifies the IPv6 prefix part for the configured IPv6 address.
PREFIX-LENGTH	Specifies the length of the prefix. The prefix of the IPv6 address is also a local subnet on the interface. The prefix length must be smaller than 64.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If the command is configured on an IPv6 ISTAP tunnel, the last 32 bits of the interface ID are constructed using the source IPv4 address of the tunnel.

Example

This example shows how to add an IPv6 address incidence.

```
Switch# configure terminal
Switch(config)# interface vlan1
Switch(config-if)# ipv6 address 3ffe:501:ffff:0::/64 eui-64
Switch(config-if)#
```

10-4 ipv6 address dhcp

This command is used to configure an interface using DHCPv6 to get an IPv6 address. Use the **no** form of the 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 vlan1
Switch(config-if)# ipv6 address dhcp
Switch(config-if)#
```

10-5 ipv6 enable

This command is used to enable IPv6 processing on interfaces that have no IPv6 address explicitly configured. Use the **no** form of the 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 vlan1
Switch(config-if)# ipv6 enable
Switch(config-if)#
```

10-6 ipv6 hop-limit

This command is used to configure the IPv6 hop limit on the switch. Use the **no** form of this command to revert to the default setting.

ipv6 hop-limit *VALUE*

no ipv6 hop-limit

Parameters

VALUE	Specifies the IPv6 hop limit range. Using the value 0 means to use the default value to send packets. The valid range is 0 to 255.

Default

The default value is 64.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the hop limit to be advertised in RA messages. The IPv6 packet originated at the system will also use this value as the initial hop limit.

Example

This example shows how to configure the IPv6 hop limit value.

```
Switch# configure terminal
Switch(config)# interface vlan1
Switch(config-if)# ipv6 hop-limit 255
Switch(config-if)#
```

10-7 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)#
```

10-8 show ipv6 general-prefix

This command is used to display IPv6 general prefix information.

show ipv6 general-prefix [*PREFIX-NAME***]**

Parameters

PREFIX-NAME	(Optional) Specifies the name of the general prefix to be displayed. If the general prefix name is not specified, all general prefixes will be displayed. The general prefix name can be up to 32 characters.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information of IPv6 general prefixes.

Example

This example shows how to display all IPv6 general prefix on the system.

```
Switch# show ipv6 general-prefix

IPv6 prefix yy
 Acquired via DHCPv6 PD
   vlan1: 200::/48
       Valid lifetime 2592000, preferred lifetime 604800
   Apply to interfaces
     vlan2: ::2/64

Total Entries: 1

Switch#
```

10-9 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 vlan2

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)
  IP MTU is 1500 bytes
  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#
```

10-10 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.

11. BPDU Attack Protection Commands

11-1 spanning-tree bpdu-protection (global)

This command is used to enable the Bridge Protocol Data Unit (BPDU) Protection function globally. Use the **no** form of this command to return to the default setting.

spanning-tree bpdu-protection

no spanning-tree bpdu-protection

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 BPDU attack protection globally.

Example

This example shows how to enable the BPDU attack protection function globally.

```
Switch#configure terminal
Switch(config)#spanning-tree bpdu-protection
Switch(config)#
```

11-2 spanning-tree bpdu-protection (interface)

This command is used to enable the BPDU attack protection function on the port. Use the **no** form of this command to return to the default setting.

spanning-tree bpdu-protection {drop | block | shutdown}

no spanning-tree bpdu-protection

Parameters

drop	Specifies to drop all the received BPDU packets when the interface enters the attacked state.
block	Specifies to drop all the packets including BPDU and normal packets when the interface enters the attacked state.
shutdown	Specifies to shut down the interface when the interface enters the attacked state.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

In a network, customers do not want all ports of a device to be able to receive STP packets, because the ports may receive the STP BPDU packets which cause the waste of the system resource.

The BPDU attack protection function can prevent ports from receiving the BPDU packets. The ports with BPDU protection function enabled will enter the protection state, and react with one of the actions, **drop**, **blok** or **shutdown**, when it receives a STP BPDU packet.

- **drop** - drop the packets of received STP BPDU only, and port is placed at normal state.
- **block** - drop the packets of received all BPDU and all data, and port is placed at normal state.
- **shutdown** - shut down the port, and port placed at err-disabled state.

Example

This example shows how to enable the BPDU attack protection with block mode on interface eth1/0/1.

```
Switch#configure terminal
Switch(config)#interface eth1/0/1
Switch(config-if)#spanning-tree bpdu-protection block
Switch(config-if)#
```

11-3 show spanning-tree bpdu-protection

This command is used to display the BPDU protection information.

show spanning-tree bpdu-protection [interface *INTERFACE-ID* **[, | -]]**

Parameters

interface *INTERFACE-ID*	Specifies to interface ID to be displayed.
,	Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	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 the command to show BPDU Protection information. If no interface is specified, display all interfaces.

Example

This example shows how to display the BPDU attack protection information and status of the interfaces.

```
Switch#show spanning-tree bpdu-protection

 Global State:      Enabled

Interface          State        Mode         Status
--------------     --------     --------     ------------
eth1/0/1           Enabled      Block        Normal
eth1/0/2           Disabled     Shutdown     Normal
eth1/0/3           Disabled     Shutdown     Normal
eth1/0/4           Disabled     Shutdown     Normal
eth1/0/5           Disabled     Shutdown     Normal
eth1/0/6           Disabled     Shutdown     Normal
eth1/0/7           Disabled     Shutdown     Normal
eth1/0/8           Disabled     Shutdown     Normal
eth1/0/9           Disabled     Shutdown     Normal
eth1/0/10          Disabled     Shutdown     Normal
eth1/0/11          Disabled     Shutdown     Normal
eth1/0/12          Disabled     Shutdown     Normal
eth1/0/13          Disabled     Shutdown     Normal
eth1/0/14          Disabled     Shutdown     Normal
eth1/0/15          Disabled     Shutdown     Normal
eth1/0/16          Disabled     Shutdown     Normal
eth1/0/17          Disabled     Shutdown     Normal
eth1/0/18          Disabled     Shutdown     Normal
eth1/0/19          Disabled     Shutdown     Normal
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

This example shows how to display the BPDU attack protection status of interface eth1/0/1.

```
Switch#show spanning-tree bpdu-protection interface eth1/0/1

Interface          State        Mode         Status
--------------     --------     --------     ------------
eth1/0/1           Enabled      Block        Normal

Switch#
```

11-4 snmp-server enable traps stp-bpdu-protection

This command is used to enable the sending of the SNMP notifications for BPDU protection. Use the **no** form of this command to disable the sending of the SNMP notifications for BPDU protection.

snmp-server enable traps stp-bpdu-protection

no snmp-server enable traps stp-bpdu-protection

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 of the SNMP notifications for BPDU protection.

Example

This example shows how to enable the sending of the SNMP notifications for BPDU protection.

```
Switch#configure terminal
Switch(config)#snmp-server enable traps stp-bpdu-protection
Switch(config)#
```

12. Cable Diagnostics Commands

12-1 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 eth1/0/1
Switch#
```

12-2 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)
------  ----------  -------------  -------------------------------  -----------------
eth1/0/1     1000BASE-T  Link Up        OK                              65
eth1/0/2     1000BASE-T  Link Up        OK                               -
eth1/0/3     1000BASE-T  Link Down      Shutdown                        25
eth1/0/4     1000BASE-T  Link Down      Shutdown                         -
eth1/0/5     1000BASE-T  Link Down      Unknown                          -
eth1/0/6     1000BASE-T  Link Down      Pair 1 Crosstalk at  30M        -
                                       Pair 2 Crosstalk at  30M
                                       Pair 3 OK         at 110M
                                       Pair 4 OK         at 110M
eth1/0/7     1000BASE-T  Link Down      NO Cable                         -
eth1/0/8     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#
```

12-3 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 eth1/0/1
Switch#
```

13. Command Logging Commands

13-1 command logging enable

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

command logging enable

no command logging enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command logging function is used to log the commands that have successfully been configured to the Switch via the command line interface. The requirement is to log the command itself, along with information about the user account that entered the command into the system log. Commands that do not cause a change in the Switch configuration or operation (such as **show**) will not be logged. Information about saving or viewing the system log is described in the sys-log functional specification.

NOTE: When the Switch is under the BAT process (booting procedure, execute downloaded configuration files, etc...), all configuration commands will not be logged.

Example

This example shows how to enable the command logging function.

```
Switch# configure terminal
Switch(config)# command logging enable
Switch(config)#
```

14. Debug Commands

14-1 debug enable

This command is used to enable the debug message output option. To disable the debug message output option, use the **no** form of this command.

debug enable

no debug enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to enable the debug message output option.

Example

This example shows how to enable and then disable the debug message output option.

```
Switch(config)# debug enable
Switch(config)# no debug enable
Switch(config)#
```

14-2 debug output

This command is used to specify the output for the debug messages of individual modules.

debug output {module <*MODULE-LIST*> | all} {buffer | console}

no debug output {module <*MODULE-LIST*> | all}

Parameters

<*MODULE-LIST*>	Specifies the module list to output the debug messages. Leave a space between modules.
all	Specifies to output the debug messages of all modules to the specified destination.
buffer	Specifies to output the debug message to the debug buffer.
console	Specifies to output the debug messages to the local console.

Default

The default debug output is **buffer**.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to set a specified module's debug message output to debug to the buffer or the local console. Use the **show debug output** command to display the module's string information. By default, module debug message is output to the debug buffer. The module debug message will be output when the module owned debug setting is enabled and the global mode debug enable command is enabled.

Example

This example shows how to configure all the module's debug messages to output to the debug buffer.

```
Switch# debug output all buffer
Switch#
```

14-3 debug reboot on-error

This command is used to set the Switch to reboot when a fatal error occurs. Use the **no** form of this command to set the Switch not to reboot when a fatal error occurs.

debug reboot on-error

no debug reboot on-error

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to enable the Switch to reboot when a fatal error occurs.

Example

This example shows how to enable the Switch to reboot on fatal errors.

```
Switch(config)# debug reboot on-error
Switch(config)#
```

14-4 debug copy

This command is used to copy debug information to the destination filename.

debug copy *SOURCE-URL DESTINATION-URL*

debug copy *SOURCE-URL* **tftp:** *IILOCATIONIDESTINATION-URL*

Parameters

SOURCE-URL	Specifies the source URL for the source file to be copied. It must be one of the following keywords. **buffer:** Specifies to copy the debug buffer information. **error-log:** Specifies to copy the error log information. **tech-support:** Specifies to copy the technical support information.
LOCATION	Specifies the IPv4 or IPv6 address of the TFTP server.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

None.

Example

This example shows how to copy debug buffer information to a TFTP server (10.90.90.99).

```
Switch# debug copy buffer tftp: //10.90.90.99/abc.txt

Address of remote host [10.90.90.99]?
Destination filename [abc.txt]?
 Accessing tftp://10.90.90.99/abc.txt...
Transmission starts...
Finished network upload(65739) bytes.

Switch#
```

14-5 debug clear buffer

This command is used to clear the debug buffer.

debug clear buffer

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to clear the debug buffer information.

Example

This example shows how to clear the debug buffer information.

```
Switch# debug clear buffer
Switch#
```

14-6 debug clear error-log

This command is used to clear the error log information.

debug clear error-log

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to clear the error log information.

Example

This example shows how to clear the error log information.

```
Switch# debug clear error-log
Switch#
```

14-7 debug show buffer

This command is used to display the content of the debug buffer or utilization information of the debug buffer.

debug show buffer [utilization]

Parameters

utilization	(Optional) Specifies to display the utilization of the debug buffer. If not specified, this will display the content in the buffer.

Default

None.

Command Mode

Privileged EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display the content of the debug buffer or utilization information of the debug buffer.

Example

This example shows how to display the debug buffer information.

```
Switch# debug show buffer

Debug buffer is empty

Switch#
```

This example shows how to display the debug buffer utilization.

```
Switch# debug show buffer utilization

Debug buffer is allocated from system memory
Total size is 2M
Utilization is 30%

Switch#
```

14-8 debug show output

This command is used to display the debug status and output information of the modules.

debug show output

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 the information about the debug status and message output of the modules.

Example

This example shows how to display the debug message output information of the modules.

```
Switch# debug show output

Debug Global State  : Disabled

Module name           Output    Enabled
----------------      --------  -------------------------------------
DHCPv6_CLIENT         buffer    No
DHCPv6_RELAY          buffer    No
OSPFV2                buffer    No
BGP                   buffer    No
VRRP                  buffer    No
RIPNG                 buffer    No

Switch#
```

14-9 debug show error-log

This command is used to display error log information.

debug show error-log

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 the content of the error log.

Example

This example shows how to display error log information.

```
Switch# debug show error log

# debug log: 1
# level: fatal
# clock: 10000ms
# time : 2013/09/11 13:00:00
====================== SOFTWARE FATAL ERROR ======================
Invalid mutex handle : 806D6480

Current TASK : bcmARL.0
------------------------ TASK STACKTRACE ------------------------
->802ACE98
->8018C814
->8028FF44
->8028352C
->801D703C
->8013B8A4
->802AE754
->802A5E0C
->802A5D6C

************************************************************************
# debug log: 2
# level: fatal
# clock: 10000ms
# time : 2013/09/11 15:00:00
====================== SOFTWARE FATAL ERROR ======================
CLI_UTL_AllocateMemory Fail!

Current TASK : CLI
------------------------ TASK STACKTRACE ------------------------
->802ACE98
->802B4498
->802B4B00
->802BD140
->802BCB08

Total Log : 2

                                  <Output truncated>
```

14-10 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-1510-28P Gigabit Ethernet SmartPro Switch
 #                         Technical Support Information
 #
 #                           Firmware: Build 1.10.001
 #          Copyright(C) 2014 D-Link Corporation. All rights reserved.
 #------------------------------------------------------------------------------


 ********************   Basic System Information   ********************

 [SYS 2000-1-1 08:25:57]

 Boot Time           : 1 Jan 2000  00:00:00
 RTC Time            : 2000/01/01 08:25:57
 Boot PROM Version   : Build 1.00.006
 Firmware Version    : Build 1.10.001
 Hardware Version    : A1
 MAC Address         : 00-01-02-03-04-00
 MAC Address Number  : 65535

 [STACKING 2000-1-1 08:25:57]

  #Topology Information

  Stable Topology:
  My Box ID : 1             Role          : Master
  Box Cnt   : 1             Topology Type : Duplex Chain
 Unit  Prio-                                      Device Runtime   Stacking
 ID    rity  Role          MAC        Type       option version   version
 ----- ----  ------- ----------------- ---------- ------ --------- -------
  1     32 32 Master  00-01-02-03-04-00 DGS-1510-28P 0x0001 1.10.001  2.0.1
  2     NOT EXIST
  3     NOT EXIST
  4     NOT EXIST
  5     NOT EXIST
  6     NOT EXIST
  *(S) means static box ID
```

```
Temporary Topology:
Stable Cnt : 48          Hot Swap Type : Stable
Box Cnt    : 1           Topology Type : Duplex Chain

Kept list
SIO-   Unit Prio-                                Device Runtime   Stacking
index  ID   rity        MAC           Type       option version   version
------ ---- ----- ----------------- ---------- ------ --------- -------
Myself 0    32 32 00-01-02-03-04-00 DGS-1510-28P 0x0001 1.10.001  2.0.1
1-1    NONE
2-1    NONE

Temp list
SIO-   Unit Prio-                                Device Runtime   Stacking
index  ID   rity        MAC           Type       option version   version
------ ---- ----- ----------------- ---------- ------ --------- -------
1-1    NONE
2-1    NONE

SIO Ports:
Port  Link Status  Hello reply
----  -----------  -----------
1     FALSE        0
2     FALSE        0
3     FALSE        0
4     FALSE        0
5     FALSE        0
6     FALSE        0


                                  <Output truncated>
```

14-11 debug show cpu utilization

This command is used to display the total CPU utilization and the CPU utilization per process.

debug show cpu utilization

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 the information about CPU and task utilization.

Example

This example shows how to display the CPU utilization per process information.

```
Switch#debug show cpu utilization

Five seconds -   7 %         One minute -   7 %         Five minutes -   7 %

Process Name         5Sec     1Min     5Min
-----------------   ------   ------   ------
OS_UTIL              93 %     93 %     93 %
FAN_Pooling           2 %      2 %      2 %
bcmL2X.0              1 %      1 %      1 %
GBIC_Pooling          1 %      1 %      1 %
bcmCNTR.0             1 %      1 %      1 %

Switch#
```

14-12 debug show packet ports

This command is used to display the packet statistics information of the SIO ports.

debug show packet ports unit [*UNIT-ID***] [sio1 | sio2]**

Parameters

UNIT-ID	Specifies the statcking unit ID.
sio1	Specifies to represent the lower stacking port.
sio2	Spcifies to represent the higher stacking port.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display the packet statistics information of the SIO ports.

Example

This example shows how to display the information of the SIO port.

```
Switch#debug show packet ports unit 1 sio1

 UNIT ID 1 SIO 1:
 Frame Size/Type           Frame Counts                Frames/sec
 ---------------           ----------------------      -----------
 rxHCTotalPkts             0                           0
 rxHCUnicastPkts           0                           0
 rxHCMulticastPkts         0                           0
 rxHCBroadcastPkts         0                           0
 rxHCOctets                0                           0
 rxHCPkt64Octets           0                           0
 rxHCPkt65to127Octets      0                           0
 rxHCPkt128to255Octets     0                           0
 rxHCPkt256to511Octets     0                           0
 rxHCPkt512to1023Octets    0                           0
 rxHCPkt1024to1518Octets   0                           0
 rxHCPkt1519to2047Octets   0                           0
 rxHCPkt2048to4095Octets   0                           0
 rxHCPkt4096to9216Octets   0                           0
 txHCTotalPkts             0                           0
 txHCUnicastPkts           0                           0
 txHCMulticastPkts         0                           0
 txHCBroadcastPkts         0                           0
 txHCOctets                0                           0
 txHCPkt64Octets           0                           0
 txHCPkt65to127Octets      0                           0
 txHCPkt128to255Octets     0                           0
 txHCPkt256to511Octets     0                           0
 txHCPkt512to1023Octets    0                           0
 txHCPkt1024to1518Octets   0                           0
 txHCPkt1519to2047Octets   0                           0
 txHCPkt2048to4095Octets   0                           0
 rxHCPkt4096to9216Octets   0                           0

Switch#
```

14-13 debug show error ports unit

This command is used to display the error statistics information of the SIO ports.

debug show error ports unit [*UNIT-ID***] [sio1 | sio2]**

Parameters

UNIT-ID	Specifies the statcking unit ID.
sio1	Specifies to represent the lower stacking port.
sio2	Spcifies to represent the higher stacking port.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display the error statistics information of the SIO ports.

Example

This example shows how to display the error statistics information of the SIO ports.

```
Switch#debug show error ports unit 1 sio1

 UNIT ID 1 SIO 1:
                        RX Frames                           TX Frames
                        ---------                           ---------
 CRC Error              0             CRC Error             0
 Undersize              0             STP Drop              0
 Oversize               0             HOL Drop              0
 Fragment               0             COS0 HOL Drop         0
 Jabber                 0             COS1 HOL Drop         0
 Symbol Error           0             COS2 HOL Drop         0
 Buffer Full Drop       0             COS3 HOL Drop         0
 ACL Drop               0             COS4 HOL Drop         0
 Multicast Drop         0             COS5 HOL Drop         0
 VLAN Ingress Drop      0             COS6 HOL Drop         0
 Invalid IPv6 Drop      0             COS7 HOL Drop         0
 STP Drop               0
 Storm and FDB Drop     0
 MTU Drop               0

Switch#
```

15. DHCP Auto-Configuration Commands

15-1 autoconfig enable

This command is used to enable the auto-configuration function. Use the **no** form of the 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 how to enable auto-configuration.

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

15-2 show autoconfig

This command is used to display the status of auto-configuration.

show autoconfig

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 status of the auto-configuration.

Example

This example shows how to display the status of the auto-configuration.

```
Switch# show autoconfig

Autoconfig State: Disabled

Switch#
```

16. DHCP Client Commands

16-1 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	Specifies the 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)#
```

16-2 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 VLAN will 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)#
```

16-3 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)#
```

16-4 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)#
```

17. DHCP Relay Commands

17-1 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 the 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

In a DHCP relay pool, the user can use this command to associate a DHCP pool class, and then use relay target to set a list of relay target addresses for DHCP packet forwarding. When the client request matches a relay pool which is configured with classes, the client must also match a class configured in the pool in order to be relayed. If there is no class configured in a relay pool, the client will be relayed to the relay destination server specified for the matched relay pool when the client matches the relay pool.

Example

This example shows how to a DHCP class, “Service-A”, is configured, 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)#
```

17-2 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 the 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 a DHCP class “Service-A” is configured 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
Switch(config-dhcp-class)#
```

17-3 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 a DHCP relay pool, called pool1, is created. 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
switch(config-dhcp-pool)#
```

17-4 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 the 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 DHCP service 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)#
```

17-5 ip dhcp relay information check-reply

This command is used to configure the DHCP relay agent to validate the relay agent information option in the received DHCP reply packet. Use the **no** form of the command to remove the configuration for the interface.

ip dhcp relay information check-reply [none]

no ip dhcp relay information check-reply [none]

Parameters

none	(Optional) Specifies to disable check for Option 82 of the reply packet.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the DHCP service 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 disable the global DHCP relay agent check but enables the DHCP relay agent check for the VLAN 100. The effect state of the check function for VLAN100 is enabled.

```
Switch# configure terminal
Switch(config)# no ip dhcp relay information check
switch(config)# interface vlan 100
switch(config-if)# ip dhcp relay information check-reply
```

17-6 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** 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

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.

Administrators can use the **ip dhcp relay information option 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)#
```

17-7 ip dhcp relay information option-insert

This command is used to enable or disable the insertion of Option 82 for an interface during the relay of DHCP request packets. Use the **no** 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 DHCP service 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)#
```

17-8 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 the command to restore 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

The command only takes effect when the DHCP service 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. If the **ip dhcp relay information relay** command is configured in the global configuration mode but not configured in the interface configuration mode, the global configuration is applied to all interfaces.

```
Switch# configure terminal
Switch(config)# ip dhcp relay information policy keep
Switch(config)#
```

17-9 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 the 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

The command only takes effect when the DHCP service 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 the effective relay agent option re-forwarding policy 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)#
```

17-10 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 the command to configure the default remote ID sub-option.

ip dhcp relay information option format remote-id {default | string *STRING* **| vendor2 | vendor3}**

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	Specifies to use a user-defined string as the remote ID. Space characters are allowed in the string.
vendor2	Specifies to use vendor 2.
Vendor3	Specifies to use vendor 3.

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

This command is used 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)#
```

17-11 ip dhcp relay information option format-type remote-id

This command is used to configure the DHCP information remote ID sub-option of vendor format string in interface configuration mode.

ip dhcp relay information option format-type remote-id vendor3 string *STRING*

no ip dhcp relay information option format-type remote-id vendor3

Parameters

Vendor3	Specifies the vendor 3 user-defined string with the maximum 32 characters.
STRING	Specifies the user-defined string.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure each interface's vendor defined string for option 82 information remote-id sub-option. It is available for both physical port and port channel interface configuration.

Example

This example shows how define vendor3 remote-id format string as "switch1" for interface eth3/0/3.

```
Switch# configure terminal
Switch(config)# interface eth 3/0/3
Switch(config-if)# ip dhcp relay information option format-type remote-id vendor3
string switch1
Switch(config-if)#
```

17-12 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 the command to configure the default circuit ID sub-option.

ip dhcp relay information option format circuit-id {default | string *STRING* **| vendor1 | vendor2| vendor3| vendor4 | vendor5 | vendor6}**

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.
vendor2	Specifies to use vender2.
vendor3	Specifies to use vender3.
vendor4	Specifies to use vender4.
vendor5	Specifies to use vender5.
vendor6	Specifies to use vender6.

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)#
```

17-13 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 vendor3 string *STRING*

no ip dhcp relay information option format-type circuit-id vendor3 string

Parameters

vendor3	Specifies to the vender3 user-defined string with the maximum 32 characters.
STRING	Specifies the vendor-defined string.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure each interface's vendor defined string for option 82 information circuit ID. It is available for both physical port and port channel interface configuration.

Example

This example shows how to define vendor3 circuit-id of "aabbcc" in interface eth3/0/3.

```
Switch# configure terminal
Switch(config)# interface eth3/0/3
Switch(config-if)# ip dhcp relay information option format-type circuit-id vendor3 string aabbcc
Switch(config-if)#
```

17-14 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** 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 option 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's setting is enabled, IP DHCP relay information is trusted for all interfaces. When this command's setting is disabled, the trust state is determined by the interface mode command **ip dhcp relay information trusted**.

Verify settings by entering the **show ip dhcp relay information trusted-sources** command.

Example

This example shows how to enable the DHCP relay agent to trust IP DHCP relay information for all interfaces. The DHCP relay agent trusts the relay information for all interfaces regardless of what the setting of **ip dhcp relay information trusted** command.

```
Switch# configure terminal
Switch(config)# ip dhcp relay information trust-all
Switch(config)#
```

17-15 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** 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 is trusted on an interface, the arriving packets with the 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 setting is enabled, IP DHCP relay information is trusted for all interfaces. When this command setting is disabled, the trust state is determined by the interface mode command **ip dhcp relay information trusted**.

Verify the settings by entering the **show ip dhcp relay information trusted-sources** command.

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)#
```

17-16 ip dhcp local-relay vlan

This command is used to enable local relay on a VLAN or a group of VLANs. Use the **no** command to disable the local relay function.

ip dhcp local-relay vlan *VLAN-ID* **[, | -]**

no ip dhcp local-relay vlan *VLAN-ID* **[, | -]**

Parameters

vlan *VLAN-ID*	Specifies the VLAN used.
,	(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, 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)#
```

17-17 ip dhcp smart-relay

This command is used to enable the smart relay feature of the DHCP relay agent. Use the **no** command to disable the smart relay function.

ip dhcp smart-relay

no ip dhcp smart-relay

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the received interface of the packet has secondary addresses, by default, the relay agent set the gateway address field of the packet to the primary address of the interface. When smart relay is enabled, relay agent will count the number that a client retries sending of the DISCOVER message. The relay agent will switch the gateway address to secondary address of the received interface after three retries.

Example

This example shows how to enable the smart relay function

```
Switch# configure terminal
Switch(config)# ip dhcp smart-relay
Switch(config)#
```

17-18 option hex (DHCP relay)

This command is used to specify a DHCP option matching pattern for a DHCP class. Use the **no** command to delete the specified matching pattern for a DHCP class.

option *CODE* **hex** *PATTERN* **[*] [bitmask** *MASK***]**

no option *CODE* **hex** *PATTERN* **[*] [bitmask** *MASK***]**

Parameters

CODE	Specifies the DHCP option number.
PATTERN	Specifies the hex pattern of the specified DHCP option.
*	(Optional) Specifies not to match the remaining bits of the option. If not specified, the bit length of the *PATTERN* should be the same as the bit length of the option.
MASK	(Optional) Specifies the hex bit mask for masking of the pattern. The masked pattern bits will be matched. If not specified, all bits specified by *PATTERN* will be checked. The bit set to FF will be checked. The input format should be the same as *PATTERN*.

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 a DHCP class, “Service-A”, is configured, defined 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)#
```

17-19 relay destination

This command is used to specify the DHCP relay destination IP address associated with a relay pool. Use the **no** 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 anyone of the relay sources, the packet will be forwarded to all of the relay destinations.

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 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 a DHCP relay pool “pool1” is created. In the relay pool, the subnet 172.19.10.0/255.255.255.0 is specified as the source subnet and 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)#
```

17-20 relay source

This command is used to specify the source subnet of client packets. Use the **no** form of command 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 DHCP server can be specified in DHCP relay pool. To do this, use the **ip dhcp pool** command to enter the DHCP pool configuration mode, 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. Multiple relay sources and multiple relay destinations can be specified in a pool. If a packet matches anyone of the relay source, 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 rely 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, if the interface that receives the packet has no IP address configured.

Example

This example shows how a DHCP relay pool “pool2” is created. 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)#
```

17-21 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 the 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 Class 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, if 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
Switch(config-dhcp-pool-class)# relay target 10.2.1.2
Switch(config-dhcp-pool-class)#
```

17-22 service dhcp

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 the DHCP relay service on the switch.

Example

This example shows how to disables the DHCP server and relay service.

```
Switch#configure terminal
Switch(config)#no service dhcp
Switch(config)#
```

17-23 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

EXEC Mode or Any Configuration 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 use this command. Note that the display output lists the interfaces that are configured to be trusted sources.

```
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 when all interfaces are trusted sources. Note that the display output does not list the individual interfaces.

```
Switch# show ip dhcp relay information trusted-sources

All interfaces are trusted source of relay agent information option

Switch#
```

17-24 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

EXEC Mode or Any Configuration 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 displays 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#
```

17-25 show ip dhcp relay information policy-action

This command is used to display the relay option policy action configuration.

show ip dhcp relay information policy-action

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 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 information policy-action

Interface      Policy
-------------- ----------
vlan1          Keep
vlan2          Drop
vlan3          Replace
vlan4          Not configured

Total Entries: 4

Switch#
```

18. DHCP Snooping Commands

18-1 ip dhcp snooping

This command is used to globally enable DHCP snooping. Use the **no** 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)#
```

18-2 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 the 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 not allowed.

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)#
```

18-3 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** command to disable the storing or reset the parameters to the default setting.

ip dhcp snooping database {*URL* **| write-delay** *SECONDS***}**

no ip dhcp snooping database [write-delay]

Parameters

URL	Specifies the URL in one of the following forms: • tftp://location/filename **NOTE:** The flash option only includes the external memory (like CF/SD/USB storage).
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 local flash or remote server. Use the follow methods to store DHCP binding entries:

- **tftp:** Store the entries to remote site via TFTP.

NOTE: The flash only includes the external memory like CF/SD/USB storage.

Use this command to save the DHCP snooping binding database in the stack switch. The database is not saved in a stack member switch.

The lease time of the entry will not be modified and the live time will continue to be counted while the entry is provisioned.

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: //10.0.0.2/store/dhcp-snp-bind
Switch(config)#
```

18-4 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
Switch#
```

18-5 clear ip dhcp snooping binding

This command is used to clear the DHCP binding entry.

clear ip dhcp snooping binding [*MAC-ADDRESS***] [***IP-ADDRESS***] [vlan** *VLAN-ID***] [interface** *INTERFACE-ID***]**

Parameters

MAC-ADDRESS	Specifies the MAC address to clear.
IP-ADDRESS	Specifies the IP address to clear.
vlan *VLAN-ID*	Specifies the VLAN ID to clear.
interface *INTERFACE-ID*	Specifies the interface 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
Switch#
```

18-6 renew ip dhcp snooping database

This command is used to renew the DHCP binding database.

renew ip dhcp snooping database *URL*

Parameters

URL	Specifies load the bind entry database from the URL and add the entries to the DHCP snooping binding entry table.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Using this command will cause the system to load the bind entry database from a URL and add the entries to the DHCP snooping binding entry table.

Example

This example shows how to renew the DHCP snooping binding database.

```
Switch# renew ip dhcp snooping database tftp: //10.0.0.2/store/dhcp-snp-bind
Switch#
```

18-7 ip dhcp snooping binding

This command is used to manually configure a DHCP snooping entry.

ip dhcp snooping binding *MAC-ADDRESS* **vlan** *VLAN-ID IP-ADDRESS* **interface** *INTERFACE-ID* **expiry** *SECONDS*

Parameters

MAC-ADDRESS	Specifies the MAC address of the entry to add or delete.
vlan *VLAN-ID*	Specifies the VLAN of the entry to add or delete.
IP-ADDRESS	Specifies the IP address of the entry to add or deleted.
INTERFACE-ID	Specifies the interface (physical port and port channel) on which to add or delete a binding entry.
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 create a dynamic DHCP snooping entry.

Example

This example shows how to configure a DHCP snooping entry with IP address 10.1.1.1 and MAC address 00-01-02-03-04-05 at VLAN 2 and port eth3/0/10 with an expiry time of 100 seconds.

```
Switch# ip dhcp snooping binding 00-01-02-03-04-05 vlan 2 10.1.1.1 interface eth3/0/10
expiry 100
Switch#
```

This example shows how to disable a DHCP snooping entry with IP address 10.1.1.1 and MAC address 00-01-02-03-04-05 at VLAN 2 and port eth3/0/10.

```
Switch# ip dhcp snooping binding 00-01-02-03-04-05 vlan 2 10.1.1.1 interface eth3/0/10
Switch#
```

18-8 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 return to the default setting.

ip dhcp snooping trust

no ip dhcp snooping trust

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 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, or DHCPNAK packet) from a DHCP server outside the firewall.
- If **ip dhcp snooping verify mac-address** 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 3/0/3.

```
Switch# configure terminal
Switch(config)# interface eth3/0/3
Switch(config-if)# ip dhcp snooping trust
Switch(config-if)#
```

18-9 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** command to reset the DHCP message entry limit.

ip dhcp snooping limit entries *NUMBER*

no ip dhcp snooping limit entries

Parameters

NUMBER	Specifies the number of DHCP snooping binding entries limited on a port. The range of value is from 0 to 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 port eth3/0/1 to 100.

```
Switch# configure terminal
Switch(config)# interface eth3/0/3
Switch(config-if)# ip dhcp snooping limit entries 100
Switch(config-if)#
```

18-10 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** command to reset the DHCP message rate limiting.

ip dhcp snooping limit rate *VALUE*

no ip dhcp snooping limit rate

Parameters

rate *VALUE*	Specifies the number of DHCP messages that can be processed per second. The valid range is from 1 to 300.

Default

By default, this option is disabled.

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 3/0/3.

```
Switch# configure terminal
Switch(config)# interface eth3/0/3
Switch(config-if)# ip dhcp snooping limit rate 100
Switch(config-if)#
```

18-11 ip dhcp snooping station-move deny

This command is used to disable the DHCP snooping station move state. Use the **no** 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, the station move is permitted.

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)#
```

18-12 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** 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)#
```

18-13 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 *VLAN-ID*	Specifies the VLAN to enable or disable the DHCP snooping function.
,	(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, 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)#
```

This example shows how to enable DHCP snooping on a range of VLANs.

```
Switch# configure terminal
Switch(config)# ip dhcp snooping vlan 10,15-18
Switch(config)#
```

18-14 show ip dhcp snooping

This command is used to display the DHCP snooping configuration.

show ip dhcp snooping

Parameters

None.

Default

None.

Command Mode

EXEC Mode or 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:
10, 15-18
Verification of MAC address is disabled
Information option of allowed on un-trusted interface is disabled

Interface    Trusted    Rate Limit
------------ ---------- ------------
eth3/0/1        no      10
eth3/0/8        no      50
eth3/0/9        yes     no_limit

Switch#
```

18-15 show ip dhcp snooping binding

This command is used to display DHCP snooping binding entries.

show ip dhcp snooping binding [*IP-ADDRESS***] [***MAC-ADDRESS***] [vlan** *VLAN-ID***] [interface [***INTERFACE-ID* **[, | -]]]**

Parameters

IP-ADDRESS	(Optional) Specifies to display the binding entry based on the IP address.
MAC-ADDRESS	(Optional) Specifies to display the binding entry based on the MAC address.
vlan *VLAN-ID*	(Optional) Specifies to display the binding entry based on the VLAN.
interface *INTERFACE-ID*	(Optional) Specifies to display the binding entry based on the port 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.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display DHCP snooping binding entries.

Example

This example shows how to display DHCP snooping binding entries.

```
Switch# show ip dhcp snooping binding

MAC Address        IP Address     Lease(seconds)    Type         VLAN  Interface
------------------ -------------- -------------  -------------- ------ ---------
00-01-02-03-04-05 10.1.1.10       1500           dhcp-snooping  100    eth3/0/5
00-01-02-00-00-05 10.1.1.11       1495           dhcp-snooping  100    eth3/0/5

Total Entries: 2

Switch#
```

This example shows how to display DHCP snooping binding entries by IP 10.1.1.1.

```
Switch# show ip dhcp snooping binding 10.1.1.1

MAC Address       IP Address      Lease (seconds)   Type           VLAN   Interface
------------------ -------------- ----------------  -------------- ------ ----------
00-01-02-03-04-05 10.1.1.1        1500              dhcp-snooping  100    eth3/0/5

Total Entries: 1

Switch#
```

This example shows how to display DHCP snooping binding entries by IP 10.1.1.11 and MAC 00-01-02-00-00-05.

```
Switch# show ip dhcp snooping binding 10.1.1.11 00-01-02-00-00-05

MAC Address         IP Address   Lease (seconds)     Type          VLAN   Interface
------------------ ------------- ------------------  ------------- ------ -----------
00-01-02-00-00-05 10.1.1.11      1495                dhcp-snooping 100    eth3/0/5

Total Entries: 1

Switch#
```

This example shows how to display DHCP snooping binding entries by IP 10.1.1.1 and MAC 00-01-02-03-04-05 on VLAN 100.

```
Switch# show ip dhcp snooping binding 10.1.1.11 00-01-02-00-00-05 vlan 100

MAC Address         IP Address    Lease (seconds)   Type           VLAN   Interface
----------------- --------------- ----------------  -------------- ------ -----------
00-01-02-03-04-05 10.1.1.1        1500              dhcp-snooping  100    eth3/0/5

Total Entries: 1

Switch#
```

This example shows how to display DHCP snooping binding entries by VLAN 100.

```
Switch# show ip dhcp snooping binding vlan 100

MAC Address         IP Address    Lease (seconds)    Type           VLAN   Interface
----------------- --------------- -----------------  -------------- ------ -----------
00-01-02-03-04-05 10.1.1.10       1500               dhcp-snooping  100    eth3/0/5
00-01-02-00-00-05 10.1.1.11       1495               dhcp-snooping  100    eth3/0/5

Total Entries: 2

Switch#
```

This example shows how to display DHCP snooping binding entries by interface eth3/0/5.

```
Switch# show ip dhcp snooping binding interface eth3/0/5

MAC Address         IP Address   Lease (seconds)   Type           VLAN   Interface
----------------- -------------- ----------------  -------------- ------ -----------
00-01-02-03-04-05 10.1.1.10      1500              dhcp-snooping  100    eth3/0/5
00-01-02-00-00-05 10.1.1.11      495               dhcp-snooping  100    eth3/0/5

Total Entries: 2

Switch#
```

Display Parameters

MAC Address	The client hardware MAC address.
IP Address	The client IP address assigned from the DHCP server.
Lease (seconds)	The IP address lease time.
Type	The Binding type configured from the CLI or dynamically learned.
VLAN	The VLAN ID.
Interface	The interface that connects to the DHCP client host.

18-16 show ip dhcp snooping database

This command is used to display the statistics of the DHCP snooping database.

show ip dhcp snooping database

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display DHCP snooping database statistics.

Example

This example shows how to display DHCP snooping database statistics.

```
Switch# show ip dhcp snooping database

URL: tftp://10.0.0.2/store/dhcp-snp-bind
Write Delay Time: 300 seconds

Last ignored bindings counters :
Binding collisions :     0     Expired    lease    :     0
Invalid interfaces :     0     Unsupported vlans :      0
Parse failures       :    0      Checksum errors    :     0

Switch#
```

Display Parameters

Binding Collisions	The number of entries that created collisions with exiting entries in DHCP snooping database.
Expired leases	The number of entries that expired in the DHCP snooping database.
Invalid interfaces	The number of interfaces that received the DHCP message but DHCP snooping is not performed.
Parse failures	The number of illegal DHCP packets.
Checksum errors	The number of calculated checksum values that is not equal to the stored checksum.
Unsupported vlans	The number of the entries of which the VLAN is disabled.

18-17 based-on hardware-address

This command is used to add or delete an entry of the DHCP server screen profile.

based-on hardware-address *CLIENT-HARDWARE-ADDRESS*

no based-on hardware-address *CLIENT-HARDWARE-ADDRESS*

Parameters

CLIENT-HARDWARE-ADDRESS	(Optional) Specifies the MAC address of the client.

Default

None.

Command Mode

Configure DHCP Server Screen Mode.

Command Default Level

Level: 12.

Usage Guideline

If a binding entry is defined with the client's MAC address, then 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.

If a binding entry is defined without the client's MAC address, then the server message with the specified server IP address in the payload will be permitted. These binding entries restrict that only specific servers are allowed to offer DHCP server services.

Example

This example shows how to configure a DHCP server screen profile named "campus-profile" which contains a list of MAC addresses of clients.

```
Switch# configure terminal
Switch(config)# dhcp-server-screen profile campus-profile
switch(config-dhcp-server-screen)# based-on hardware-address 00-08-01-02-03-04
switch(config-dhcp-server-screen)# based-on hardware-address 00-08-01-03-00-01
switch(config-dhcp-server-screen)#
```

18-18 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
Switch#
```

18-19 dhcp-server-screen profile

This command is used to define a server screen profile and enter the server screen configure mode.

dhcp-server-screen profile *PROFILE-NAME*

no dhcp-server-screen profile *PROFILE-NAME*

Parameters

PROFILE-NAME	Specifies the profile 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 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 “campus”.

```
Switch# configure terminal
Switch(config)# service dhcp
switch(config)# dhcp-server-screen profile campus
switch(config-dhcp-server-screen)#
```

18-20 ip dhcp snooping server-screen

This command is used to enable or disable DHCP server screening.

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 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 configure a DHCP server screen profile named "campus-profile" and associate it with a DHCP server screen entry for port eth2/0/3.

```
Switch# configure terminal
Switch(config)# dhcp-server-screen profile campus-profile
switch(config-dhcp-server-screen)# based-on hardware-address 00-08-01-02-03-04
switch(config-dhcp-server-screen)# based-on hardware-address 00-08-01-03-00-01
switch(config-dhcp-server-screen)# exit
switch(config)# interface eth2/0/3
switch(config-if)# ip dhcp snooping server-screen 10.1.1.2 profile campus-profile
switch(config-if)#
```

18-21 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 the command to return 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

By default, this 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 64.

```
Switch# configure terminal
Switch(config)# ip dhcp snooping server-screen log-buffer entries 64
Switch(config)#
```

18-22 show ip dhcp server-screen log

This command is used to display the server screen log buffer.

show ip dhcp server-screen log

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 content of the DHCP server screen log buffer. The buffer keeps the information of server messages that violates the screening. The number of occurrences of the same violation and the latest time of the occurrence are tracked.

Example

This example shows how to display the DHCP server screen log buffer.

```
Switch# show ip dhcp server-screen log
Total log buffer size: 64

VLAN   Server IP       Client MAC        Occurrence
------ --------------- ----------------- ----------------------
100    10.20.1.1       00-20-30-40-50-60 06:30:37, 2014-03-10
100    10.58.2.30      10-22-33-44-50-60 06:31:42, 2014-03-10

Total Entries: 2

Switch#
```

18-23 snmp-server enable traps dhcp-server-screen

This command is used to enable sending SNMP notifications for the forge DHCP Server attacking. Use the **no** form of the command to disable sending SNMP notifications.

snmp-server enable traps dhcp-server-screen

no snmp-server enable traps dhcp-server-screen

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When DHCP Server Screen is enabled and the Switch receives the forge DHCP Server packet, the Switch will log the event if any attacking packet is received. You can use this command to enable or disable the sending of the SNMP notifications for such events.

Example

This example shows how start sending sending trap for DHCP Server Screen.

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

19. DHCPv6 Client Commands

19-1 clear ipv6 dhcp client

This command is used to restart the DHCPv6 client on an interface.

clear ipv6 dhcp client *INTERFACE-ID*

Parameters

INTERFACE-ID	Specifies the VLAN interface to restart the DHCPv6 client.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to restart the IPv6 DHCP client on the specified interface.

Example

This example shows how to restart the DHCPv6 client for interface VLAN 1.

```
Switch# clear ipv6 dhcp client vlan1
Switch#
```

19-2 ipv6 dhcp client pd

This command is used to enable the Dynamic Host Configuration Protocol (DHCP) IPv6 client process to request the prefix delegation through a specified interface. Use the **no** form of this command to disable the request.

ipv6 dhcp client pd *PREFIX-NAME* **[rapid-commit]**

no ipv6 dhcp client pd

Parameters

PREFIX-NAME	Specifies the IPv6 general prefix name with a maximum of 32 characters.
rapid-commit	(Optional) Specifies to proceed with two-message exchange for prefix delegation. The rapid-commit option will be filled in the Solicit message to request two messages handshake.

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 prefix delegation request through an interface. The interface being configured will be in DHCP client mode. The prefix acquired from the server will be stored in the IPv6 general prefix pool represented by the general prefix name of the command, which will be in turn used in configuration of IPv6 addresses. Only one general prefix name can be specified for DHCPv6 PD on an interface. However, a general prefix name can be specified for DHCPv6 PD on multiple interfaces.

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 prefix delegation.

When the client receives advertisement from multiple servers, the client will take the server with best preference value. The client can accept multiple prefixes delegated from a server.

The DHCP for IPv6 client, server and relay functions are mutually exclusive on an interface.

Example

This example shows how to configure an IPv6 address based on the general prefix “dhcp-prefix” on VLAN 2 and enables DHCPv6 prefix delegation on VLAN 1 with “dhcp-prefix” as the general prefix name and with the rapid commit option.

```
Switch# configure terminal
Switch(config)# interface vlan2
Switch(config-if)# ipv6 address dhcp-prefix 0:0:0:7272::72/64
Switch(config-if)# exit
Switch(config)# interface vlan1
Switch(config-if)# ipv6 dhcp client pd dhcp-prefix rapid-commit
Switch(config-if)#
```

19-3 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 DUID for the device.

```
Switch# show ipv6 dhcp

This device's DUID is 0001000111A8040D001FC6D1D47B.

Switch#
```

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
  State is OPEN
  List of known servers:
    Reachable via address: FE80::200:11FF:FE22:3344
    Configuration parameters:
        IA PD: IA ID 1, T1 40, T2 64
          Prefix: 2000::/48
                preferred liftime 80, valid lifetime 100
  Prefix name: yy
  Rapid-Commit: disabled

Switch#
```

20. DHCPv6 Guard Commands

20-1 ipv6 dhcp guard policy

This command is used to create or modify a DHCPv6 guard policy. This command will enter into the DHCPv6 guard configuration mode. Use the **no** 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.

Command Default Level

Level: 12.

Usage Guideline

This command is used to create or modify the DHCPv6 guard policy. This command will enter into the DHCPv6 guard 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)# device-role server
Switch(config-dhcp-guard)# match ipv6 access-list acl1
Switch(config-dhcp-guard)#
```

20-2 device-role

This command is used to specify the role of the attached device.

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.

Command Default Level

Level: 12.

Usage Guideline

The command is used 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's 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)#
```

20-3 match ipv6 access-list

This command is used to verify the sender's IPv6 address in server messages. Use the **no** form of the 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.

Command Default Level

Level: 12.

Usage Guideline

This command is used 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)#
```

20-4 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.

Command Default Level

Level: 12.

Usage Guideline

This command is used 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 interface eth1/0/3.

```
Switch# configure terminal
Switch(config)# interface eth1/0/3
Switch(config-if)# ipv6 dhcp guard attach-policy pol1
Switch(config-if)#
```

20-5 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

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If the policy name is specified, only the specified policy information is displayed. If the policy name is not specified, information is displayed for all policies.

Example

This example shows how to displayed for all policies.

```
Switch# show ipv6 dhcp guard policy

DHCP guard policy: default
   Device Role: DHCP client
   Target: eth1/0/3

DHCP guard policy: test1
   Device Role: DHCP server
   Source Address Match Access List: acl1
   Target: eth1/0/1

Switch#
```

Display Parameters

Device Role	The role of the device. The role is either client or server.
Target	The name of the target. The target is an interface.
Source Address Match Access List	The IPv6 access list of the specified policy.

21. DHCPv6 Relay Commands

21-1 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 the command to remove a relay destination.

ipv6 dhcp relay destination *IPV6-ADDRESS* **[***INTERFACE-ID***]**

no ipv6 dhcp relay destination *IPV6-ADDRESS*

Parameters

IPV6-ADDRESS	Specifies the DHCPv6 relay destination address.
INTERFACE-ID	Specifies the output interface for the relay destination.

Default

By default, this option is disabled.

Command Mode

Interface 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)#
```

21-2 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 *SUB-TYPE-NAME*

no ipv6 dhcp relay remote-id format

Parameters

SUB-TYPE-NAME	Specifies the string that identifies the sub-type for the remote ID to be configured.

Default

None.

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 “cid-with-user-define”.

```
Switch# configure terminal
Switch(config)# ipv6 dhcp relay remote-id format cid-with-user-define
Switch(config)#
```

21-3 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 the 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 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)#
```

21-4 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 the command to restore 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** policy is selected, 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** policy is selected, the Switch doesn't 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)#
```

21-5 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)#
```

21-6 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

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 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

Switch #
```

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#
```

21-7 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

EXEC Mode or Any Configuration 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”

Switch#
```

22. Digital Diagnostics Monitoring (DDM) Commands

22-1 show interfaces transceiver

This command is used to display the current SFP module operating parameters.

show interfaces [*INTERFACE-ID* **[,|-] transceiver [detail]**

Parameters

INTERFACE-ID **[,|-]**	(Optional) Specifies multiple interfaces for transceiver monitoring status display. If no interface ID is specified, transceiver monitoring statuses on all valid interfaces are displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the current 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: None

 Port    Temperature   Voltage    Bias Current   TX Power     RX Power
           (Celsius)     (V)         (mA)         (mW)         (mW)
------- ------------ ------------ ------------ ------------ ------------
eth2/0/23     30.090     3.353      16.794(++)    0.258       0.000(--)
eth3/0/25     29.316     3.302       5.326        0.529       0.506
eth3/0/26     31.617     3.297       5.170        0.527       0.504

Total Entries: 3

Switch#
```

This example shows how to display detailed transceiver monitoring information for all ports which are valid for transceiver monitoring.

```
Switch# show interfaces transceiver detail

++ : high alarm, +  : high warning, -  : low warning, -- : low alarm
mA: milliamperes, mW: milliwatts
A: The threshold is administratively configured.

eth2/0/3
Transceiver Monitoring is enabled
Transceiver Monitoring shutdown action：Alarm

                  Current     High-Alarm  High-Warning Low-Warning Low-Alarm
Temperature(C)    30.090      75.000(A)   70.000       0.000       -5.000
Voltage (v)        3.353       3.630       3.465       3.135        2.970
Bias Current(mA)  16.794(++)  10.500       9.000       2.500        2.000
TX Power (mW)      0.258       1.413       0.708       0.186        0.074
RX Power (mW)      0.000(--)   1.585       0.794       0.102        0.041

Switch#
```

22-2 snmp-server enable traps transceiver-monitoring

This command is used to send all or the specified level of optical transceiver monitoring SNMP notifications. Use the **no** form of the command to stop sending the notifications.

snmp-server enable traps transceiver-monitoring [alarm] [warning]

no snmp-server enable traps transceiver-monitoring [alarm] [warning]

Parameters

alarm	(Optional) Specifies to send or stop sending alarm level notification.
warning	(Optional) Specifies to send or stop sending warning level notification.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to send all or the specified level of transceiver-monitoring SNMP notifications.

Example

This example shows how to start sending the SNMP notifications at the warning level.

```
Switch#configure terminal
Switch(config)#snmp-server enable traps transceiver-monitoring warning
Switch(config)#
```

22-3 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 **no** form of the command to disable the shutdown action.

transceiver-monitoring action shutdown {alarm | warning}

no transceiver-monitoring action shutdown

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 the shutdown interface eth3/0/1 when an alarm event is detected.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# transceiver-monitoring action shutdown alarm
Switch(config-if)#
```

22-4 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 the command to remove the configuration.

transceiver-monitoring bias-current *INTERFACE-ID* **{high | low} {alarm | warning}** *VALUE*

no transceiver-monitoring bias-current *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	Specifies the value of the threshold. This value must be between 0 and 131 mA.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This configuration is only suitable for SFP/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 module.

If the 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 interface eth1/0/25.

```
Switch# configure terminal
Switch(config)# transceiver-monitoring bias-current eth1/0/25 high warning 10.237

WARNING: A closest value 10.236 is chosen according to the transceiver-monitoring
precision definition.

Switch(config)#
```

22-5 transceiver-monitoring enable

This command is used to enable the optical transceiver monitoring function for an SFP port. Use the **no** form of the command to 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 function 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 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'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 monitoring on interface eth3/0/1.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# transceiver-monitoring enable
Switch(config-if)#
```

22-6 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* **| dbm** *VALUE***}**

no transceiver-monitoring rx-power *INTERFACE-ID* **{high | low} {alarm | warning}**

Parameters

INTERFACE ID	Specifies the interface to modify.
high	Specifies that when the operating parameter rises above the highest threshold, it indicates an abnormal status.

low	Specifies that when the operating parameter falls below the low threshold this value, it indicates an abnormal status.
alarm	Specifies to configure the high and low threshold value condition.
warning	Specifies to configure the high and low warning threshold 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 and 8.1647.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only SFP/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 module.

If the 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 0.135 mW on interface eth3/0/1.

```
Switch# configure terminal
Switch(config)# transceiver-monitoring rx-power eth3/0/1 low warning mwatt 0.135
Switch(config)#
```

22-7 transceiver-monitoring temperature

This command is used to configure the temperature thresholds for the specified port. Use the **no** form of the command to remove the configuration.

transceiver-monitoring temperature *INTERFACE-ID* **{high | low} {alarm | warning}** *VALUE*

no transceiver-monitoring temperature *INTERFACE-ID* **{high | low} {alarm | warning}**

Parameters

INTERFACE ID	Specifies the interface to modify.
high	Specifies that when the operating parameter rises above this high

	threshold value, it indicates an abnormal status.
low	Specifies that when the operating parameter falls below this low threshold value, it indicates an abnormal status.
alarm	Specifies to configure the high and low threshold value condition.
warning	Specifies to configure the high and low warning threshold conditions.
VALUE	Specifies the threshold value. This value must be between -128 and 127.996 °C.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only SFP/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 module.

If the 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 127.994 on interface eth3/0/1.

```
Switch# configure terminal
Switch(config)# transceiver-monitoring temperature eth3/0/1 high alarm 127.994

 WARNING: A closest value 127.992 is chosen according to the transceiver-monitoring
precision definition.
Switch(config)#
```

22-8 transceiver-monitoring tx-power

This command is used to configure the output power threshold 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* **| dbm** *VALUE***}**

no transceiver-monitoring tx-power *INTERFACE-ID* **{high | low} {alarm | warning}**

Parameters

high	Specifies the interface to modify.
low	Specifies that when the operating parameter rises above this high threshold value, it indicates an abnormal status.
alarm	Specifies that when the operating parameter falls below this low threshold value, it indicates an abnormal status.
warning	Specifies to configure the high and low warning threshold 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 and 8.1647.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only SFP/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 module.

If the 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 TX power low warning threshold to 0.181 mW on interface eth3/0/1.

```
Switch# configure terminal
Switch(config)# transceiver-monitoring tx-power eth3/0/1 low warning mwatt 0.181
Switch(config)#
```

22-9 transceiver-monitoring voltage

This command is used to configure the threshold voltage of the specified port. Use the **no** form of the command to remove the configuration.

transceiver-monitoring voltage *INTERFACE-ID* **{high | low} {alarm | warning}** *VALUE*

no transceiver-monitoring voltage *INTERFACE-ID* **{high | low} {alarm | warning}**

Parameters

INTERFACE-ID	Specifies the interface to modify.
high	Specifies that when the operating parameter rises above the highest threshold, it indicates an abnormal status.
low	Specifies that when the operating parameter falls below this low threshold value, it indicates an abnormal status.
alarm	Specifies to configure the high and low threshold value condition.
warning	Specifies to configure the high and low warning threshold conditions.
VALUE	Specifies the threshold value. This value must be between 0 and 6.55 Volt.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only SFP/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. 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 written into the SFP module.

If the 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 low alarm voltage threshold as 0.005 on interface eth3/0/1.

```
Switch# configure terminal
Switch(config)# transceiver-monitoring voltage eth3/0/1 low alarm 0.005
Switch(config)#
```

23. D-Link Discovery Protocol (DDP) Client Commands

23-1 ddp

This command is used to enable DDP client function globally or on the specified ports. Use the **no** form of the 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)#
```

23-2 ddp report-timer

This command is used to configure interval between two consecutive DDP report messages. Use **no** form of the command to revert the setting to default.

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 30 seconds.

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)#
```

23-3 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
--------------    ----------
eth1/0/1          Enabled

Switch#
```

24. Domain Name System (DNS) Commands

24-1 clear host

This command is used to clear the dynamically learned host entries in the privileged user mode.

clear host {all | [*HOST-NAME***]}**

Parameters

all	Specifies to clear all host entries.
HOST-NAME	(Optional) Specifies to delete the specified dynamically learned host entry.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to delete a host entry or all host entries which are dynamically learned by the DNS resolver or caching server.

Example

This example shows how to delete the dynamically entry “www.abc.com” from the host table.

```
Switch# clear host www.abc.com
Switch#
```

24-2 ip dns server

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

ip dns server

no ip dns server

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The system supports the DNS caching name server function. When the caching name server function is enabled and IP domain-lookup, the system forwards the DNS query packet to the configured name server. The answer replied by the name server will be cached and used to answer the subsequent queries.

Example

This example shows how to enable the DNS caching name server function.

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

24-3 ip dns lookup

This command is used to enable DNS searching dynamic cached or static created host entries. Use the **no** form of this command to disable DNS searching dynamic or static host entries.

ip dns lookup [static] [cache]

no ip dns lookup [static] [cache]

Parameters

static	(Optional) Specifies to enable or disable the lookup of static entries before asking the name server.
cache	(Optional) Specifies to enable or disable the lookup of the dynamic cache before asking the name server.

Default

By default, both the **static** and **cache** options are enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the system tries to lookup a domain name, by default, it will look in the static and dynamic cache first and then send a query to the name server if no matching entries were found. Use this command to disable the lookup option of static or dynamic cache entries before sending requests to the name server. If this command is used without options, then the static and cache options are enabled or disabled at the same time.

Example

This example shows how to enable the lookup of a static host for answering the request.

```
Switch# configure terminal
Switch(config)# ip dns lookup static
Switch(config)#
```

24-4 ip domain lookup

This command is used to enable the DNS to carry out the domain name resolution. Use the **no** form of this command to disable the DNS domain name resolution function.

ip domain lookup

no ip domain lookup

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 the domain name resolution function. The DNS resolver sends the query to the configured name server. The answer replied by the name server will be cached for answering the subsequent requests.

Example

This example shows how to enable the DNS domain name resolution function.

```
Switch# configure terminal
Switch(config)# ip domain lookup
Switch(config)#
```

24-5 ip host

This command is used to configure the static mapping entry for the host name and the IP address in the host table. Use the **no** form of the command to remove the static host entry.

ip host *HOST-NAME* **{***IP-ADDRESS* **|** *IPV6-ADDRESS***}**

no ip host *HOST-NAME* **{***IP-ADDRESS* **|** *IPV6-ADDRESS***}**

Parameters

HOST-NAME	Specifies the host name of the equipment.
IP-ADDRESS	Specifies the IPv4 address of the equipment.

IPV6-ADDRESS	Specifies the IPv6 address of the equipment.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The host name specified in this command needs to be qualified. To delete a static host entry, use the **no** command.

Example

This example shows how to configure the mapping of the host name “www.abc.com” and the IP address 192.168.5.243.

```
Switch# configure terminal
Switch(config)# ip host www.abc.com 192.168.5.243
Switch(config)#
```

24-6 ip name-server

This command is used to configure the IP address of a domain name server. Use the **no** form of this command to delete the configured domain name server.

ip name-server {*IP-ADDRESS* **|** *IPV6-ADDRESS***} [{***IP-ADDRESS2* **|** *IPV6-ADDRESS2***}]**

no ip name-server {*IP-ADDRESS* **|** *IPV6-ADDRESS***} [{***IP-ADDRESS2* **|** *IPV6-ADDRESS2***}]**

Parameters

IP-ADDRESS	Specifies the IPv4 address of the domain name server.
IPV6-ADDRESS	Specifies the IPv6 address of the domain name server.
IP-ADDRESS2…IP-ADDRESS6	Specifies multiple IP addresses, separated by spaces. Up to four servers can be specified.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure a DNS server. When the system cannot obtain an answer from a DNS server, it will attempt the subsequent server until it receives a response. If name servers are already

configured, the servers configured later will be added to the server list. The user can configure up to 4 name servers.

Example

This example shows how to configure the domain name server 192.168.5.134 and 5001:5::2.

```
Switch# configure terminal
Switch(config)# ip name-server 192.168.5.134 5001:5::2
Switch(config)#
```

24-7 ip name-server timeout

This command is used to configure the timeout value for the name server. Use the **no** form of this command to revert it to the default value.

ip name-server timeout *SECONDS*

Parameters

SECONDS	Specifies the maximum time to wait for a response from a specified name server. This value must be between 1 and 60.

Default

By default, this value is 3 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the DNS maximum time value to wait for a response from a specified name server.

Example

This example shows how to configure the timeout value to 5 seconds.

```
Switch# configure terminal
Switch(config)# ip name-server timeout 5
Switch(config)#
```

24-8 show hosts

This command is used to display the DNS configuration.

show hosts

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display DNS related configuration information.

Example

This example shows how to display DNS related configuration information.

```
Switch# show hosts

Number of Static Entries: 2
Number of Dynamic Entries: 1

Host Name:    www.yes.com
IP Address:    10.0.0.88
IPv6 Address:  2001:1::1
Age:          1334minutes

Host Name:    www.abc.com
IP Address:    10.0.0.10
Age:           forever

Host Name:    www.greet.com
IPV6 Address:  2001:2::1
Age:           forever

Switch#
```

24-9 show ip name_server

This command is used to display the DNS configuration.

show ip name_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 the DNS related configuration information.

Example

This example shows how to display the DNS related configuration information.

```
Switch# show ip name_server

Name servers are: 1.1.1.1
Name servers are: 1000::1
Name servers are: 2.2.2.2
Name servers are: 2000::2

Switch#
```

25. DoS Prevention Commands

25-1 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)#
```

25-2 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 the DoS prevention.

```
Switch# show dos-prevention land

DoS Type    : Land Attack
State        : Enabled

Switch#
```

25-3 snmp-server enable traps dos-prevention

This command is used to enable sending SNMP notifications for DoS attacking. Use the **no** form of the command to disable sending SNMP notifications.

snmp-server enable traps dos-prevention

no snmp-server enable traps dos-prevention

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When DoS prevention is enabled, the Switch will log the event if any attacking packet is received every five minutes. You can use this command to enable or disable sending SNMP notifications for such events.

Example

This example shows how to enable sending trap for DoS attacking.

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

26. Dynamic ARP Inspection Commands

26-1 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** 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 two permit entries.

```
Switch# configure terminal
Switch(config)# arp access-list static-arp-list
Switch(config-arp-nacl)# permit ip 10.20.0.0 0.0.255.255 mac any
Switch(config-arp-nacl)# permit ip 10.30.0.0 0.0.255.255 mac any
Switch(config-arp-nacl)#
```

26-2 clear ip 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#
```

26-3 clear ip arp inspection statistics

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

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

Parameters

vlan *VLAN-ID*	(Optional) Specifies the VLAN or range of VLANs.

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#
```

26-4 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 associated with the ARP access list.
,	(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.
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 binding against the entries of the DHCP snooping database. If the command is configured, the validation process will match the address binding 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)#
```

26-5 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 the command to return 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 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

For DAI untrusted interfaces, the rate limit is 15 packets per second with a burst interval of 1 second.

For DAI trusted interfaces, the rate has no limit.

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 eth3/0/10
Switch(config-if)# ip arp inspection limit rate 30 burst interval 5
Switch(config-if)#
```

26-6 ip arp inspection log-buffer

This command is used to configure the ARP inspection log buffer parameter.

ip arp inspection log-buffer entries *NUMBER*

no ip arp inspection log-buffer entries

Parameters

NUMBER	(Optional) Specifies the buffer entry number. The maximum number is 1024.

Default

By default, this value is 32.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the command to configure the maximum entry number of the log buffer. The ARP inspection log buffer keeps tracks the information of ARP packet. The first packet that is given by check will be sent to syslog module and recorded in the inspection 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 logging events, the event will not be logged. If the user specifies a buffer size less than the current entry number, then the log buffer will be automatically cleared.

Example

This example shows how to change the maximum buffer number to 64.

```
Switch# configure terminal
Switch(config)# ip arp inspection log-buffer entries 64
Switch(config)#
```

26-7 ip arp inspection trust

This command is used to trust an interface for dynamic ARP inspection. Use the **no** form of the 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 3/0/3 to be trusted for DAI.

```
Switch# configure terminal
Switch(config)# interface eth3/0/3
Switch(config-if)# ip arp inspection trust
Switch(config-if)#
```

26-8 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 the 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 enable source MAC validation.

```
Switch# configure terminal
Switch(config)# ip arp inspection validate src-mac
Switch(config)#
```

26-9 ip arp inspection vlan

This command is used to enable specific VLANs for dynamic ARP inspection. Use the **no** form of the command disable dynamic ARP inspection for VLAN.

ip arp inspection vlan *VLAN-ID* **[, | -]**

no ip arp inspection vlan *VLAN-ID* **[, | -]**

Parameters

vlan *VLAN-ID*	Specifies the VLAN to enable or disable the ARP inspection function.
,	(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, 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 checked.

Example

This example shows how to enable ARP inspection on VLAN 2.

```
Switch# configure terminal
Switch(config)# ip arp inspection vlan 2
Switch(config)#
```

26-10 ip arp inspection vlan logging

This command is used to control the type of packets that are logged. Use the **no** form of the command to revert the setting to default.

ip arp inspection vlan *VLAN-ID* **[, | -] logging {acl-match {permit | all | none} | dhcp-bindings {permit | all | none}}**

no ip arp inspection vlan *VLAN-ID* **[, | -] logging {acl-match | dhcp-bindings}**

Parameters

vlan *VLAN-ID*	Specifies the VLAN to enable or disable the logging control function.
,	(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.
acl-match	Specifies the logging criteria for packets that are dropped or permitted based on ACL matches.
acl-match permit	Specifies logging when permitted by the configured ACL.
acl-match all	Specifies logging when permitted or denied by the configured ACL.
acl-match 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.
dhcp-bindings permit	Specifies logging when permitted by DHCP bindings.
dhcp-bindings all	Specifies logging when permitted or denied by DHCP bindings.
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. If not specified, all the logging types are reset to log on when the ARP packets are denied.

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)#
```

26-11 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 the 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 any	Specifies to match any source IP address.

ip 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 any	Specifies to match any source MAC address.
mac host *SENDER-MAC*	Specifies to match a single source MAC address.
SENDER-MAC SENDER-MAC-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 two permit entries.

```
Switch# configure terminal
Switch(config)# arp access-list static-arp-list
Switch(config-arp-nacl)# permit ip 10.20.0.0 255.255.0.0 mac any
Switch(config-arp-nacl)# permit ip 10.30.0.0 255.255.0.0 mac any
Switch(config-arp-nacl)#
```

26-12 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

interfaces *INTERFACE-ID*	(Optional) Specifies a port, range of ports or all ports to configure.
,	(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.
vlan *VLAN-ID*	(Optional) Specifies a VLAN or range of VLANs.

Default

None.

Command Mode

EXEC Mode or 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 statistics of packets that have been processed by DAI for VLAN 10.

```
Switch# show ip arp inspection statistics vlan 10

VLAN    Forwarded    Dropped    DHCP Drops   ACL Drops
-----   ---------   ---------   ----------   ---------
10       21546        145261       145261        0
VLAN    DHCP Permits   ACL Permits   Source MAC Failures
-----   ------------   -----------   -------------------
10       21546            0                0
VLAN    Dest MAC Failures   IP Validation Failures
-----   -----------------   ----------------------
10       0                       0

Switch#
```

This example shows how to display the statistics of packets that have been processed by DAI for all active VLANs.

```
Switch# show ip arp inspection statistics

VLAN    Forwarded    Dropped    DHCP Drops   ACL Drops
-----   ---------   ---------   ----------   ---------
1        0              0           0              0
2        0              0           0              0
10       21546        145261      145261         0
100     0              0            0              0
200     0              0            0              0
1024    0              0            0              0
VLAN    DHCP Permits   ACL Permits   Source MAC Failures
-----   ------------   -----------   -------------------
1        0                 0               0
2        0                 0               0
10       21546           0               0
100      0                0               0
200      0                0               0
1024     0                0               0
VLAN    Dest MAC Failures   IP Validation Failures
-----   -----------------   ----------------------
1        0                        0
2        0                        0
10       0                        0
100      0                        0
200      0                        0
1024     0                        0

Switch#
```

Display Parameters

VLAN	The VLAN ID that is enabled for ARP inspection.
Forwarded	The number of ARP packets that are forwarded by ARP inspection.
Dropped	The number of ARP packets that are dropped by ARP inspection.
DHCP Drops	The number of ARP packets that are dropped by DHCP snooping binding database.
ACL Drops	The number of ARP packets that are dropped by ARP ACL rule.
DHCP Permits	The number of ARP packets that are permitted by DHCP snooping binding database.
ACL Permits	The number of ARP packets that are permitted by ARP ACL rule.
Source MAC Failures	The number of ARP packets that fail source MAC validation.
Dest MAC Failures	The number of ARP packets that fail destination MAC validation.
IP Validation Failures	The number of ARP packets that fail the IP address validation.

Example

This example shows how to display the configuration and operating state of DAI.

```
Switch# show ip arp inspection

Source MAC Validation     : Disabled
Destination MAC Validation: Disabled
IP Address Validation     : Disabled
VLAN   State            ACL Match                              Static ACL
----- -------------  ------------------------------ ----------
10      Enabled         -                                        -
VLAN   ACL Logging DHCP Logging
----- ----------- ----------
10      Deny          Deny

Switch#
```

Display Parameters

VLAN	The VLAN ID that enables ARP inspection.
Configuration	The configuration state of ARP inspection. **Enable:** ARP inspection is enabled. **Disable:** ARP inspection is enabled.
ACL Match	The name of ARP ACL that is specified.
Static ACL	The configuration of the static ACL. **Yes:** Static ARP ACL is configured. **No:** Static ARP ACL is not configured.
ACL logging	The state of logging for packets dropped or permitted based on ACL matches. **None:** ACL-matched packets are not logged. **Permit:** Logging when packets are permitted by the configured ACL. **Deny:** Logging when packets are dropped by the configured ACL. **All:** ACL-matched packets are always logged.
DHCP Logging	The state of logging for packets dropped or permitted based on DHCP bindings. **None:** Prevent logging when packets are dropped or permitted by the DHCP bindings. **Permit:** Logging when packets are permitted by the DHCP bindings. **Deny:** Logging when packets are dropped by the DHCP bindings. **All:** Logging when packets are dropped or permitted by the DHCP bindings.

Example

This example shows how to display the trust state of interface eth3/0/3.

```
Switch# show ip arp inspection interfaces eth3/0/3

Interface   Trust State   Rate(pps)  Burst Interval
---------   -----------   ---------  --------------
eth3/0/3     untrusted     30           5

Switch#
```

This example shows how to display the trust state of interfaces on the Switch.

```
Switch# show ip arp inspection interfaces

Interface   Trust State   Rate(pps)    Burst Interval
---------   -----------   ---------   -------------
eth3/0/1      untrusted    30            1
eth3/0/2      untrusted    30            1
eth3/0/3      untrusted    30            5
eth3/0/5      trusted       None         1
eth3/0/6      untrusted    30            1
eth3/0/7      untrusted    30            1
eth3/0/8      untrusted    30            1

Total Entries: 7

Switch#
```

Display Parameters

Interface	The name of interface that enable ARP inspection.
Trust State	The state of the interface. **trusted:** This interface is ARP inspection trusted port, all ARP packet will be legal and not be authorized. **untrusted:** This interface is ARP inspection untrusted port, all ARP packet will be authorized.
Rate (pps)	The upper limit on the number of incoming packets processed per second.
Burst Interval	The consecutive interval in seconds over which the interface is monitored for the high rate of the ARP packets.

26-13 show ip arp inspection log

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

show ip arp inspection log

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 content of the inspection log buffer.

Example

This example shows how to display the inspection log-buffer.

```
Switch# show ip arp inspection log

Total log buffer size: 64

Interface   VLAN        Sender IP          Sender MAC        Occurrence
---------- --------  ------------- -----------------  -------------------------
eth1/0/1     100       10.20.1.1      00-20-30-40-50-60     1 (2014-03-28 23:08:66)
eth1/0/2     100       10.5.10.16     55-66-20-30-40-50     2 (2014-04-02 00:11:54)
eth1/0/3     100       10.58.2.30     10-22-33-44-50-60     1 (2014-03-30 12:01:38)

Total Entries: 3

Switch#
```

Display Parameters

Interface	The name of interface that logging occurred.
VLAN	The VLAN that logging occurred.
Sender IP	The logging ARP’s sender IP address.
Sender MAC	The logging ARP’s sender MAC address.
Occurrence	The counter of logging entries occurred and the last time of logging entry occurred.

27. Error Recovery Commands

27-1 errdisable recovery

This command is used to enable the error recovery for causes and to configure the recovery interval. Use the **no** 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 for an error port caused by port security violation.
storm-control	Specifies to enable the auto-recovery option for an error port caused by storm control.
bpdu-protect	
arp-rate	Specifies to enable the auto-recovery option for an error port caused by ARP rate limiting.
dhcp-rate	Specifies to enable the auto-recovery option for an error port caused by DHCP rate limiting.
loopback-detect	Specifies to enable the auto-recovery option for an 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, etc…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)#
```

27-2 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                                enabled       120 seconds
Storm Control                               enabled        120 seconds
BPDU Attack Protection              disabled       120 seconds
Dynamic ARP Inspection             enabled       120 seconds
DHCP Snooping                           enabled       120 seconds
Loop Detection                             enabled       120 seconds

Interfaces that will be recovered at the next timeout:

Interface    Errdisable Cause                        Time left(sec)
---------    ------------------------------------   --------------
eth1/0/7     BPDU Attack Protection             infinite
eth2/0/3     Loop Detection                          45
eth2/0/5     Loop Detection                          45

Switch#
```

27-3 snmp-server enable traps errdisable

This command is used to enable sending SNMP notifications for error disabled state. Use the **no** form of the 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 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)#
```

28. File System Commands

28-1 cd

This command is used to change the current directory.

cd [*DIRECTORY-URL***]**

Parameters

DIRECTORY-URL	Specifies the URL of the directory. If not specified, the current directory will be shown.

Default

The default current directory is the root directory on the file system of the local FLASH.

Command Mode

EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If the URL is not specified, then the current directory is not changed.

Example

This example shows how to change the current directory to the directory “log” on file system “c:/”.

```
Switch# dir

Directory of /c:
1 d             0 Dec 29 2013 17:49:36  images
2 d             0 Jan 02 2013 18:42:53  configurations
3 d             0 Jan 02 2013 18:42:53  log
4 -           639 Jan 03 2013 12:09:32  new_config.cfg

20578304 bytes total (3104544 bytes free)

Switch#cd c:/log
Switch#dir

Directory of /c:/log
No files in directory
20578304 bytes total (3104544 bytes free)

Switch#
```

This example shows how to display the current directory.

```
Switch# cd

Current directory is /c:/log

Switch#
```

28-2 delete

This command is used to to delete a file.

delete *FILE-URL*

Parameters

FILE-URL	Specifies the name of the file to be deleted.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

The firmware image or the configuration file that is specified as the boot-up file cannot be deleted.

Example

This example shows how to delete the file named “test.txt” from file system on the local flash.

```
Switch# delete c:/test.txt

Delete test.txt? (y/n) [n] y
File is deleted

Switch#
```

28-3 dir

This command is used to display the information for a file or the listing of files in the specified path name.

dir [*URL***]**

Parameters

URL	(Optional) Specifies the name of the file or directory to be displayed.

Default

None.

Command Mode

EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If URL is not specified, the current directory is used. By default, the current directly is located at the root of the file system located at local flash. The storage media is mounted in the file system and appears to the user as a sub-directory under the root directory.

The supported file systems can be displayed as the user issues the **dir** command for the root directory. The storage media that is mapped to the file system can be displayed by using the **show storage media** command.

Example

This example shows how to display the root directory in a standalone switch.

```
Switch# dir /

Directory of /
1 d--             0 Jun 31 2013 17:49:36  c:
2 d--             0 Jun 31 2013 18:42:53  d:
0 bytes total (0 bytes free)

Switch#
```

28-4 mkdir

This command is used to create a directory under the current directory.

mkdir *DIRECTORY-NAME*

Parameters

DIRECTORY-NAME	Specifies the name of the directory.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to make a directory in the current directory.

Example

This example shows how to create a directory named “newdir” under the current directory.

```
Switch# mkdir newdir
Switch#
```

28-5 more

This command is used to display the contents of a file.

more *FILE-URL*

Parameters

FILE-URL	Specifies the URL for the file to be displayed.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display the contents of a file in the file system. The command is usually used to display text files. If the content of a file contains non-standard printable characters, the display will feature unreadable characters or even blank spaces.

Example

This example shows how to display the contents of file “usr_def.conf”.

```
Switch# more  /c:/configuration/usr_def.conf

!DGS-1510
!Firmware Version:1.10.001
!Slot      Model
!------ ------------------
! 1        DGS-1510-28P
! 2        -
! 3        DGS-1510-28P
! 4        DGS-1510-28P
!
ip igmp snooping vlan 1
!.
end

Switch#
```

28-6 rename

This command is used to rename a file.

rename *FILE-URL1 FILE-URL2*

Parameters

FILE-URL1	Specifies the URL for the file to be renamed.
FILE-URL2	Specifies the URL after file renaming.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

A file can be renamed to a file located either within the same directory or to another directory.

Example

This example shows how to rename file called “doc.1” to “test.txt”.

```
Switch# rename /c:/doc.1 /c:/test.txt

Rename file doc.1 to text.txt? (y/n) [n] y

Switch#
```

28-7 rmdir

This command is used to remove a directory in the file system.

rmdir *DIRECTORY-NAME*

Parameters

DIRECTORY-NAME	Specifies the name of the directory.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to remove a directory in the working directory.

Example

This example shows how to remove a directory called “newdir” under the current directory.

```
Switch# rmdir newdir

Remove directory newdir? (y/n) [n] y
The directory is removed

Switch#
```

28-8 show storage media-info

This command is used to display the storage media’s information.

show storage media-info [unit *UNIT-ID***]**

Parameters

unit *UNIT-ID*	(Optional) Specifies the unit ID in the stacking system. If not specified, all units are displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the information of the storage media available on the system.

Example

This example shows how to display the information of the storage media on all units.

```
Switch# show storage media-info

Unit  Drive  Media-Type  Size     FS-Type   Label
----  -----  ----------  -------  --------  -------------
 1    c:     FLASH       29M      FFS
 2    c:     FLASH       31M      FFS
 3    c:     FLASH       31M      FFS

Switch#
```

29. Filter Database (FDB) Commands

29-1 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#
```

29-2 mac-address-table aging-time

This command is used to configure the MAC address table aging time. Use the **no** form of the 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 aging time 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)#
```

29-3 mac-address-table aging destination-hit

This command is used to enable the destination MAC address triggered update function. Use the **no** form of the command to disable the destination MAC address triggered updated function.

mac-address-table aging destination-hit

no mac-address-table aging destination-hit

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The source MAC address triggered update function is always enabled. The hit bit of MAC address entries corresponding to the port that receives the packet will be updated based on the source MAC address and the VLAN of the packet. When the user enables the destination MAC address triggered update function by using the **mac-address-table aging destination-hit** command, the hit bit of MAC address entries corresponding to the port that transmit the packet will be updated based on the destination MAC address and the VLAN of the packet.

The destination MAC address triggered update function increases the MAC address entries hit bit update frequency and reduce traffic flooding by the MAC address entries aging time-out.

Example

This example shows how to enable the destination MAC address triggered update function.

```
Switch# configure terminal
Switch(config)# mac-address-table aging destination-hit
Switch(config)#
```

29-4 mac-address-table learning

This command is used to enable MAC address learning on the physical port. Use the **no** form of the 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 MAC address 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 eth1/0/5
Switch(config)#
```

29-5 mac-address-table notification change

This command is used to enable or configure the MAC address notification function. Use the **no** form of the 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 trap interval is 1 second.

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 and then sent to the SNMP server if the **snmp-server enable traps mac-notification change** command is enabled. The MAC notification history table stores the MAC address learned or deleted on each interface for which the trap is enabled. 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)#
```

29-6 mac-address-table static

This command is used to add a static address to the MAC address table. Use the **no** form of the 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 spaces are allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No spaces are 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 eth1/0/1
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 eth1/0/5-6
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-
channel 2
Switch(config)#
```

29-7 multicast filtering-mode

This command is used to configure the handling method for multicast packets for a VLAN. Use the **no** form of the 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)#
```

29-8 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   Static   CPU

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
----------------------------------------
1     00-02-4B-28-C4-82     Static    CPU
2     00-02-4B-28-C4-82     Static    CPU
4     00-01-00-02-00-04     Static    eth1/0/2
4     C2-F3-22-0A-12-F4     Static    port-channel2
6     00-01-00-02-00-07     Static    eth1/0/1
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     00-02-4B-28-C4-82    Static         CPU
1     00-03-40-11-22-33    Dynamic        eth1/0/2

Total Entries: 2

Switch#
```

29-9 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

Switch#
```

29-10 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 MAC address learning status on all physical ports 1 to 10.

```
Switch# show mac-address-table learning interface ethernet 1/0/1-10

Interface                State
-----------------------  --------
eth1/0/1                 Enabled
eth1/0/2                 Enabled
eth1/0/3                 Enabled
eth1/0/4                 Enabled
eth1/0/5                 Enabled
eth1/0/6                 Enabled
eth1/0/7                 Enabled
eth1/0/8                 Enabled
eth1/0/9                 Enabled
eth1/0/10                Enabled

Switch#
```

29-11 show mac-address-table notification change

This command is used to display the MAC address notification configuration or history content.

show mac-address-table notification change [interface [*INTERFACE-ID***] | history]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies the interface to display.
history	(Optional) Specifies to display the MAC address notification change history.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If no option is specified, the global configuration will be displayed. Use the **interface** keyword to display information about all interfaces. If the interface ID is included, the specified interface will be displayed.

Example

This example shows how to display the MAC address notification change configuration on all interfaces.

```
Switch#show mac-address-table notification change interface

Interface                Added Trap       Removed Trap
-----------------------  --------------   --------------

eth1/0/1                 Disabled         Disabled
eth1/0/2                 Disabled         Disabled
eth1/0/3                 Disabled         Disabled
eth1/0/4                 Disabled         Disabled
eth1/0/5                 Disabled         Disabled
eth1/0/6                 Disabled         Disabled
eth1/0/7                 Disabled         Disabled
eth1/0/8                 Disabled         Disabled
eth1/0/9                 Disabled         Disabled
eth1/0/10                Disabled         Disabled
eth1/0/11                Disabled         Disabled
eth1/0/12                Disabled         Disabled
eth1/0/13                Disabled         Disabled
eth1/0/14                Disabled         Disabled
eth1/0/15                Disabled         Disabled
eth1/0/16                Disabled         Disabled
eth1/0/17                Disabled         Disabled
eth1/0/18                Disabled         Disabled
eth1/0/19                Disabled         Disabled
eth1/0/20                Disabled         Disabled
eth1/0/21                Disabled         Disabled
eth1/0/22                Disabled         Disabled
eth1/0/23                Disabled         Disabled
eth1/0/24                Disabled         Disabled
eth1/0/25                Disabled         Disabled
eth1/0/26                Disabled         Disabled
eth1/0/27                Disabled         Disabled
eth1/0/28                Disabled         Disabled

Switch#
```

This example shows how to display the MAC address notification global configuration.

```
Switch#show mac-address-table notification change

MAC Notification Change Feature: Disabled
Interval between Notification Traps: 1 seconds
Maximum Number of Entries Configured in History Table: 1
Current History Table Length: 0
MAC Notification Trap State: Disabled

Switch#
```

This example shows how to display the MAC address notification history.

```
Switch# show mac-address-table notification change history

History Index: 1
Operation:ADD Vlan: 1 MAC Address: 00-f8-d0-12-34-56 eth1/0/1
History Index: 2
Operation:DEL Vlan: 1 MAC Address: 00-f8-d0-00-00-01 eth1/0/1
History Index: 3
Operation:DEL Vlan: 1 MAC Address: 00-f8-d0-00-00-02 eth1/0/1

Switch#
```

29-12 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#
```

29-13 snmp-server enable traps mac-notification change

This command is used to enable the sending of SNMP MAC notification traps. Use the **no** form of the command to disable the sending of SNMP MAC notification traps.

snmp-server enable traps mac-notification change

no snmp-server enable traps mac-notification change

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 the sending of SNMP MAC notification traps.

Example

This example shows how to enable the sending of SNMP MAC notification traps.

```
Switch# configure terminal
Switch(config)# snmp-server enable traps mac-notification change
Switch(config)#
```

29-14 snmp trap mac-notification change

This command is used to enable the MAC address change notification on a specific interface. Use the **no** form of the command to return to the default setting.

snmp trap mac-notification change {added | removed}

no snmp trap mac-notification change{added | removed}

Parameters

added	Specifies to enable the MAC change notification when a MAC address is added on the interface.
removed	Specifies to enable the MAC change notification when a MAC address is removed from the interface.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Even when enabling the notification trap for a specific interface by using the **snmp trap mac-notification change** command, the notification is sent to the notification history table only when the **mac-address-table notification change** command was enabled.

Example

This example shows how to enable the MAC address added notification trap on interface eth1/0/2.

```
Switch# configure terminal
Switch(config)# interface eth1/0/2
Switch(config-if)# snmp trap mac-notification change added
Switch(config-if)#
```

30. GARP VLAN Registration Protocol (GVRP) Commands

30-1 clear gvrp statistics

This command is used to clear the statistics for a GVRP port.

clear gvrp statistics {all | interface *INTERFACE-ID* **[, | -]}**

Parameters

all	Specifies to clear GVRP statistic counters associated with all interfaces.
interface *INTERFACE-ID* **[,|-]**	Specifies the interfaces. Specify a single interface, a range of interfaces separated by a hyphen, or a series of interfaces separated by comma.

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#
```

30-2 gvrp global

This command is used to enable the GVRP function globally and use the **no** command to disable the GVRP function globally.

gvrp global

no gvrp global

Parameters

None.

Default

By default, this option 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)#
```

30-3 gvrp enable

This command is used to enable the GVRP function on a port. Use the **no** command to disable the GVRP function on a port.

gvrp enable

no gvrp 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 both physical ports and port-channel interface configuration. This command only takes effect for hybrid mode and trunk mode.

Example

This example shows how to enable the GVRP function on interface eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# gvrp enable
Switch(config-if)#
```

30-4 gvrp advertise

This command is used to specify the VLAN that are allowed to be advertised by the GVRP protocol. Use the **no** 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 **[,|-]**	(Optional) Specified the advertise VLAN list or the VLAN list 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 spaces are required before and after the comma.
-	(Optional) Specifies a range of VLANs. No spaces are required 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 enable the advertise function of VLAN 1000 on interface eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# gvrp advertise 1000
Switch(config-if)#
```

30-5 gvrp vlan create

This command is used to enable dynamic VLAN creation. Use the **no** command to disable the dynamic VLAN creation function.

gvrp vlan create

no gvrp vlan create

Parameters

None.

Default

By default, this option 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 the creation of dynamic VLANs registered with the GVRP protocol.

```
Switch# configure terminal
Switch(config)# gvrp vlan create
Switch(config)#
```

30-6 gvrp forbidden

This command is used to specify a port as being a forbidden member of the specified VLAN. Use the **no** 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, except VLAN 1, are forbidden on the interface.
add	(Optional) Specifies a VLAN or a list of VLANs to be added to the forbidden VLAN list.
remove	(Optional) Specifies a VLAN or a list of VLANs to be removed from the forbidden VLAN list.
VLAN-ID **[,|-]**	(Optional) Specified the forbidden VLAN list. If the add or remove option is not specified, the specified VLAN list will overwrite the forbidden VLAN list. The range is 2 to 4094.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No spaces are required before and after the

	comma.
-	(Optional) Specifies a range of VLANs. No spaces are required 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 interface eth1/0/1 as a forbidden port of VLAN 1000 via the GVRP operation.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# gvrp forbidden 1000
Switch(config-if)#
```

30-7 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	(Optional) Specifies to set the timer for joining a group. The unit is in a hundredth of a second.
leave	(Optional) Specifies to set the timer for leaving a group. The unit is in a hundredth of a second.
leave-all	(Optional) Specifies to set the timer for leaving all groups. The unit is in a hundredth of a second.
TIMER-VALUE	(Optional) Specifies the 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 interface eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# gvrp timer leave-all 500
Switch(config-if)#
```

30-8 show gvrp configuration

This command is used to display the GVRP settings.

show gvrp configuration [interface [*INTERFACE-ID* **[,|-]]]**

Parameters

configuration	Specifies to display the GVRP configuration. If the interface is not specified, the GVRP global configuration is displayed.
interface	Specifies to display the GVRP interface configuration. If the interface ID is not specified, all interfaces are displayed.
INTERFACE-ID **[,|-]**	(Optional) Specifies the interfaces used to display the configuration. Specify a single interface or a range of interfaces, separated by a hyphen, or a series of interfaces separated by comma.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command only displays GVRP related configurations.

Example

This example shows how to display the GVRP configuration for the global configuration.

```
Switch# show gvrp configuration

Global GVRP State     : Enabled
Dynamic VLAN Creation : Disabled

Switch#
```

This example shows how to display the GVRP configuration on interfaces eh3/0/5 to eth3/06.

```
Switch# show gvrp configuration interface eth3/0/5-3/0/6

eth3/0/5
GVRP Status     : Enabled
Join Time       : 20 centiseconds
Leave Time      : 60 centiseconds
Leave-All Time  : 1000 centiseconds
Advertise VLAN  : 1-4094
Forbidden VLAN  : 3-5

eth3/0/6
GVRP Status     : Enabled
Join Time       : 20 centiseconds
Leave Time      : 60 centiseconds
Leave-All Time  : 1000 centiseconds
Advertise VLAN  : 1-3
Forbidden VLAN  : 5-8

Switch#
```

30-9 show gvrp statistics

This command is used to display the statistics for a GVRP port.

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

Parameters

INTERFACE-ID **[, | -]**	(Optional) Specifies the interfaces. Specify a single interface, a range of interfaces separated by a hyphen, or a series of interfaces separated by commas.

Default

None.

Command Mode

EXEC Mode or 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 eth3/0/5 to eth3/0/6.

```
Switch# show gvrp statistics interface eth3/0/5–3/0/6

Port        JoinEmpty       JoinIn  LeaveEmpty     LeaveIn   LeaveAll    Empty
----------- ----------- ------------ ----------- ---------- ------------ --------
eth3/0/5 RX          0             0           0          0          0          0
         TX 4294967296    4294967296  4294967296 4294967296 4294967296 4294967296
eth3/0/6 RX          0             0           0          0          0          0
         TX          0             0           0          0          0          0

Switch#
```

31. Gratuitous ARP Commands

31-1 ip arp gratuitous

This command is used to enable the learning of gratuitous ARP packets in the ARP cache table. To disable ARP control, use the **no** form of this command.

ip arp gratuitous

no ip arp gratuitous

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The system will learn gratuitous ARP packets in the ARP cache table by default.

Example

This example shows how to disable the learning of gratuitous ARP request packets.

```
Switch# configure terminal
Switch(config)# no ip arp gratuitous
switch(config)#
```

31-2 ip gratuitous-arps

This command is used to enable the transmission of gratuitous ARP request packets. To disable the transmission, use the **no** form of this command.

ip gratuitous-arps [dad-reply]

no ip gratuitous-arps [dad-reply]

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A gratuitous ARP request packet is an ARP request packet where the source and the destination IP address are both set to the IP address of the sending device and the destination MAC address is the broadcast address.

Generally, a device use the gratuitous ARP request packet to discover whether the IP address is duplicated by other hosts or to preload or reconfigure the ARP cache entry of hosts connected to the interface.

Use the **ip gratuitous-arps** command to enable transmission of gratuitous ARP request. The device will send out the packet when an IP interface becomes link-up or when the IP address of an interface is configured or modified.

Use the **ip gratuitous-arps dad-reply** command to enable the transmission of gratuitous ARP requests. The device will send out the packet while a duplicate IP address is detected

Example

This example shows how to sending of gratuitous ARP messages.

```
Switch# configure terminal
Switch(config)# ip gratuitous-arps dad-reply
switch(config)#
```

31-3 arp gratuitous-send

This command is used to set the interval for regularly sending of gratuitous ARP request messages on the interface. Use **no** command to disable this function on the interface.

arp gratuitous-send interval *SECONDS*

no arp gratuitous-send

Parameters

SECONDS	Specifies the time interval to send the gratuitous ARP request message in the range from 1 to 3600 seconds.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If an interface on the Switch is used as the gateway of its downlink devices and counterfeit gateway behavior occurs in the downlink devices, administrators can configure to send gratuitous ARP request messages regularly on this interface to notify that the Switch is the real gateway.

Example

This example shows how to enable the sending of gratuitous ARP messages.

```
Switch# configure terminal
Switch(config)# ip gratuitous-arps
switch(config)# interface vlan100
Switch(config-if)# arp gratuitous-send interval 1
Switch(config-if)#
```

32. IGMP Snooping Commands

32-1 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* **| interface** *INTERFACE-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.
interface *INTERFACE-ID*	Specifies a port 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#
```

32-2 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)#
```

32-3 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 immediately 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 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)#
```

32-4 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 the 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)#
```

32-5 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 eth4/0/1
Switch(config-vlan)#
```

32-6 ip igmp snooping proxy-reporting

This command is used to enable the proxy-reporting function. Use the **no** form of this command to disable the proxy-reporting function.

ip igmp snooping proxy-reporting [source *IP-ADDRESS***]**

no ip igmp snooping proxy-reporting

Parameters

IP-ADDRESS	(Optional) Specifies the source IP of proxy reporting. The default value is zero IP.

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. When the function proxy reporting is enabled, the received multiple IGMP report or leave packets for a specific (S, G) will be integrated into one report before being sent to the router port. Proxy reporting source IP will be used as source IP of the report, Zero IP address will be used when the proxy reporting source IP is not set.

Example

This example shows how to enable IGMP snooping proxy-reporting on VLAN 1 and configure the proxy-reporting message source IP to be 1.2.2.2.

```
Switch# configure terminal
Switch(config)# vlan 1
Switch(config-if)# ip igmp snooping proxy-reporting source 1.2.2.2
Switch(config-if)#
```

32-7 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)#
```

32-8 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 the 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)#
```

32-9 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)#
```

32-10 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 won't 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)#
```

32-11 ip igmp snooping report-suppression

This command is used to enable the report suppression. Use the **no** form of this command to disable the report suppression.

ip igmp snooping report-suppression

no ip igmp snooping report-suppression

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. The report suppression function only works for IGMPv1 and IGMPv2 traffic. When report suppression is enabled, the Switch suppresses the duplicate reports sent by hosts. The suppression for the same group report or leave will continue until the

suppression time expired. For report or leave messages to the same group, only one report or leave message is forwarded. The remaining report and leave messages are suppressed.

Example

This example shows how to enable report suppression on VLAN 1.

```
Switch# configure terminal
Switch(config)# vlan 1
Switch(config-vlan)# ip igmp snooping report-suppression
Switch(config-vlan)#
```

32-12 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)#
```

32-13 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 eth3/0/5
Switch(config-vlan)#
```

32-14 ip igmp snooping suppression-time

This command is used to configure the interval of suppressing duplicate IGMP reports or leaves. Use the **no** form of the command to revert to the default setting.

ip igmp snooping suppression-time *SECONDS*

no ip igmp snooping suppression-time

Parameters

SECONDS	Specifies to configure the interval of suppressing duplicates IGMP reports. The range is from 1 to 300.

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. The report suppression function will suppress the duplicate IGMP report or leave packets received in the suppression time interval. A small suppression time will cause the duplicate IGMP packets be sent more frequently.

Example

This example shows how to configure the suppression time to be 125 on VLAN 1000.

```
Switch# configure terminal
Switch(config)# vlan 1000
Switch(config-vlan)# ip igmp snooping suppression-time 125
Switch(config-vlan)#
```

32-15 ip igmp snooping minimum-version

This command is used to configure the minimum version of IGMP hosts that is allowed on the interface. Use the **no** form of this command to remove the restriction from the interface.

ip igmp snooping minimum-version {2 | 3}

no ip igmp snooping minimum-version

Parameters

2	Specifies to filter out IGMPv1 messages.
3	Specifies to filter out IGMPv1 and IGMPv2 messages.

Default

By default, there is no limit on the minimum version.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. This setting only applies to the filtering of IGMP membership reports.

Example

This example shows how to restrict all IGMPv1 hosts to join VLAN 1.

```
Switch# configure terminal
Switch(config)# vlan 1
Switch(config-vlan)# ip igmp snooping minimum-version 2
Switch(config-vlan)#
```

This example shows how to restrict all IGMPv1 and IGMPv2 hosts disallowed to join VLAN 1.

```
Switch# configure terminal
Switch(config)# vlan 1
Switch(config-vlan)# ip igmp snooping minimum-version 3
Switch(config-vlan)#
```

This example shows how to remove the restriction configured on VLAN 1.

```
Switch# configure terminal
Switch(config)# vlan 1
Switch(config-vlan)# no ip igmp snooping minimum-version
Switch(config-vlan)#
```

32-16 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*	(Otpional) 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
    Minimum version                 : v1
    Fast leave                      : Enabled (host-based)
    Report suppression              : Disabled
    Suppression time                : 10 seconds
    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
    Proxy reporting                 : Enabled (Source 1.2.2.2)

Switch#
```

32-17 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   FM  Exp(sec)  Interface
-------  ---------------  ---------------  --  --------  ---------
1        239.255.255.250         *         EX  382       2/0/7

Total Entries: 1

Switch#
```

32-18 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#
```

32-19 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#
```

32-20 show ip igmp snooping statistics

This command is used to display IGMP snooping statistics information on the Switch.

show ip igmp snooping statistics {interface [*INTERFACE-ID***] | vlan [***VLAN-ID***]}**

Parameters

interface *INTERFACE-ID*	Specifies the interface to display port statistics counters.
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#
```

33. Interface Commands

33-1 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 eth1/0/1.

```
Switch# clear counters interface eth1/0/1
Switch#
```

33-2 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 RFC 2233.

Example

This example shows how to add the description “Physical Port 10” to interface eth 1/0/10.

```
Switch# configure terminal
Switch(config)# interface eth1/0/10
Switch(config-if)# description Physical Port 10
Switch(config-if)#
```

33-3 interface

This command is used to enter the interface configuration mode for a single interface. Use the **no** form of the 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.

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 eth 2/0/5.

```
Switch# configure terminal
Switch(config)# interface eth2/0/5
Switch(config-if)#
```

This example shows how to enter the interface configuration mode for VLAN 100.

```
Switch# configure terminal
Switch(config)# interface vlan100
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)#
```

33-4 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 spaces are allowed before and after the comma.
-	(Optional) Specifies an interface range by delimiting the start and the ending interface numbers with a hyphen. No spaces are 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 2/0/1 to 2/0/5: and port 3/0/3.

```
Switch# configure terminal
Switch(config)# interface range eth2/0/1-5,3/0/3
Switch(config-if-range)#
```

33-5 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 eth1/0/1.

```
Switch#show counter interface eth 1/0/1

eth1/0/1 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
rxBufferFullDropPkts              : 0
rxACLDropPkts                     : 0
rxMulticastDropPkts               : 0
rxVLANIngressCheckDropPkts        : 0
rxIpv6DropPkts                    : 0
rxSTPDropPkts                     : 0
rxStormAndFDBDropPkts             : 0
rxMTUDropPkts                     : 0

txCollisions                      : 0
ifInErrors                        : 0
ifOutErrors                       : 0
ifInDiscards                      : 1175
ifInUnknownProtos                 : 0
```

```
ifOutDiscards                    : 0
txDelayExceededDiscards          : 0
txCRC                            : 0
txSTPDropPkts                    : 0
txHOLDropPkts                    : 0

dot3StatsAlignmentErrors         : 0
dot3StatsFCSErrors               : 0
dot3StatsSingleColFrames         : 0
dot3StatsMultiColFrames          : 0
dot3StatsSQETestErrors           : 0
dot3StatsDeferredTransmisions    : 0
dot3StatsLateCollisions          : 0
dot3StatsExcessiveCollisions     : 0
dot3StatsInternalMacTransmitErrors : 0
dot3StatsCarrierSenseErrors      : 0
dot3StatsFrameTooLongs           : 0
dot3StatsInternalMacReceiveErrors  : 0

linkChange                       : 1

Switch#
```

33-6 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 interface was specified, all existing physical ports will be displayed.

Example

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

```
Switch# show interfaces vlan1

VLAN1 is enabled, link status is down
Interface type: VLAN
Interface description: VLAN 1 for MIS
MAC address: 08-00-01-22-00-00

Switch#
```

This example shows how to display the NULL interface information for interface null0.

```
Switch# show interfaces null0

Null0 is enabled, link status is up
Interface type: Null
Interface description: Null0 for MIS

Switch#
```

This example shows how to display the interface information for eth1/0/1.

```
Switch#show interfaces eth1/0/1

Eth1/0/1 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 CRC error: 0, TX excessive deferral: 0
  TX single collision: 0, TX excessive collision: 0
  TX late collision: 0, TX collision:0

Switch#
```

33-7 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
------------- --------------------- ---------------------
eth1/0/1      1834520               629
              9234                  338
eth1/0/2      0                     0
              0                     0
eth1/0/3      0                     0
              0                     0
eth1/0/4      0                     0
              0                     0
eth1/0/5      0                     0
              0                     0
eth1/0/6      0                     0
              0                     0
eth1/0/7      0                     0
              0                     0
eth1/0/8      0                     0
              0                     0

Port          OutOctets /           OutMcastPkts /
              OutUcastPkts          OutBcastPkts
------------- --------------------- ---------------------
eth1/0/1      5387265               0
              9381                  0
eth1/0/2      0                     0
              0                     0
eth1/0/3      0                     0
              0                     0
eth1/0/4      0                     0
              0                     0
eth1/0/5      0                     0
              0                     0
eth1/0/6      0                     0
              0                     0
eth1/0/7      0                     0
              0                     0
eth1/0/8      0                     0
              0                     0

Total Entries:8

Switch#
```

This example shows how to display switch ports error counters.

```
Switch# show interfaces ethernet 2/0/1-8,3/0/1-4 counters errors

Port      Align-Err   Fcs-Err  Rcv-Err   Undersize  Xmit-Err  OutDiscard
--------- ---------- --------- --------  ---------- --------- -----------
eth2/0/1           0         0         0           0         0           0
eth2/0/2           0         0         0           0         0           0
eth2/0/3           0         0         0           0         0           0
eth2/0/4           0         0         0           0         0           0
eth2/0/5           0         0         0           0         0           0
eth2/0/6           0         0         0           0         0           0
eth2/0/7           0         0         0           0         0           0
eth2/0/8           0         0         0           0         0           0
eth3/0/1           0         0         0           0         0           0
eth3/0/2           0         0         0           0         0           0
eth3/0/3           0         0         0           0         0           0
eth3/0/4           0         0         0           0         0           0

Port          Single-Col Multi-Col  Late-Col    Excess-Col Carri-Sen  Runts
------------- ---------- ---------- ----------  ---------- ---------- ----------

eth2/0/1      0          0          0           0          0          0         0
eth2/0/2      0          0          0           0          0          0         0
eth2/0/3      0          0          0           0          0          0         0
eth2/0/4      0          0          0           0          0          0         0
eth2/0/5      0          0          0           0          0          0         0
eth2/0/6      0          0          0           0          0          0         0
eth2/0/7      0          0          0           0          0          0         0
eth2/0/8      0          0          0           0          0          0         0
eth3/0/1      0          0          0           0          0          0         0
eth3/0/2      0          0          0           0          0          0         0
eth3/0/3      0          0          0           0          0          0         0
eth3/0/4      0          0          0           0          0          0         0

Port          Giants     Symbol-Err SQETest-Err DeferredTx IntMacTx   IntMacRx
------------- ---------- ---------- ----------  ---------- ---------- ----------
eth2/0/1      0          0          0           0          0          0         0
eth2/0/2      0          0          0           0          0          0         0
eth2/0/3      0          0          0           0          0          0         0
eth2/0/4      0          0          0           0          0          0         0
eth2/0/5      0          0          0           0          0          0         0
eth2/0/6      0          0          0           0          0          0         0
eth2/0/7      0          0          0           0          0          0         0
eth2/0/8      0          0          0           0          0          0         0
eth3/0/1      0          0          0           0          0          0         0
eth3/0/2      0          0          0           0          0          0         0
eth3/0/3      0          0          0           0          0          0         0
eth3/0/4      0          0          0           0          0          0         0

Total Entries:12

Switch#
```

33-8 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 displays the Switch's port connection status.

Example

This example shows how to display the Switch's port connection status.

```
Switch# show interfaces eth1/0/1-8,3/0/1-2 status

Port          Status        VLAN         Duplex  Speed          Type
------------- ------------- ------------ ------- -------------- -------------
eth1/0/1      not-connected 1            auto    auto           1000BASE-T
eth1/0/2      not-connected 1            auto    auto           1000BASE-T
eth1/0/3      not-connected 1            auto    auto           1000BASE-T
eth1/0/4      not-connected 1            auto    auto           1000BASE-T
eth1/0/5      not-connected 1            auto    auto           1000BASE-T
eth1/0/6      not-connected 1            auto    auto           1000BASE-T
eth1/0/7      not-connected 1            auto    auto           1000BASE-T
eth1/0/8      connected     trunk        a-full  a-1000         1000BASE-T
eth3/0/1      connected     2            a-full  a-1000         1000BASE-T
eth3/0/2      not-connected 1            auto    auto           1000BASE-T

Total Entries: 10

Switch#
```

33-9 show interfaces utilization

This command is used to display the Switch's port utilization.

show interfaces [*INTERFACE-ID* **[,|-]] utilization**

Parameters

utilization	(Optional) Specifies to display the utilization information.
INTERFACE-ID	(Optional) Specifies the interface ID. If no interface is specified, the utilization of all physical port interfaces will be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the Switch's physical port utilization.

Example

This example shows how to display the Switch's port utilization.

```
Switch# show interfaces utilization

Port        TX packets/sec  RX packets/sec   Utilization
----------- -------------   --------------   -----------
eth1/0/1      0               0                0
eth1/0/2      1488109         0                50
eth1/0/3      0               0                0
eth1/0/4      0               1488109          50
eth1/0/5      0               0                0
eth1/0/6      0               0                0
eth1/0/7      0               0                0
eth1/0/8      0               0                0

Total Entries: 8

Switch#
```

33-10 show interfaces auto-negotiation

This command is used to display detailed auto-negotiation information of physical port interfaces.

show interfaces [*INTERFACE-ID* **[,|-]] auto-negotiation**

Parameters

auto-negotiation	Specifies to display detailed auto-negotiation information.
INTERFACE-ID	(Optional) Specifies the interface ID. If no interface is specified, the auto-negotiation information on all physical port interfaces will be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the auto-negotiation information.

Example

This example shows how to display auto-negotiation information.

```
Switch# show interfaces eth1/0/1-2 auto-negotiation

eth1/0/1
 Auto Negotiation: Disabled

eth1/0/2
 Auto Negotiation: Enabled

 Speed auto downgrade: Disabled
 Remote Signaling: Detected
 Configure Status: Configuring
 Capability Bits: 10M_Half, 10M_Full, 100M_Half, 100M_Full, 1000M_Full
 Capability Advertised Bits: 10M_Half, 10M_Full, 100M_Half, 100M_Full, 1000M_Full
 Capability Received Bits: -
 RemoteFaultAdvertised: Disabled
 RemoteFaultReceived: NoError

Switch#
```

33-11 shutdown

This command is used to disable an interface. Use the **no** form of the 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 eth1/0/1
Switch(config-if)# shutdown
```

34. IP Source Guard Commands

34-1 ip verify source vlan dhcp-snooping

This command is used to enable IP source guard for a port. Use the **no** form of the 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 IP packets.

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 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 option **ip-mac** is not specified, the validation is based on the source IP address and VLAN check only.
- If the option **ip-mac** 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 for eth3/0/1.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# ip verify source vlan dhcp-snooping
Switch(config-if)#
```

34-2 ip source binding

This command is used to create a static entry used for IP source guard. Use the **no** form of the 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-ID	Specifies the port that the valid host is connected.
,	(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.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to create a static binding entry used for IP source guard checking. Use the **no** command to delete a static binding entry. The parameters specified for the command must exactly match the configured parameters to be deleted.

If the MAC address and the VLAN for the configured entry already exist, the existing binding entry is updated. The interface specified for the command can be a physical port or a port-channel interface.

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 interface eth3/0/10.

```
Switch# configure terminal
Switch(config)# ip source binding 00-01-02-03-04-05 vlan 2 10.1.1.1 interface
eth3/0/10
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 interface eth3/0/10.

```
Switch# configure terminal
Switch(config)# no ip source binding 00-01-02-03-04-05 vlan 2 10.1.1.1 interface
eth3/0/10
Switch(config)#
```

34-3 show ip source binding

This command is used to display an IP-source guard binding entry.

show ip source binding [*IP-ADDRESS***] [***MAC-ADDRESS***] [dhcp-snooping | static] [vlan** *VLAN-ID***] [interface** *INTERFACE-ID* **[, | -]]**

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-ID	(Optional) Specifies to display the IP-source guard binding entry based on ports.
,	(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.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

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 IP Source Guard binding entries without any parameters.

```
Switch# show ip source binding

MAC Address       IP Address      Lease(sec)  Type         VLAN   Interface
----------------- --------------- ---------- ------------- ----- -----------
00-01-01-01-01-01 10.1.1.10        infinite  static        100    eth3/0/3
00-01-01-01-01-10 10.1.1.11          3120    dhcp-snooping 100    eth3/0/3

Total Entries: 2

Switch#
```

This example shows how to display IP Source Guard binding entries by IP address 10.1.1.10.

```
Switch# show ip source binding 10.1.1.10

MAC Address       IP Address      Lease(sec)  Type         VLAN   Interface
----------------- --------------- ---------- ------------- ----- ----------
00-01-01-01-01-01 10.1.1.10        infinite  static        100    eth3/0/3

Total Entries: 1

Switch#
```

This example shows how to display IP Source Guard binding entries by IP address 10.1.1.11, MAC address 00-01-01-01-01-10, at VLAN 100 on interface eth3/0/3 and learning by DHCP snooping.

```
Switch# show ip source binding 10.1.1.10 00-01-01-01-01-10 dhcp-snooping vlan 100
interface eth3/0/3

MAC Address       IP Address      Lease(sec)  Type         VLAN   Interface
----------------- --------------- ---------- ------------- ----- -----------
00-01-01-01-01-10 10.1.1.11          3564    dhcp-snooping 100    eth3/0/3

Total Entries: 1

Switch#
```

Display Parameters

MAC Address	The client's hardware MAC address.
IP Address	The client's IP address assigned from the DHCP server or configured by the user.
Lease (sec)	The IP address lease time.
Type	The binding type. Static bindings are configured manually. Dynamic binding are learned from DHCP snooping.
VLAN	The VLAN number of the client interface.
Interface	The interface that connects to the DHCP client host.

34-4 show ip verify source

This command is used to display the hardware port ACL entry on a particular interface.

show ip verify source [interface *INTERFACE-ID* **[, | -]]**

Parameters

INTERFACE-ID	(Optional) Specifies a port or a range of ports to configure.
,	(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.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

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 100 to 110, the interface with IP source filter mode that is configured as IP, and that there is an existing IP address binding 10.1.1.1 on VLAN 100.

```
Switch# show ip verify source interface eth3/0/3

Interface  Filter-type  Filter-mode IP address       MAC address       VLAN
---------  -----------  ----------- ---------------  ----------------- -------
eth3/0/3       ip       active      10.1.1.1                            100
eth3/0/3       ip       active      deny-all                            101-120

Total Entries: 2

Switch#
```

This example shows how to display when the interface has an IP source filter mode that is configured as IP MAC and an existing IP MAC that binds IP address 10.1.1.10 to MAC address 00-01-01-01-01-01 on VLAN 100 and IP address 10.1.1.11 to MAC address 00-01-01-01-01-10 on VLAN 101.

```
Switch# show ip verify source interface eth3/0/3

Interface  Filter-type  Filter-mode  IP address       MAC address       VLAN
---------  -----------  -----------  ---------------  ----------------- -------
eth3/0/3       ip-mac     active       10.1.1.10        00-01-01-01-01-01 100
eth3/0/3       ip-mac     active       10.1.1.11        00-01-01-01-01-10 101
eth3/0/3       ip-mac     active       deny-all                -          102-120

Total Entries: 3

Switch#
```

Display Parameters

Interface	The interface that has IP inspection enabled.
Filter-type	The type of IP Source Guard in operation. **ip:** Just use an IP address to authorize IP packets. **ip-mac:** Use the IP and MAC address to authorize IP packets.

Filter-Mode	**active:** Actively verify IP source entries. **inactive-trust-port:** Enable DHCP snooping to trust ports with no IP source entry verification active. **inactive-no-snooping-vlan:** No DHCP snooping VLAN configured with no IP source entry verification active.
IP address	The client's IP address assigned from the DHCP server or configured by the user.
MAC address	The client's MAC address.
VLAN	The VLAN number of the client interface.

35. IP Utility Commands

35-1 ping

This command is used to diagnose basic network connectivity.

ping {[ip] *IP-ADDRESS* **| [ipv6]** *IPV6-ADDRESS* | *HOST-NAME***} [count** *TIMES***] [timeout** *SECONDS***] [source {***IP-ADDRESS* **|** *IPV6-ADDRESS***}]**

Parameters

ip	(Optional) Specifies the destination IPv4 address.
IP-ADDRESS	Specifies the IPv4 address of the destination host.
ipv6	(Optional) Specifies the destination IPv6 address.
IPV6-ADDRESS	Specifies the IPv6 address of the system to discover.
HOST-NAME	Specifies the host name of the system to discover.
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#
```

35-2 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] *IP-ADDRESS* **| [ipv6]** *IPV6-ADDRESS* **|** *HOST-NAME***} [probe** *NUMBER***] [timeout** *SECONDS***] [max-ttl** *TTL***] [port** *DEST-PORT***]**

Parameters

ip	(Optional) Specifies the destination IPv4 address.
IP-ADDRESS	Specifies the IPv4 address of the destination host.
ipv6	(Optional) Specifies the destination IPv6 address.
IPV6-ADDRESS	Specifies the IPv6 address of the system to discover.
HOST-NAME	Specifies the host name of the system to discover.
probe *NUMBER*	(Optional) Specifies to stop after sending the specified number of datagrams. The value must be between 1 and 9.
timeout *SECONDS*	(Optional) Specifies response timeout value, in seconds.
max-ttl *TTL*	(Optional) Specifies the maximum TTL value for outgoing UDP datagrams. The value must be between 1 and 60.
port *DEST-PORT*	(Optional) Specifies the UDP destination port used in outgoing

	datagrams. This value is incremented each time when a datagram is sent. The value is from 30000 to 64900. Use this option in the unlikely event that the destination host is listening to a port in the default traceroute port range.

Default

By default, this command sends three 40-byte UDP datagrams with a TTL value of 1.

By default, the maximum TTL is 30, timeout period is 5 seconds, UDP port number is 33434, and query number for each TTL is 1.

Command Mode

EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

To interrupt **traceroute** after the command has been issued, press Ctrl+C.

The **traceroute** command uses the TTL field in the IP header to cause routers and servers to generate specific return messages. **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 sends 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 the host with IP address 211.21.180.1.

```
Switch#traceroute 211.21.180.1

 10  ms  10.1.1.254
 30  ms  192.168.249.134
 30  ms  192.168.249.134
 <10 ms  192.168.5.230
 <10 ms  211.21.180.1

Trace complete.


Switch#
```

This example shows how to traceroute the host with IPv6 address 2001:238:f8a:77:7c10:41c0:6ddd:ecab.

```
Switch#traceroute 2001:238:f8a:77:7c10:41c0:6ddd:ecab

 10  ms  1001:238:f8a:77:7c10:41c0:6ddd:ecab

Trace complete.


Switch#
```

36. IP-MAC-Port Binding (IMPB) Commands

36-1 clear ip ip-mac-port-binding violation

This command is used to clear IP-MAC-Port Binding (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.

Command Default Level

Level: 12.

Usage Guideline

Use the command to delete the IMPB violation entry from the filtering database.

Example

This example shows how to clear the entry blocked on interface eth1/0/4.

```
Switch# clear ip ip-mac-port-binding violation interface eth1/0/4
Switch#
```

36-2 ip ip-mac-port-binding

This command is used to enable the IMPB access control for port interfaces. Use the **no** form of the command to disable the IMPB access control function.

ip ip-mac-port-binding [*MODE***]**

no ip ip-mac-port-binding

Parameters

MODE	(Optional) Specifies the IMPB access control mode. **strict-mode:** Specifies to perform strict mode access control. **loose-mode:** Specifies to perform loose mode access control. If the mode option is not specified, the **strict-mode** is used.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a port is enabled for IMPB **strict-mode** access control, a host can only access the port after the host sends ARP or IP packets and the ARP packet or IP packet sent by the host passes the binding check. To pass the binding check, the source IP address, source MAC address, VLAN ID, and arrival port number must match any of the entries defined by either the IP source guard static binding entry or the DHCP snooping learned dynamic binding entry.

When a port is enabled for IMPB **loose-mode** access control, a host will be denied to access the port after the host sends ARP or IP packets and the ARP packet or IP packet sent by the host does not pass the binding check. To pass the binding check, the source IP address, source MAC address, VLAN ID, and arrival port must match any of the entries defined by either the IP source guard static binding entry or the DHCP snooping learned dynamic binding entry.

Example

This example shows how to enable the strict-mode IMPB access control on eth3/0/10.

```
Switch# configure terminal
Switch(config)# interface eth3/0/10
Switch(config-if)# ip ip-mac-port-binding strict
Switch(config-if)#
```

36-3 show ip ip-mac-port-binding

This command is used to display the IMPB configuration settings or the entries blocked by IMPB access control.

show ip ip-mac-port-binding [interface *INTERFACE-ID* **[, | -]] [violation]**

Parameters

interface *INTERFACE-ID*	(Optional) Specifies to display 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.
violation	(Optional) Specifies to display the blocked entry.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the IMPB configuration or use the **show ip ip-mac-port-binding violation** command to display the entries blocked because of the IMPB check violation.

Example

This example shows how to display all of the entries blocked by the IMPB access control.

```
Switch# show ip ip-mac-port-binding violation

Port       VLAN      MAC Address
------- --------- -------------------
eth3/0/3      1       01-00-0c-cc-cc-cc
eth3/0/3      1       01-80-c2-00-00-00
eth3/0/4      1       01-00-0c-cc-cc-cd
eth3/0/4      1       01-80-c2-00-00-01

Total Entries: 4

Switch#
```

This example shows how to display the IMPB configuration for all ports.

```
Switch# show ip ip-mac-port-binding

Port           Mode
---------- ------------
eth3/0/1       Strict
eth3/0/2       Strict
eth3/0/3       Loose
eth3/0/4       Loose

Total Entries: 4

Switch#
```

36-4 snmp-server enable traps ip-mac-port-binding

This command is used to enable the sending of the SNMP notifications for IP-MAC-Port Binding. Use the **no** form of the command to disable sending SNMP notifications.

snmp-server enable traps ip-mac-port-binding

no snmp-server enable traps ip-mac-port-binding

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 of the SNMP notifications for such events. When enabled, the Switch sends violation traps if any violation packet is received.

Example

This example shows how to enable sending traps for IP-MAC-Port Binding.

```
Switch# configure terminal
Switch(config)# snmp-server enable traps ip-mac-port-binding
Switch(config)#
```

37. IPv6 Snooping Commands

37-1 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** 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.

Command Default Level

Level: 12.

Usage Guideline

This command is used 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)#
```

37-2 protocol

This command is used to specify that addresses should be snooped with DHCPv6 or NDP. Use the **no** 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 packets.
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.

Command Default Level

Level: 12.

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)#
```

37-3 limit address-count

This command is used to limit the maximum number of IPv6 snooping binding entries. Use the **no** command to reset it to default.

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.

Command Default Level

Level: 12.

Usage Guideline

This command is used 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)#
```

37-4 ipv6 snooping attach-policy

This command is used to apply an IPv6 snooping policy to a specified VLAN. Use the **no** 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.

Command Default Level

Level: 12.

Usage Guideline

After an IPv6 snooping policy has been created, use this command to apply the policy on a specific VLAN.

Example

This example shows how to enable IPv6 snooping on VLAN 200.

```
Switch# configure terminal
Switch(config)# ipv6 snooping policy policy1
Switch(config-ipv6-snooping)# limit address-count 100
Switch(config-ipv6-snooping)# exit
Switch(config)# vlan 200
Switch(config-vlan)# ipv6 snooping attach-policy policy1
Switch(config-vlan)#
```

37-5 ipv6 snooping station-move deny

This command is used to deny the station move function for IPv6 snooping entries. Use the **no** command to reset it to default.

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.

Command Default Level

Level: 12.

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)#
```

37-6 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

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If the policy name is specified, only the specified policy information is displayed.

If the policy name is not specified, information is displayed for all policies.

Example

This example shows how to display DHCPv6 guard information.

```
Switch# show ipv6 snooping policy

Snooping policy: test1
        Protocol: DHCP, NDP
        Limit Address Count: 30
        Target VLAN: 100,200-210,4000

Switch#
```

Display Parameters

Protocol	The protocol used for snooping.
Limit Address Count	The maximum number of this IPv6 Snooping policy.
Target VLAN	The name of the target. The target is a VLAN list.

38. IPv6 Source Guard Commands

38-1 ipv6 source binding vlan

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-ADDRESS* **vlan** *VLAN-ID IPV6-ADDRESS* **interface** *INTERFACE-ID*

no ipv6 source binding *MAC-ADDRESS* **vlan** *VLAN-ID IPV6-ADDRESS* **interface** *INTERFACE-ID*

Parameters

MAC-ADDRESS	Specifies the MAC address of the manual binding entry.
VLAN-ID	Specifies the binding VLAN of the manual binding entry.
IPV6-ADDRESS	Specifies the IPv6 address of the manual binding entry.
INTERFACE-ID	Specifies the interface number of the manual binding entry.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is used 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 interface eth3.10.

```
Switch# configure terminal
Switch(config)# ipv6 source binding 00-01-02-03-04-05 vlan 2 2000::1 interface
eth3/0/1
Switch(config)#
```

38-2 ipv6 source-guard policy

This command is used to create an IPv6 source guard policy. This command will 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.

Command Default Level

Level: 12.

Usage Guideline

The command is used to create 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)#
```

38-3 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.

Command Default Level

Level: 12.

Usage Guideline

The command is used 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)#
```

38-4 permit link-local

This command is used to allow hardware permitted data traffic send by the link-local address. Use the **no** form of this command to disable this function

permit link-local

no permit link-local

Parameters

None.

Default

By default, this option is denied.

Command Mode

Source-guard Policy Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is used to enable hardware to permit data traffic sent by the link-local address.

Example

This example shows how to allow all data traffic that is send by the link-local address.

```
Switch# configure terminal
Switch(config)# ipv6 source-guard policy policy1
Switch(config-source-guard)# permit link-local
Switch(config-source-guard)#
```

38-5 ipv6 source-guard attach-policy

This command is used to apply IPv6 source guard on an interface. Use the **no** form of the command to remove this source guard from the interface.

ipv6 source-guard attach-policy [*POLICY-NAME***]**

no ipv6 source-guard attach-policy

Parameters

POLICY-NAME	Specifies the name of the source guard policy.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

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 interface eth1/0/3.

```
Switch# configure terminal
Switch(config)# interface eth1/0/3
Switch(config-if)# ipv6 source-guard attach-policy pol1
Switch(config-if)#
```

38-6 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	Specifies the name of the source guard policy.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

The command is used to display the IPv6 source guard policy configuration. If the policy name is not 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

Policy Test configuration:
    permit link-local
    deny global-autoconf
    Target: eth2/0/3

Switch#
```

38-7 show ipv6 neighbor binding

This command is used to display the IPv6 binding table.

show ipv6 neighbor binding [vlan *VLAN-ID***] [interface** *INTERFACE-ID***] [ipv6** *IPV6-ADDRESS***] [mac** *MAC-ADDRESS***]**

Parameters

VLAN-ID	(Optional) Specifies to displays the binding entries that match the specified VLAN.
INTERFACE-ID	(Optional) Specifies to displays the binding entries that match the specified interface number.
IPV6-ADDRESS	(Optional) Specifies to displays the binding entries that match the specified IPv6 address.
MAC-ADDRESS	(Optional) Specifies to displays the binding entries that match the specified MAC address.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

The command is used to display the entries of the binding table.

Example

This example shows how to display the specified entries of the binding table.

```
Switch# show ipv6 neighbor binding

Codes: D - DHCPv6 Snooping, S - Static, N - ND Snooping
  IPv6 address                  MAC address     Interface      VLAN Time left
N FE80::A8BB:CCFF:FE01:F500 AABB.CC01.F500 eth0/0         100  8850
S FE80::21D:71FF:FE99:4900  001D.7199.4900  eth0/1         100   N/A
N 2001:600::1                   AABB.CC01.F500 eth0/0          100  3181
D 2001:300::1                   AABB.CC01.F500 port-channel3 100  9559
D 2001:100::2                   AABB.CC01.F600 eth1/0          200  9196
D 2001:400::1                   001D.7199.4900 eth1/2          100  1568
S 2001:500::1                   000A.000B.000C eth2/13         300  N/A

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.

39. Japanese Web-based Access Control (JWAC) Commands

39-1 jwac authentication-method

This command is used to configure the JWAC authentication method. Use the **no** form of this command to return to the default setting.

jwac authentication-method {md5 | chap | pap | mschap | mschapv2}

no jwac authentication-method

Parameters

md5	Specifies that the authentication will be done via a RADIUS server through EAP MD5.
chap	Specifies that the authentication will be done via a RADIUS server through CHAP.
pap	Specifies that the authentication will be done via a RADIUS server through PAP.
mschap	Specifies that the authentication will be done via a RADIUS server through MS-CHAP.
mschapv2	Specifies that the authentication will be done via a RADIUS server through MS-CHAPv2.

Default

By default, the JWAC authentication method is PAP.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to specify the RADIUS protocol which JWAC uses to complete RADIUS authentication.

Example

This example shows how to configure the JWAC authentication method to MS-CHAPv2.

```
Switch# configure terminal
Switch(config)# jwac authentication-method mschapv2
Switch(config)#
```

39-2 jwac enable

This command is used to enable the JWAC function on the port. Use the **no** form of this command to disable JWAC on the port.

jwac enable

no jwac enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The JWAC interface configuration command allows hosts connected to the port to do authentication via the Web browser.

Example

This example shows how to enable the JWAC function on interface eth1/0/1.

```
Switch# configure terminal
Switch(config)# jwac virtual-ip ipv4 1.1.1.1
Switch(config)# jwac virtual-ip url www.website1.com
Switch(config)# jwac success redirect-path http://www.website2.com
Switch(config)# jwac redirect destination jwac-login-page
Switch(config)# jwac system-auth-control
Switch(config)# interface eth1/0/1
Switch(config-if)# jwac enable
Switch(config-if)#
```

39-3 jwac forcible-logout

This command is used to enable the JWAC forcible logout function. Use the **no** form of this command to disable the JWAC forcible logout function.

jwac forcible-logout

no jwac forcible-logout

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the forcible logout feature is enabled, a ping packet from an authenticated host to the JWAC switch with a TTL of 1 will be regarded as a logout request and the host will be moved back to unauthenticated state.

Example

This example shows how to enable the JWAC forcible logout function.

```
Switch# configure terminal
Switch(config)# jwac forcible-logout
Switch(config)#
```

39-4 jwac max-authenticating-user

This command is used to configure the maximum authenticating user number on the specified interface. Use the **no** form of this command to return to the default setting.

jwac max-authenticating-user *NUMBER*

no jwac max-authenticating-user

Parameters

NUMBER	Specifies to set the maximum number of users being authenticated. The range is from 1 to 100.

Default

By default, this value is 100.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the maximum authenticating user number for JWAC on the specified interface.

Example

This example shows how to configure the maximum authenticating user number for JWAC to 10 on interface eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# jwac max-authenticating-user 10
Switch(config-if)#
```

39-5 jwac authenticate-page language

This command is used to choose the authenticate page language. Use the **no** form of this command to return to the default setting.

jwac authenticate-page language {japanese | english}

no jwac authenticate-page language

Parameters

japanese	Specifies to choose the Japanese page.
english	Specifies to choose the English page.

Default

By default, this option is English.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The JWAC Web server will return the authentication page to the client for local authentication. There are Japanese and English versions for these authentication pages. The default version is English. Use this command to choose the language of the JWAC authentication page.

Example

This example shows how to change the JWAC authenticate page language to Japanese.

```
Switch# configure terminal
Switch(config)# jwac authenticate-page language japanese
Switch(config)#
```

39-6 jwac page-element

This command is used to customize the JWAC authentication page elements. Use the **no** form of this command to return to the default setting.

jwac page-element {japanese | english} {page-title *STRING* **| login-window-title** *STRING* **| username-title** *STRING* **| password-title** *STRING* **| logout-window-title** *STRING* **| copyright-line** *LINE-NUMBER* **title** *STRING***}**

no jwac page-element {japanese | english} {page-title | login-window-title | username-title | password-title | logout-window-title | copyright-line}

Parameters

japanese	Specifies to configure Japanese page element.
english	Specifies to configure English page element.
page-title *STRING*	Specifies the title of the JWAC authentication page. The maximum number can be up to 128 characters.
login-window-title *STRING*	Specifies the title of the JWAC authentication login window. The maximum number can be up to 64 characters.

username-title *STRING*	Specifies the user name title of JWAC authentication login window. The maximum number can be up to 32 characters.
password-title *STRING*	Specifies the password title of JWAC authentication login window. The maximum number can be up to 32 characters.
logout-window-title *STRING*	Specifies the title of the JWAC authentication logout window. The maximum number can be up to 64 characters.
copyright-line *LINE-NUMBER* **title** *STRING*	Specifies the copyright information by lines in JWAC authentication pages. The total copyright information can be up to 5 lines and 128 characters for each line.

Default

These are the default values:

page-title is not set.

login-window-title is “Authentication Login”.

username-title is “User Name”.

password-title is “Password”.

logout-window-title is “Logout From The Network”.

Copyright information is not set.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to customize JWAC authentication page elements. There are two JWAC authentication pages, (1) authentication login page and (2) authentication logout page.

The Web authentication login page will be displayed to the user to get a username and password when the system is doing Web authentication for the user. Users can log out from the network by clicking the **Logout** button on the authentication login page after success login to the network.

Example

This example shows how to configure the page title to be “Company”:

```
Switch# configure terminal
Switch(config)# jwac page-element english page-title Company
Switch(config)#
```

This example shows how to configure the two-line copyright information at the bottom of the authentication page with:

Line 1: Copyright @ 2014 All Rights Reserved

Line 2: Site: http://support.website.com

```
Switch# configure terminal
Switch(config)# jwac page-element english copyright-line 1 title Copyright @ 2014 All
Rights Reserved
Switch(config)# jwac page-element english copyright-line 2 title Site:
http://support.website.com
Switch(config)#
```

39-7 jwac quarantine-server url

This command is used to configure the JWAC quarantine server URL. Use the **no** form of this command to return to the default setting.

jwac quarantine-server url {ipv4 *STRING* **| ipv6** *STRING***}**

no jwac quarantine-server url

Parameters

ipv4 *STRING*	Specifies the URL on the Quarantine Server for IPv4 access authentication. The maximum number can be up to 128 characters.
ipv6 *STRING*	Specifies the URL on the Quarantine Server for IPv6 access authentication. The maximum number can be up to 128 characters.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command allows you to configure the URL of the Quarantine Server. If redirection is enabled and the redirection destination is the Quarantine Server, when an HTTP request from an unauthenticated host is received which is not headed to the Quarantine Server, the switch will handle this HTTP packet and send back a message to the host to make it access Quarantine Server with the configured URL. When the PC is connected to the specified URL, the quarantine server will request the PC user to input the username and password to authenticate.

Example

This example shows how to configure the JWAC quarantine server URL to be “http://10.90.90.88/authpage.html”.

```
Switch# configure terminal
Switch(config)# jwac quarantine-server url ipv4 http://10.90.90.88/authpage.html
Switch(config)#
```

This example shows how to configure the JWAC quarantine server URL to be “http://[3000::2]/authpage.html”.

```
Switch# configure terminal
Switch(config)# jwac quarantine-server url ipv6 http://[3000::2]/authpage.html
Switch(config)#
```

39-8 jwac quarantine-server monitor

This command is used to enable the JWAC Quarantine server monitor function. Use the **no** form of this command to return to the default setting.

jwac quarantine-server monitor

no jwac quarantine-server monitor

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the JWAC Quarantine server monitor feature is enabled, the JWAC switch will monitor the Quarantine server to ensure the server is OK. If the switch detects no Quarantine server, it will redirect all unauthenticated HTTP accesses to the JWAC Login Page if the redirect option is enabled and the redirect destination is configured to be Quarantine server.

Example

This example shows how to enable the JWAC Quarantine server function.

```
Switch# configure terminal
Switch(config)# jwac quarantine-server monitor
Switch(config)#
```

39-9 jwac quarantine-server timeout

This command is used to set the JWAC Quarantine server timeout period. Use the **no** form of this command to return to the default setting.

jwac quarantine-server timeout *SECONDS*

no jwac quarantine-server timeout *SECONDS*

Parameters

SECONDS	Specifies the timeout period. The range is from 5 to 300 seconds.

Default

By default, this value is 30 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the Quarantine server monitor is enabled, the JWAC switch will periodically check if the Quarantine server works. If the switch does not receive any response from the Quarantine server during the configured error timeout period, the switch will regard it as working improperly.

Example

This example shows how to configure the JWAC Quarantine server error timeout period to 60 seconds.

```
Switch# configure terminal
Switch(config)# jwac quarantine-server timeout 60
Switch(config)#
```

39-10 jwac redirect

This command is used to enable the JWAC redirect function or configure the redirect destination and delay time. Use the **no** form of this command to disable the JWAC redirect or reset parameters to the default settings.

jwac redirect [destination {quarantine-server | jwac-login-page} | delay-time *SECONDS***]**

no jwac redirect [destination | delay-time]

Parameters

destination	(Optional) Specifies the destination to which the unauthenticated host will be redirected to.
delay-time *SECOND*	(Optional) Specifies the time period after which the unauthenticated host will be redirected. This unit is in seconds. The range is from 0 to 10 seconds.

Default

By default, JWAC redirect to the JWAC login page.

By default, the delay time is 1 second.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When redirecting the quarantine server is specified, the unauthenticated host will be redirected to quarantine server when it tries to access a random URL. When redirecting the JWAC login page is specified, the unauthenticated host will be redirected to the JWAC login page in the switch to finish authentication. When redirect is enabled, all Web access is redirected to the quarantine server or JWAC login page. When redirecting to the quarantine server is specified, a quarantine server must be configured first before enabling the JWAC function globally. When redirect is disabled, all Web access is denied except for access to the quarantine server or JWAC login page.

Example

This example shows how to enable the JWAC redirect function.

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

This example shows how to configure the JWAC redirect destination to the Quarantine server.

```
Switch# configure terminal
Switch(config)# jwac redirect destination quarantine-serve
Switch(config)#
```

This example shows how to configure the JWAC redirect delay time to 5 seconds.

```
Switch# configure terminal
Switch(config)# jwac redirect delay-time 5
Switch(config)#
```

39-11 jwac system-auth-control

This command is used to enable the JWAC function globally on the switch. Use the **no** form of this command to disable the JWAC function globally on the switch.

jwac system-auth-control

no jwac system-auth-control

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

JWAC is a feature designed to authenticate a user when the user is trying to access the Internet via the switch. The client user initiates the authentication process of JWAC with a Web access.

Example

This example shows how to enable the JWAC function globally on the switch.

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

39-12 jwac update-server

This command is used to configure the update server network that a PC needs to access in order to complete the JWAC authentication. Use the **no** form of this command to return to the default setting.

jwac update-server {*IPV4-PREFIX***|***IPREFIX–LENGTH* **|** *IPV6-PREFIX***|***IPREFIX-LENGTH***} [tcp** *NUMBER* **| udp** *NUMBER***]**

no jwac update-server {*IPV4-PREFIX***|***IPREFIX–LENGTH* **|** *IPV6-PREFIX***|***IPREFIX-LENGTH***} [tcp** *NUMBER* **| udp** *NUMBER***]**

Parameters

*IPV4-PREFIX***|***IPREFIX–LENGTH*	Specifies the IPv4 network address for the update server network.
*IPV6-PREFIX***|***IPREFIX-LENGTH*	Specifies the IPv6 network address for the update server network.
tcp *NUMBER*	(Optional) Specifies the accessible TCP port number for the specified update server network.
udp *NUMBER*	(Optional) Specifies the accessible UDP port number for the specified update server network.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to add or delete a server network address to which the traffic from unauthenticated client host will not be blocked to by the JWAC switch. Any servers (like update.microsoft.com or some sites of Antivirus software companies, which ActiveX needs to access to accomplish the authentication before the client passes the authentication) should be added with its IP address or with the network address. By adding the network address, an entry can serve multiple update servers on the same network. Multiple update server addresses or network addresses can be configured.

Example

This example shows how to add a JWAC update server with the network address 10.90.90.0/24 and TCP port 80.

```
Switch# configure terminal
Switch(config)# jwac update-server 10.90.90.90/24 tcp 80
Switch(config)#
```

39-13 jwac udp-filtering

This command is used to enable the JWAC UDP filtering function. Use the **no** form of this command to disable the JWAC UDP filtering function.

jwac udp-filtering

no jwac udp-filtering

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the UDP filtering feature is enabled, all UDP and ICMP packets except for DHCP and DNS packets from unauthenticated hosts will be dropped.

Example

This example shows how to enable the JWAC UDP filtering function.

```
Switch# configure terminal
Switch(config)# jwac udp-filtering
Switch(config)#
```

39-14 jwac virtual-ip

This command is used to configure the JWAC virtual IP address which is used to exchange messages with hosts. Use the **no** form of this command to return to the default setting.

jwac virtual-ip {ipv4 *IP-ADDRESS* **| ipv6** *IPV6-ADDRESS* **| url** *STRING***}**

no jwac virtual-ip {ipv4 | ipv6 | url}

Parameters

ipv4 *IP-ADDRESS*	Specifies the JWAC virtual IPv4 address.
url *STRING*	Specifies the FQDN URL for JWAC FQDN URL. This can be up to 128 characters.
ipv6 *IPV6-ADDRESS*	Specifies the JWAC virtual IPv6 address.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The virtual IP of JWAC is just the characterization of the JWAC function on the switch. All JWAC authentication processes communicate with this IP address, however, the virtual IP does not respond to

any ICMP packets or ARP requests. So it's not allowed to configure virtual IP in the same subnet as the switch's IP interface or the same subnet as the host PCs' subnet, otherwise JWAC authentication cannot operate correctly.

The defined URL only takes effect when the virtual IP address is configured. The users get the FQDN URL stored on the DNS server to get the virtual IP address. The obtained IP address must match the virtual IP address configured by the command.

If the IPv4 virtual IP is not configured, the IPv4 access cannot start JWAC authentication. If the IPv6 virtual IP is not configured, the IPv6 access cannot start a JWAC authentication.

Example

This example shows how to configure the JWAC virtual IPv4 to be "1.1.1.1" and the FQDN URL to be "www.web.co".

```
Switch# configure terminal
Switch(config)# jwac virtual-ip ipv4 1.1.1.1
Switch(config)# jwac virtual-ip url www.web.co
Switch(config)#
```

This example shows how to configure the JWAC virtual IPv6 to be "2000::2" and the FQDN URL to be "www.web.co".

```
Switch# configure terminal
Switch(config)# jwac virtual-ip ipv6 2000::2
Switch(config)# jwac virtual-ip url www.web.co
Switch(config)#
```

40. Jumbo Frame Commands

40-1 max-rcv-frame-size

This command is used to configure the maximum Ethernet frame size allowed. Use the **no** form of the 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.

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 eth4/0/1
Switch(config-if)# max-rcv-frame-size 6000
Switch(config-if)#
```

41. Link Aggregation Control Protocol (LACP) Commands

41-1 channel-group

This command is used to assign an interface to a channel group. Use the **no** form of the 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 32.
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 the command 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  eth1/0/4-1/0/5
Switch(config-if)# channel-group 3 mode active
Switch(config-if)#
```

41-2 lacp port-priority

This command is used to configure the port priority. Use the **no** form of the 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 eth1/0/4-1/0/5
Switch(config-if)# lacp port-priority 20000
Switch(config-if)#
```

41-3 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 at 30 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  eth1/0/1
Switch(config-if)# lacp timeout long
Switch(config-if)#
```

41-4 lacp system-priority

This command is used to configure the system priority. Use the **no** form of the command to revert the system priority back to the default value.

lacp system-priority *PRIORITY*

no lacp system-priroity

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)#
```

41-5 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. To reset the load distribution to the default settings, use the **no** form of this command.

port-channel load-balance {dst-ip | dst-mac | src-dst-ip | src-dst-mac | src-ip | src-mac}

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.

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)#
```

41-6 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.

```
Switch# show channel-group channel detail

Flag:
S - Port is requesting Slow LACPDUs   F - Port is requesting fast LACPDU
A - Port is in active mode         P - Port is in passive mode
LACP state:
bndl:   Port is attached to an aggregator and bundled with other ports.
hot-sby:  Port is in a hot-standby state.
indep:    Port is in an independent state(not bundled but able to switch data
            traffic)
down:     Port is down
Channel Group 1
Member Ports: 2, Maxports = 12, Protocol: LACP
                     LACP         Port       Port
Port          Flags  State        Priority   Number
-------------------------------------------------
eth1/0/10     SA     bndl         32768       10
eth1/0/11     SA     bndl         32768       11

Channel Group 2
Member Ports: 2, Maxports = 12, Protocol: Static
                      LACP        Port       Port
Port          Flags   State       Priority   Number
-------------------------------------------------
eth3/0/8      N/A      bndl       N/A        N/A
eth3/0/9      N/A      down       N/A        N/A

Switch#
```

This example shows how to display the neighbor information for port-channel 3.

```
Switch# show channel-group channel 3 neighbor

Flag:
S - Port is requesting Slow LACPDUs, F - Port is requesting Fast LACPDUs,
A - Port is in Active mode,          P - Port is in Passive mode,

Channel Group 3
            Partner                  Partner   Partner   Partner
Port        System ID                 PortNo   Flags     Port_Pri.
-----------------------------------------------------------------
eth1/0/1   32768,00-07-eb-49-5e-80     12       SP        32768
eth1/0/2   32768,00-07-eb-49-5e-80     13       SP        32768

Switch#
```

This example shows how to display the load balance information for all channel groups.

```
Switch# show channel-group load-balance

load-balance algorithm: src-dst-mac

Switch#
```

This example shows how to display the system identifier information.

```
Switch# show channel-group sys-id

System-ID: 32765,00-02-4b-29-3a-00

Switch#
```

This example shows how to display the summary information for all port-channels.

```
Switch# show channel-group

load-balance algorithm: src-dst-mac
system-ID: 32765,00-02-4b-29-3a-00

Group          Protocol
------------------------
1               LACP
2               Static

Switch#
```

42. Link Layer Discovery Protocol (LLDP) Commands

42-1 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 all LLDP statistics.

```
Switch# clear lldp counters all
Switch#
```

42-2 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 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

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#
```

42-3 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. To disable the transmission of TLVs, use the **no** form of this command.

lldp dot1-tlv-select {port-vlan | protocol-vlan *VLAN-ID* **[, | -] | vlan-name [***VLAN-ID* **[, | -]] | protocol-identity [***PROTOCOL-NAME***]}**

no lldp dot1-tlv-select {port-vlan | protocol-vlan [*VLAN-ID* **[, | -]] | 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.
protocol-vlan	Specifies the Port and Protocol VLAN ID (PPVID) TLV to send. The PPVID TLV is an optional TLV that allows a bridge port to advertise a port and protocol VLAN ID.
VLAN-ID **[,	-]**	Specifies the ID of the VLAN in the PPVID TLV. The VLAN ID range is 1 to 4094. Separate nonconsecutive VLAN IDs with a comma. Use a hyphen to designate a range of VLAN IDs. In the **no** form of this command, the VLAN ID is optional. If no VLAN ID is specified, all configured PPVID VLANs will be cleared and no PPVID TLV will be

	sent.
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 eth1/0/1
Switch(config-if)# lldp dot1-tlv-select port-vlan
Switch(config-if)#
```

This example shows how to enable advertising Port and Protocol VLAN ID TLV. The advertised VLAN includes 1 to 3.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# lldp dot1-tlv-select protocol-vlan 1-3
Switch(config-if)#
```

This example shows how to enable the VLAN Name TLV advertisement from vlan1 to vlan3.

```
Switch# configure terminal
Switch(config)#interface eth1/0/1
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 eth1/0/1
Switch(config-if)# lldp dot1-tlv-select protocol-identity lacp
Switch(config-if)#
```

42-4 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. To disable the transmission of the TLVs, use the **no** form of this command.

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 eth1/0/1
Switch(config-if)# lldp dot3-tlv-select mac-phy-cfg
Switch(config-if)#
```

42-5 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 return to the default settings.

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)#
```

42-6 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 return to the default settings.

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)#
```

42-7 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	(Optional) 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.

When no optional address is specified along with the command **lldp management-address**, the Switch will find least one IPv4 and IPv6 address of the VLAN with the smallest VLAN ID. If no applicable IPv4/IPv6 address exists, then no management address TLV will be advertised. Once the administrator configures an address, both of the default IPv4 and IPv6 management address will become inactive and won't be sent. The default IPv4 or IPv6 address will be active again when all the configured addresses are removed. 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 eth3/0/1 and eth3/0/2 for setting the management address entry (IPv4).

```
Switch# configure terminal
Switch(config)# interface range eth3/0/1-3/0/2
Switch(config-if-range)# lldp management-address 10.1.1.1
Switch(config-if-range)#
```

This example shows how to enable eth3/0/3 and eth3/0/4 for setting the management address entry (IPv6).

```
Switch# configure terminal
Switch(config)# interface range eth3/0/3-3/0/4
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 eth3/0/1 and eth3/0/2. If 10.1.1.1 is the last one, no Management Address TLV will be sent.

```
Switch# configure terminal
Switch(config)# interface range eth3/0/1-3/0/2
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 eth3/0/3. and eth3/0/4.

```
Switch# configure terminal
Switch(config)# interface range eth3/0/3-3/0/4
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 eth3/0/5 and then no Management Address TLV will be sent on eth3/0/5.

```
Switch# configure terminal
Switch(config)# interface eth3/0/5
Switch(config-if)# no lldp management-address
Switch(config-if)#
```

42-8 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. To disable the transmission of the TLVs, use the **no** form of this command.

lldp med-tlv-select [capabilities | inventory-management | network-policy | power-management]

no lldp med-tlv-select [capabilities | inventory-management | network-policy | power-management]

Parameters

capabilities	(Optional) Specifies to transmit the LLDP-MED capabilities TLV.
inventory-management	(Optional) Specifies to transmit the LLDP-MED inventory management TLV.
network-policy	(Optional) Specifies to transmit the LLDP-MED network policy TLV.
power-management	(Optional) Specifies to transmit the LLDP-MED extended power via MDI TLV, if the local device is PSE device or PD device.

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)#
```

42-9 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 Switch doesn't 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)#
```

42-10 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 return to the default settings.

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)#
```

42-11 lldp run

This command is used to enable the Link Layer Discovery Protocol (LLDP) globally. Use the **no** form of this command to return to the default settings.

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)#
```

42-12 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)#
```

42-13 lldp tlv-select

This command is used to select the Type-Length-Value (TLVs) in the 802.1AB basic management set and will be transmitted and encapsulated in the LLDPDUs and sent to neighbor devices. To disable this option, use the **no** form of this command.

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)#
```

42-14 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)#
```

42-15 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 return to the default settings.

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)#
```

42-16 lldp tx-interval

This command is used to configure the LLDPDUs transmission interval on the Switch. Use the **no** form of this command to return to the default settings.

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 that LLDP updates are sent every 50 seconds.

```
Switch# configure terminal
Switch(config)# lldp tx-interval 50
Switch(config)#
```

42-17 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 states are 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)#
```

42-18 lldp notification enable

This command is used to enable the sending of LLDP and LLDP-MED notifications for the interface. Use the **no** form of the command to disable the sending.

lldp [med] notification enable

no lldp [med] notification enable

Parameters

med	(Optional) Specifies to enable the LLDP-MED notification state.

Default

The LLDP and LLDP-MED notification states are disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **lldp notification enable** command to enable the sending of LLDP notifications.

Use the **lldp med notification enable** command to enable the sending of LLDP-MED notifications.

Example

This example shows how to enable the sending of LLDP MED notifications for eth2/0/1.

```
Switch# configure terminal
Switch(config)# interface eth2/0/1
Switch(config-if)# lldp med notification enable
Switch(config-if)#
```

42-19 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)#
```

42-20 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                : 00-01-02-03-04-00
    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         : 1.10.001
    Serial Number             :
    Manufacturer Name         : D-Link
    Model Name                : DGS-1510-28P Gigabit Ethernet SmartPro Switch
    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
    Message TX Hold Multiplier: 4
    ReInit Delay              : 2
    TX Delay                  : 2

LLDP-MED Configuration:
    Fast Start Repeat Count   : 4


Switch#
```

42-21 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: eth1/0/1
------------------------------------------------------------------------------
Port ID                                                 :eth1/0/1
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	Displays the enabled protocol string for protocol identity TLVs. If there is no enabled protocol for protocol identity TLVs, the string is “(None)”.

42-22 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#show lldp local interface ethernet 1/0/1 detail

Port ID: eth1/0/1
------------------------------------------------------------------------------
Port ID Subtype                             : Local
Port ID                                     : eth1/0/1
Port Description                            : D-Link DGS-1510-28P 1.10.001
                                              Port 1 on Unit 1
Port PVID                                   : 1
Management Address Count                    : 2

    Address 1 : (default)
        Subtype                             : IPv4
        Address                             : 10.90.90.90
        IF Type                             : IfIndex
        OID                                 : 1.3.6.1.4.1.171.10.137.3

    Address 2 :
        Subtype                             : IPv4
        Address                             : 10.90.90.90
        IF Type                             : IfIndex
        OID                                 : 1.3.6.1.4.1.171.10.137.3

PPVID Entries Count                         : 0
    (None)
VLAN Name Entries Count                     : 1
    Entry 1 :
        VLAN ID                             : 1
        VLAN Name                           : default

Protocol Identity Entries Count             : 0
    (None)
MAC/PHY Configuration/Status                :
    Auto-Negotiation Support                : Supported
    Auto-Negotiation Enabled                : Enabled
    Auto-Negotiation Advertised Capability  : 6c01(hex)
    Auto-Negotiation Operational MAU Type   : 001e(hex)

Power Via MDI                               :
    Port Class                              : PSE
    PSE MDI Power Support                   : Supported
    PSE MDI Power State                     : Enabled
    PSE Pairs Control Ability               : Uncontrollable
    PSE Power Pair                          : 1
    Power Class                             : 6

Link Aggregation                            :
    Aggregation Capability                  : Aggregated
    Aggregation Status                      : Not Currently in Aggregation
    Aggregation Port ID                     : 0

Maximum Frame Size                          : 1536

LLDP-MED Capabilities Support:
```

```
    Capabilities               :Support
    Network Policy             :Support
    Location Identification    :Not Support
    Extended Power Via MDI PSE :Support
    Extended Power Via MDI PD  :Not Support
    Inventory                  :Support

Network Policy:
  Application Type :Voice
    VLAN ID                      :0
    Priority                     :5
    DSCP                         :0
    Unknown                      :False
    Tagged                       :False

Extended Power Via MDI:
    Power Priority               :Low
    Power Value                  :154


Switch#
```

This example shows how to display the local information of port 1 in normal mode.

```
Switch#show lldp local interface ethernet 1/0/1

Port ID: eth1/0/1
------------------------------------------------------------------------------
Port ID Subtype                          : Local
Port ID                                  : eth1/0/1
Port Description                         : D-Link DGS-1510-28P 1.10.001
                                           Port 1 on Unit 1
Port PVID                                : 1
Management Address Count                 : 2
PPVID Entries Count                      : 0
VLAN Name Entries Count                  : 1
Protocol Identity Entries Count          : 0
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)


Switch#
```

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: eth1/0/1
------------------------------------------------------------------------------
Port ID Subtype                          : Local
Port ID                                  : eth1/0/1
Port Description                         : D-Link DGS-1510-28P 1.10.001
                                           Port 1 on Unit 1


Switch#
```

42-23 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#
```

42-24 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 eth4/0/9 in detailed mode.

```
Switch# show lldp neighbor interface eth4/0/9 detail

Port ID : eth4/0/9
------------------------------------------------------------------------------
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                                     : eth1/0/5
    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 eth3/0/1

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                       : eth3/0/1
      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                       : eth2/0/1
      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 eth3/0/1 to eth3/0/2 in brief mode.

```
Switch# show lldp neighbor interface eth3/0/1-3/0/2 brief

Port ID: eth3/0/1
------------------------------------------------------------
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                       : eth3/0/1
      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                       : eth4/0/1
      Port Description              : RMON Port 1 on Unit 4

Port ID : eth3/0/2
------------------------------------------------------------------
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                       : eth2/0/1
      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                       : eth2/0/2
      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                       : eth3/0/2
      Port Description              : RMON Port 2 on Unit 3

Total Entries: 2

Switch#
```

42-25 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.

42-26 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 1.

```
Switch#show lldp traffic interface ethernet 1/0/1

Port ID : eth1/0/1
-------------------------------------------
    Total Transmits     : 0
    Total Discards      : 0
    Total Errors        : 0
    Total Receives      : 0
    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.

43. Loopback Detection (LBD) Commands

43-1 loopback-detection (Global)

This command is used to enable the loopback detection function globally. Use the **no** form of the 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)#
```

43-2 loopback-detection (Interface)

This command is used to enable the loopback detection function for an interface. Use **no** form of the 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 eth3/0/1.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# loopback-detection
Switch(config-if)#
```

43-3 loopback-detection interval

This command is used to configure the timer interval. Use **no** command to return to the default settings.

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)#
```

43-4 loopback-detection vlan

This command is used to configure the VLANs to be enabled for loop detection. Use **no** command to return to the default settings.

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)#
```

43-5 show loopback-detection

This command is used to display the current loopback detection control settings.

show loopback-detection [interface *INTERFACE-ID* **[, | -]]**

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.

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

Interface      Result           Time Left(sec)
-------------- ------------------ ------------
eth3/0/1       Normal             -
eth3/0/8       Normal             -
eth4/0/6       Loop on VLAN 2     120
               Loop on VLAN 3     115
…
Po1            Loop               50
Po2           Normal              -

Switch#
```

This example shows how to displays the loopback detection status for port 1/0/1.

```
Switch# show loopback-detection interface eth1/0/1

Interface        Result           Time Left(sec)
-------------- ------------------ ------------
eth1/0/1         Normal           -

Switch#
```

This example shows how to displays the loopback detection status for port-channel 2.

```
Switch# show loopback-detection interface port-channel2

Interface        Result           Time Left(sec)
-------------- ------------------ ------------
Po2            Normal             -

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.

43-6 snmp-server enable traps loopback-detection

This command is used to enable the sending SNMP notifications of loopback detection. Use **no** command to return to the default settings..

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)#
```

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 the 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.

Command Default Level

Level: 12.

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 the 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.

Command Default Level

Level: 12.

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 interface eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
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 reset the password to the default setting.

mac-auth password [0 | 7] *STRING*

no mac-auth password

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.

Command Default Level

Level: 12.

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 mac username format** command.

Example

This example shows how to configure the password for MAC authentication.

```
Switch# configure terminal
Switch(config)# mac-auth password newpass
Switch(config)#
```

44-4 mac-auth username

This command is used to configure the username of local and RADIUS authentication. Use the **no** form of this command to restore the username to the client's MAC address.

mac-auth username *STRING*

no mac-auth username

Parameters

username *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,

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the username used in the authentication of MAC address users. The username is used in the authentication via both the local database and remote servers. If the command is not configured, the username for authentication of the MAC address user 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 dlink
Switch(config)#
```

44-5 snmp-server enable traps mac-auth

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

snmp-server enable traps mac-auth

no snmp-server enable traps mac-auth

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 sending SNMP notifications for MAC authentication.

Example

This example shows how to enable sending trap for MAC authentication.

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

45. Mirror Commands

45-1 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 the command to delete a port monitor session or remove the destination interface of the session.

monitor session *SESSION-NUMBER* **destination interface** *INTERFACE-ID*

no monitor session *SESSION-NUMBER* **destination 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 destination interface for the 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 source ports (ethernet1/0/2 to ethernet1/0/4) as monitor source ports.

```
Switch# configure terminal
Switch(config)# monitor session 1 destination interface ethernet1/0/1
Switch(config)# monitor session 1 source interface ethernet1/0/2-4
Switch(config)#
```

45-2 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* **[, | -] [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.
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 port.

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 transmitted and received traffic are monitored.

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 source physical ports (ethernet1/0/2 to ethernet1/0/4) as monitor source ports.

```
Switch# configure terminal
Switch(config)# monitor session 1 destination interface ethernet1/0/1
Switch(config)# monitor session 1 source interface ethernet1/0/2-4
Switch(config)#
```

45-3 monitor session source acl

This command is used to configure an access list for flow-based monitoring. Use the **no** form of this command to remove an access list for flow-based monitoring.

monitor session *SESSION-NUMBER* **source acl** *ACCESS-LIST-NAME*

no monitor session *SESSION-NUMBER* **source acl** *ACCESS-LIST-NAME*

Parameters

session *SESSION-NUMBER*	Specifies the session number for the port monitor session. The valid range is 1 to 4.
acl *ACCESS-LIST-NAME*	Specifies the flow-based mirror.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Multiple access lists can be monitored on a session at a time.

Example

This example shows how to create a monitor session with the session number 2. It assigns the MAC access list MAC-Monitored-flow as the monitor source.

```
Switch# configure terminal
Switch(config)# monitor session 2 destination interface ethernet1/0/1
Switch(config)# monitor session 2 source acl MAC-Monitored-flow
Switch(config)#
```

45-4 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: Ethernet1/0/1
   Source Ports:
      Both:
          Ethernet1/0/2
          Ethernet1/0/3
          Ethernet1/0/4
      RX:
          Ethernet1/0/5
      TX:
          Ethernet1/0/7

Total Entries: 1

Switch#
```

46. MLD Snooping Commands

46-1 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* **| interface** *INTERFACE-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.
interface *INTERFACE-ID*	Specifies the interface used.

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#
```

46-2 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 VLAN 1.

```
Switch# configure terminal
Switch(config)# vlan 1
Switch(config-vlan)# ipv6 mld snooping
Switch(config-vlan)#
```

46-3 ipv6 mld snooping fast-leave

This command is used to configure MLD snooping fast-leave on the interface. Use the **no** form of the 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 be immediately 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)#
```

46-4 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 the command to revert to 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)#
```

46-5 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* **[,|-] | learn pimv6}**

no ipv6 mld snooping mrouter {interface *INTERFACE-ID* **[,|-] | forbidden interface** *INTERFACE-ID* **[,|-] | learn pimv6}**

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.
learn pimv6	Specifies to enable dynamic learning of multicast router port.

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 eth2/0/1 as an MLD snooping multicast router port and eth1/0/2 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 eth2/0/1
Switch(config-vlan)# ipv6 mld snooping mrouter forbidden interface eth1/0/2
Switch(config-vlan)#
```

This example shows how to disable the auto-learning of routing protocol packets on VLAN 4.

```
Switch# configure terminal
Switch(config)# vlan 4
Switch(config-vlan)# no ipv6 mld snooping mrouter learn pimv6
Switch(config-vlan)#
```

46-6 ipv6 mld snooping proxy-reporting

This command is used to enable the proxy-reporting function. Use the **no** form of this command to disable the proxy-reporting function.

ipv6 mld snooping proxy-reporting [source *IPV6-ADDRESS***]**

no ipv6 mld snooping proxy-reporting

Parameters

source *IPV6-ADDRESS*	(Optional) Specifies the source IP address of proxy reporting.

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.

When the function proxy reporting is enabled, the received multiple MLD report or leave packets will be integrated into one report before being sent to the router port. Proxy reporting source IP will be used as source IP of the report, Zero IP address will be used when the proxy reporting source IP is not set.

Example

This example shows how to enable MLD snooping proxy-reporting on VLAN 1.

```
Switch# configure terminal
Switch(config)# vlan 1
Switch(config-vlan)# ipv6 mld snooping proxy-reporting
Switch(config-vlan)#
```

46-7 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)#
```

46-8 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 the 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)#
```

46-9 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)#
```

46-10 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)#
```

46-11 ipv6 mld snooping report-suppression

This command is used to enable MLD report suppression on a VLAN. To disable report suppression on a VLAN, use the **no** form of this command.

ipv6 mld snooping report-suppression

no ipv6 mld snooping report-suppression

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 report suppression function only works for MLDv1 traffic.

When report suppression is enabled, the Switch suppresses the duplicate reports sent by hosts. The suppression for the same group report or leave will continue until the suppression time expired. For report or leave messages to the same group, only one report or leave message is forwarded. The remaining report and leave messages are suppressed.

Example

This example shows how to enable MLD report suppression.

```
Switch# configure terminal
Switch(config)# vlan 100
Switch(config-vlan)# ipv6 mld snooping report-suppression
Switch(config-vlan)#
```

46-12 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)#
```

46-13 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 eth3/0/5
Switch(config-vlan)#
```

46-14 ipv6 mld snooping suppression-time

This command is used to configure the interval of suppressing duplicate MLD reports or leaves. Use the **no** form of the command to revert to the default setting.

ipv6 mld snooping suppression-time *SECONDS*

no ipv6 mld snooping suppression-time

Parameters

SECONDS	Specifies to configure the interval of suppressing duplicates MLD reports. The range is 1 to 300.

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. Report suppression function will suppress the duplicate MLD report or leave packets receiving in the suppression time interval. A small suppression time will cause the duplicate MLD packets be sent up more frequently.

Example

This example shows how to configure the suppression time to be 125 on VLAN 1000.

```
Switch# configure terminal
Switch(config)# vlan 1000
Switch(config-vlan)# ipv6 mld snooping suppression-time 125
Switch(config-vlan)#
```

46-15 ipv6 mld snooping minimum-version

This command is used to configure the minimum version of MLD hosts which MLD that is allowed on the interface. Use the **no** form of this command to remove the restriction from the interface.

ipv6 mld snooping minimum-version 2

no ipv6 mld snooping minimum-version

Parameters

None.

Default

No limit on minimum version.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. This setting only applies to filtering of MLD membership reports.

Example

This example shows how to restrict all MLDv1 hosts to join VLAN 1.

```
Switch# configure terminal
Switch(config)# vlan 1
Switch(config-vlan)# ipv6 mld snooping minimum-version 2
Switch(config-vlan)#
```

46-16 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
  Minimum version       : v2
  Fast leave            : Enabled (host-based)
  Report suppression    : Enabled
  Suppression time      : 10 seconds
  Proxy reporting       : Disabled (Source ::)
  Mrouter port learning : Enabled
  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#
```

46-17 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       FM  Exp(sec)  Interface
-------  -------------------  -------------------  --  --------  ---------
1        FF1E::                        *           EX  258       2/0/7
1        FF1E::3                       *           EX  258       2/0/7
1        FF1E::4              3620:110:1::3a2b     IN  258       2/0/7

Total Entries: 3

Switch#
```

46-18 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
-----  ----------------------------
1      T1 (dynamic)

10     2/0/48 (static)
         T1 (dynamic)

4094   1/0/12 (forbidden)
          T1 (dynamic)

Total Entries: 3

Switch#
```

46-19 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#
```

46-20 show ipv6 mld snooping statistics

This command is used to display MLD snooping statistics information on the Switch.

show ipv6 mld snooping statistics {interface [*INTERFACE-ID***] | vlan [***VLAN-ID***]}**

Parameters

interface *INTERFACE-ID*	Specifies the interface of which to display the port statistics counter.
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 eth4/0/1
Rx: V1Report 1, v2Report 2, Query 1, v1Done 2
Tx: v1Report 1, v2Report 2, Query 1, v1Done 2

Interface eth4/0/3
Rx: V1Report 0, v2Report 0, Query 0, v1Done 0
Tx: v1Report 0, v2Report 0, Query 0, v1Done 0

Interface eth4/0/4
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 1

VLAN 1 Statistics:
Rx: V1Report 3, v2Report 0, Query 3, v1Done 0
Tx: v1Report 2, v2Report 2, Query 1, v1Done 2

Total Entries: 1

Switch#
```

47. Multiple Spanning Tree Protocol (MSTP) Commands

47-1 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)#
```

47-2 name

This command is used to configure the name of an MST region. To return to the default name, use the **no** form of this command.

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)#
```

47-3 revision

This command is used to configure the revision number for the MST configuration. To return to the default settings, use the **no** form of this command.

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)#
```

47-4 show spanning-tree mst

This command is used to display the information that used in the MSTP version.

show spanning-tree mst [configuration [digest]]

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.
digest	Specifies to display the MD5 digest included in the current MST configuration identifier (MSTCI).
instance *INSTANCE-ID* **[, | -]**	Specifies to display the MSTP information for the designated instance only. Define multiple instances by using ‘,’ 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)
 Topology Changes Count: 0

 eth1/0/1
   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 eth1/0/1.

```
Switch#show spanning-tree mst interface eth1/0/1 detail

eth1/0/1
 Configured link type: auto, operation status: point-to-point
 Configured fast-forwarding: auto, operation status: non-edge
 Bpdu statistic counter: sent: 0, received: 0

 >>>>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)
 Topology Changes Count: 0

                                              Priority Link
 Interface      Role       State      Cost      .Port#   Type   Edge
 ---------      ----       -----      ----      -------  -----  ----
 eth1/0/1       nonStp     forwarding 200000    128.1    p2p    non-edge


Switch#
```

This example shows how to display MSTP summary information for interfaces eth3/0/3 to eth 3/0/4.

```
Switch# show spanning-tree mst interface eth3/0/3-4

eth3/0/3
Configured link type: auto, operation status: point-to-point
  Configured fast-forwarding: auto, operation status: edge
  Bpdu statistic counter: sent: 4, received: 0

                                       Priority
 Instance  Role       State      Cost    .Port#
--------  ----       -----      ------  ---------
MST00     designated forwarding  20000   128.3
MST01     backup     blocking   200000   128.3

eth3/0/4
Configured link type: auto, operation status: point-to-point
  Configured fast-forwarding: auto, operation status: edge
  Bpdu statistic counter: sent: 4, received: 0

                                       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 eth3/0/3 to eth 3/0/4 of MST02.

```
Switch# show spanning-tree mst instance 2 interface eth3/0/3-4

>>>>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  Link
   Interface  Role       State      Cost    .Port#    Type        Edge
---------  ----       -----      ------  --------- ------      --------
eth3/0/3    backup     blocking   200000    128.3  p2p         non-edge
eth3/0/4    backup     blocking   200000    128.4  p2p         non-edge

Switch#
```

This example shows how to display MSTP instance mapping configuration.

```
Switch# show spanning-tree mst configuration

Name     : [region1]
Revision : 2, Instances configured: 3
Instance   Vlans
---------  -------------
0          21-4094
1          1-10
2          11-20

Switch#
```

47-5 spanning-tree mst

This command is used to configure the path cost and port priority parameters for any MST instance (including the CIST with instance ID 0). To return to the default settings, use the **no** form of this command.

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 eth3/0/1
Switch(config-if)# spanning-tree mst 0 cost 17031970
Switch(config-if)#
```

47-6 spanning-tree mst configuration

This command is used to enter the MST Configuration Mode. To return to the default settings, use the **no** form of this command.

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)#
```

47-7 spanning-tree mst max-hops

This command is used to configure the MSTP maximum hop count value. Use the **no** form of the command to reset 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)#
```

47-8 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 the 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 eth1/01.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# spanning-tree mst hello-time 1
Switch(config-if)#
```

47-9 spanning-tree mst priority

This command is used to configure the bridge priority value for the selected MSTP instance. Use the **no** command to return the setting 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)#
```

48. Neighbor Discovery (ND) Inspection Commands

48-1 ipv6 nd inspection policy

This command is used to create an ND inspection policy. This command will enter into 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.

Command Default Level

Level: 12.

Usage Guideline

This command is used to create an ND inspection policy. This command will enter into 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)#
```

48-2 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 the 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.

Command Default Level

Level: 12.

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)#
```

48-3 device-role

This command is used to specify the role of the attached device. Use the **no** form of the command to reset to the default setting.

device-role {host | router}

no device-role

Parameters

host	Specifies to set the role of the device to host.
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.

Command Default Level

Level: 12.

Usage Guideline

The command is used 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)#
```

48-4 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.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port and port channel configuration. The command is used to apply the ND Inspection policy on a specified interface. If **no policy-name** 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 interface eth1/0/3.

```
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 eth1/0/3
Switch(config-if)# ipv6 nd inspection attach-policy policy1
Switch(config-if)#
```

48-5 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

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If the policy name is specified, only the specified policy information is displayed. If the policy name is not specified, information is displayed for all policies.

Example

This example shows how to display the policy configuration for a policy named “inspect1” and all the interfaces where the policy is applied:

```
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#
```

49. Network Access Authentication Commands

49-1 authentication guest-vlan

This command is used to configure the guest VLAN setting. Use the **no** form of the 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 the authentication host-mode is set to **multi-auth**, the port will be added as a guest VLAN member port and the PVID of the port will be changed to a guest VLAN. Hosts that are allowed to access the guest VLAN are forbidden to access other VLANs until it pass authentication. When one host passes authentication, the port will stay in the guest VLAN, the PVID of the port will not be changed.

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 eth1/0/1
Switch(config-if)# authentication guest-vlan 5
Switch(config-if)#
```

49-2 authentication host-mode

This command is used to specify the authentication mode. Use the **no** form of the command to reset 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 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 eth1/0/1
Switch(config-if)# authentication host-mode multi-host
Switch(config-if)#
```

49-3 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 eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# authentication periodic
Switch(config-if)#
```

49-4 authentication timer inactivity

This command is used to configure the timer after which an inactive session is terminated. Use the **no** form of the command to disable the inactivity timer

authentication timer inactivity {*SECONDS***}**

no authentication timer inactivity

Parameters

SECONDS	Specifies to configure the timer after which an inactive session is terminated. The range is from 120 to 65535.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the inactivity timer is configured, a user session will be terminated if the session sustains no activity for the configured period of time. If the inactivity timer is configured, it should be shorter than the timer value configured by authentication timer re-authentication command.

Example

This example shows how to configure the inactivity timer to 240 for eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# authentication timer inactivity 240
Switch(config-if)#
```

49-5 authentication timer reauthentication

This command is used to configure the timer to re-authenticate a session. Use the **no** form of the command to revert the setting to default.

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 eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# authentication timer reauthentication 200
Switch(config-if)#
```

49-6 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 the command to revert the setting to default.

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 configure the restart timer to 20 for eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# authentication timer restart 20
Switch(config-if)#
```

49-7 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)#
```

49-8 clear authentication sessions

This command is used to remove authentication sessions.

clear authentication sessions {mac | wac | dot1x | all | interface *INTERFACE-ID* **[mac | wac | jwac |dot1x] | mac-address** *MAC-ADDRESS***}**

Parameters

mac	Specifies to clear all MAC sessions.
wac	Specifies to clear all WAC sessions.
jwac	Specifies to clear all JWAC sessions.
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 eth1/0/1
Switch#
```

49-9 authentication username mac-format

This command is used to configure the MAC address format that will be used for authenticating as the username via the RADIUS server. Use the **no** form of this command to return to the default setting.

authentication username mac-format case {lowercase | uppercase} delimiter {hyphen | colon | dot | none} number {1 | 2 | 5}

no authentication username mac-format

Parameters

lowercase	Specifies that when using the lowercase format, the RADIUS authentication username will be formatted as: aa-bb-cc-dd-ee-ff.
uppercase	Specifies that when using uppercase format, the RADIUS authentication username will be formatted as: AA-BB-CC-DD-EE-FF.
hyphen	Specifies that when using "-" as delimiter, the format is: AA-BB-CC-DD-EE-FF.
colon	Specifies that when using ":" as delimiter, the format is: AA:BB:CC:DD:EE:FF.
dot	Specifies that when using "." as delimiter, the format is: AA.BB.CC.DD.EE.FF.
none	Specifies that when not using any delimiter, the format is: AABBCCDDEEFF.
number	Specifies the delimiter number value. Choose one of the following delimiter options: **1:** Single delimiter, the format is: AABBCC.DDEEFF. **2:** Double delimiters, the format is: AABB.CCDD.EEFF. **5:** Multiple delimiters, the format is: AA.BB.CC.DD.EE.FF. If none is chosen for delimiter, the number does not take effect.

Default

The default authentication MAC address case is **uppercase**.

The default authentication MAC address delimiter is **dot**.

The default authentication MAC address delimiter number is 2.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the formatting of usernames used for RADIUS authentication or for IGMP security based on the MAC address.

Example

This example shows how to format the username based on the MAC address.

```
Switch# configure terminal
Switch(config)# authentication username mac-format case uppercase delimiter hyphen
number 5
Switch(config)#
```

49-10 authentication compauth mode

This command is used to specify the compound authentication modeUse the **no** form of the command to revert the setting to default.

authentication compauth mode {any | mac-jwac | mac-wac}

no authentication compauth mode

Parameters

any	Specifies that if any of the authentication method (802.1X, MAC-based Access Control, WAC, or JWAC) to passes, then pass.
mac-jwac	Specifies to verify MAC-based authentication first. If the client passes, JWAC will be verified next. Both authentication methods need to be passed.
mac-wac	Specifies to verify MAC-based authentication first. If the client passes, WAC will be verified next. Both authentication methods need to be passed.

Default

By default the authentication method is **any**.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration. Use this command to configure the authentication method on ports.

The enable or disable setting of individual authentication will always take effect. If the compound authentication method of a port is set to **any** but MAC-based Access Control is disabled, and JWAC and 802.1X are enabled, then user must pass either the JWAC or 802.1X method. If the method is **mac-jwa**c or **mac-wac**, the user is authorized after two methods are authenticate passed. If any of the methods failed, the user is rejected. If the related method's global or port state is not enabled, the user is rejected (due to not authenticated pass). After authenticated, the authorized information will take from JWAC or WAC module.

Example

This example shows how to configure Ethernet port 1/0/6 in **mac-jwac** mode.

```
Switch#configure terminal
Switch(config)#mac-auth system-auth-control
Switch(config)#jwac system-auth-control
Switch(config)#interface eth1/0/6
Switch(config-if)#mac-auth enable
Switch(config-if)#jwac enable
Switch(config-if)#
```

49-11 authentication max users

This command is used to configure the maximum authenticated users for the entire system or for a port. Use the **no** form of the command to reset to default setting.

authentication max users *NUMBER*

no authentication max users

Parameters

NUMBER	Specifies to set the maximum authenticated users' number. The range is from 1 to 1000.

Default

None.

Command Mode

Global Configuration Mode.

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command can be used in the global configuration mode and interface configuration mode.

If the command is configured in the global configuration mode, the maximum user number limits the user number of the entire system.

If the command is configured in the interface configuration mode, the maximum user number is set for the interface.

The maximum users being limited include 802.1X, MAC-based Access Control, WAC, and JWAC users.

In addition, the command has the following limitation:

- If the new maximum is less than the current number of users, the command will be rejected and the error message will be prompted.

Example

This example shows how to set the maximum authenticated users for system.

```
Switch# configure terminal
Switch(config)# authentication max users 256
Switch(config)#
```

49-12 authentication mac-move deny

This command is used to disable MAC move on the Switch. Use the **no** form of this command to return 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)#
```

49-13 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 enabled.

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.

Example

This example shows how to enable the authorization status.

```
Switch# configure terminal
Switch(config)# no authorization disable
Switch(config)#
```

49-14 show authentication sessions

This command is used to display authentication information.

show authentication sessions [mac | wac | jwac | dot1x | interface *INTERFACE-ID* **[, | -] [mac | wac | jwac | dot1x] | mac-address** *MAC-ADDRESS***]**

Parameters

mac	(Optional) Specifies to display all MAC sessions.
wac	(Optional) Specifies to display all WAC sessions.
wac	(Optional) Specifies to display all JWAC sessions.
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 eth1/0/1

Interface: eth1/0/1
MAC Address: 00-16-76-35-1A-38
Authentication VLAN: 1
Authentication State: Success
Accounting Session ID: 0000000000CB
Authentication Username: wac
Client IP Address: 10.90.90.9
Aging Time: 3590 sec
Method   State
  WEB-based Access Control: Success, Selected

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.
Method	The Authentication method, such as 802.1X, MAC-Auth, Web-Auth, JWAC, etc…
State	The method authentication state. **Authenticating** – Host is under authentication by this method. **Success** – Host pass this method authentication. **Selected** – This method's authentication result is taken and parsed by system for the host. **Failure** – Host fail at this method authentication. **No Information** – Authentication info is unavailable.
Aging Time/Block Time	**Aging Time**: Specifies a time period during which an authenticated host will be kept in an authenticated state. When the aging time has timed-out, the host will be moved back to an unauthenticated state. **Blocked Time**: If a host fails to pass the authentication, the next authentication will not start within the block time unless the user clears the entry state manually.
Idle Time	**Idle Time**: Indicates the leftover time of an authenticated session that will be terminated if the session sustains no activity for the configured period of time. It is only available for WEB sessions.
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.

50. Port Security Commands

50-1 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* **[, | -]} [vlan** *VLAN-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.
vlan *VLAN-ID*	Specifies to delete the auto-learned secured entry learned with the specified VLAN.

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#
```

50-2 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 eth1/0/1 to eth1/0/3.

```
Switch# show port-security interface range eth1/0/1-3 interface range eth1/0/1-3

 D:Delete-on-Timeout  P:Permanent
 Interface     Max  Curr  Violation     Violation   Security Admin  Current
 No.           No.   No.    Act.          Count        Mode  State   State
 ------------ ----- ----- -------- -------------------- -- -------- -----------
 eth1/0/1     5    2    Restrict          0            D    Enabled  Forwarding
 eth1/0/2     10   10   Shutdown          0            D    Enabled  Err-disabled
 eth1/0/3     10   0    Shutdown          0            P    Disabled -

Switch#
```

50-3 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 the 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)#
```

50-4 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 1 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 eth1/0/1
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 eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
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 security violation counter if a security violation is detected.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# switchport port-security violation restrict
Switch(config-if)#
```

50-5 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 the command to reset to the default setting.

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 eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
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 eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# switchport port-security aging type inactivity
Switch(config-if)#
```

50-6 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 reset 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)#
```

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 the **no** form of this command to clear the description.

poe pd description *TEXT*

no poe pd description

Parameters

TEXT	Specifies the string that describes the PD connected to a PoE interface. The maximum length is 32 characters.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure a description for the PD connected to the port.

Example

This example shows how to configure the PoE PD description on interface eth3/0/1.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# poe pd description For VOIP usage
Switch(config-if)#
```

51-2 poe pd legacy-support

This command is used to enable the support of legacy PD. Use the **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

Use this command to enable the support of legacy PDs connected to the port. If legacy support is disabled, the system will not provide power to the legacy PDs.

Example

This example shows how to enable legacy support for PDs connected to interface eth3/0/1.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
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** command to return the priority to the default setting.

poe pd priority {critical | high | low}

no poe pd priority

Parameters

critical	Specifies the PD connected to the port gains the highest priority.
high	Specifies the PD connected to the port gains the second high priority.
low	Specifies the PD connected to the port gains the lowest priority.

Default

By default, this option is set as low.

Command Mode

Interface 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 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 the priority of eth 3/0/1 to the first priority.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
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 conditions. Use the **no** form of the command to reset to the default setting.

poe unit *UNIT-ID* **policy preempt**

no poe unit *UNIT-ID* **policy preempt**

Parameters

UNIT-ID	Specifies the stacking unit's ID to be configured. This parameter is only available, if stacking is enabled.

Default

By default, this option is disabled.

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 the 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 the default settings.

poe power-inline {auto [max *MAX-WATTAGE*] **[time-range** *PROFILE-NAME*] **| never}**

no poe power-inline [auto {max | time-range}]

Parameters

auto	Specifies to enable the auto-detection of PDs and provision power to the PD.
max *MAX-WATTAGE*	(Optional) Specifies to set the maximum wattage of power that can be provisioned to the auto-detected PD. If not specified, then the class of the PD automatically determines the maximum wattage which can be provisioned. The valid range for maximum wattage is from 1000 mW to 30000 mW.
time-range *PROFILE-NAME*	(Optional) Specifies the name of the time-range profile to delineate the activation period.
never	Specifies to disable supplying power to PD connected to the port.

Default

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

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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 maximum wattage value which can be provisioned to the port. If the maximum wattage value is not specified, then the class of the PD automatically determines the maximum wattage that can be provisioned. The PD will not be provisioned if it requests more wattage than the maximum wattage.

Use this command to also specify a 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.

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 the time-range is not specified.

Example

This example shows how to enable PD detection and to automatically power PoE port, eth3/0/1.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# poe power-inline auto
Switch(config-if)#
```

This example shows how to configure a PoE port, eth3/0/1, to allow powered devices under 7000mw.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# poe power-inline auto max 7000
Switch(config-if)#
```

This example shows how to disable powered device detection and not to power a PoE port, eth3/0/1.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# poe power-inline never
Switch(config-if)#
```

This example shows how to combine a time-range profile called “day-time” with the PoE port, eth3/0/1.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# poe power-inline auto time-range day-time
Switch(config-if)#
```

51-6 poe usage-threshold

This command is used to configure the utilization threshold to record a log. Use the **no** form of this command to restore to the default setting.

poe unit *UNIT-ID* **usage-threshold** *PERCENTAGE*

no poe unit *UNIT-ID* **usage-threshold**

Parameters

UNIT-ID	Specifies the stacking unit’s ID to be configured. This parameter is only available, if stacking is enabled.
PERCENTAGE	Specifies the usage threshold to generate a log. The valid range is from 1 to 99. The unit is percentage.

Default

By default, this value is 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 threshold, then the *EXCEED* log will be recorded. Once the percentage decreases and become lower than the threshold, then the *RECOVER* log is recorded.

Example

This example shows how to configure the usage threshold to 50%.

```
Switch# configure terminal
Switch(config)# poe unit 1 usage-threshold 50
Switch(config)#
```

51-7 snmp-server enable traps poe

This command is used to enable the 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 [unit *UNIT-ID***]**

no snmp-server enable traps poe [unit *UNIT-ID***]**

Parameters

UNIT-ID	Specifies the stacking unit's ID to be configured. This parameter is only available, if stacking is enabled.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable sending 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)#
```

51-8 clear poe statistic

This command is used to clear the statistic counters on the port.

clear poe statistic {all | interface *INTERFACE-ID* **[,|-]}**

Parameters

all	Specifies to clear PoE statistics for all interfaces.
interface *INTERFACE-ID*	Specifies the interface ID of an interface.
,	(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

Privilege EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

There are counters on ports to record the statistic and they can be shown by **show poe power-inline statistics** command. Use this command to clear all the counter values on the port.

Example

This example shows how to clear statistics on interface eth3/0/1.

```
Switch# clear poe statistic interface eth3/0/1
Switch#
```

51-9 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-ID* **[, | -]] {status | configuration | statistics | measurement | lldp-classification}**

Parameters

INTERFACE-ID	(Optional) Specifies the interface to be displayed.
,	(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.
status	Specifies to display the port PoE status.
configuration	Specifies to display the port configuration information.
statistics	Specifies to display the port error counters.
measurement	Specifies to display the port voltage, current, consumed power, and temperature.
lldp-classification	Specifies to display the data link layer classification using information of power via MDI TLV.

Default

None

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the PoE status of ports, power inline configuration status, statistic counters, the measurement result, and the data link layer classification information. If the interface ID is not specified with this command, then all PoE interfaces will be displayed. Only the PoE capable interfaces are displayed.

Example

This example shows how to display the PoE power inline status.

```
Switch# show poe power-inline status

Interface   State      Class   Max(W) Used(W) Description
------------------------------------------------------------------------------
eth3/0/1    delivering class-1 4      3.4     IP-camera-1
eth3/0/2    delivering class-2 10     6.3     12345678901234567890123456789012
!--- Output suppressed...
eth4/0/1    delivering class-3 15.4   13.0
eth4/0/2    delivering class-3 15.4   12.4
eth4/0/3    disabled   n/a     0      0
eth4/0/4    searching  n/a     11.0   0
!--- Output suppressed...
eth5/0/24   disabled   n/a     0      0
eth5/0/25   faulty[2]   n/a     0      0

Faulty code:
[1] MPS (Maintain Power Signature) Absent
[2] PD short
[3] Overload
[4] Power Denied
[5] Thermal Shutdown
[6] Startup Failure
[7] Classification Failure

Switch#
```

Display Parameters

Interface	The PoE interface ID.
State	The port status can be of the following: **Disabled** – The PSE function is disabled. **Searching** – The remote PD is not connected. **Requesting** – The remote PD is inserted, but the PSE doesn't provide power yet. **Delivering** – The remote PD is now powering by PoE system. **Faulty[X]** – The device detection or a powered device is in a faulty state. X is the error code number. • **[1]** - MPS (Maintain Power Signature) Absent.

	• **[2]** - PD Short. • **[3]** - Overload. • **[4]** - Power Denied. • **[5]** - Thermal Shutdown. • **[6]** - Startup Failure. • **[7]** - Classification Failure(IEEE 802.3at).
Class	The IEEE classification: N/A or a value from IEEE class 0 to 4.
Max(W)	The maximum amount of power could be allocated to the powered device in watts.
Used(W)	The amount of power is currently allocated to PoE ports in watts.
Description	The configured description of the connected PD.

Example

This example shows how to display the PoE power inline configuration.

```
Switch# show poe power-inline configuration

Interface   Admin   Priority Legacy-Support Time-Range
------------------------------------------------------------------------------
eth3/0/1    auto    critical enabled        12345678901234567890123456789012
eth3/0/2    auto(M) critical disabled       rdtime
!--- Output suppressed...
eth4/0/2    auto    critical disabled
eth4/0/3    never   high     disabled
!--- Output suppressed...
eth5/0/24   never   low      disabled
eth5/0/25   never   low      disabled

Switch#
```

Display Parameters

Interface	The PoE interface ID.
Admin	The user configured mode can be of the following: **Auto** - The powered device will be automatically detected and maximum power is based on the detection result. **Auto(M)** - The powered device will be automatically detected and maximum power is the user configured value. **Never** - The powered device will not be detected, and no power to the port.
Priority	The priority used to prioritize the service order when power constrain happens within at the power unit.
Legacy-Support	**Enabled** - The legacy PD can be detected. **Disabled** - The legacy PD cannot be detected.
Time-Range	The time-range profile name which sets the activation time frame for a port.

Example

This example shows how to display the PoE power inline statistics.

```
Switch# show poe power-inline statistics

Interface MPS Absent  Overload  Short  Power Denied  Invalid Signature
--------- ----------  --------  -----  ------------  -----------------
eth3/0/1       2          5        0         10               7
eth3/0/2       2          1        0         3                9
!--- Output suppressed.
eth4/0/1       2          0        0         2                3
eth4/0/2       2          0        0         1                0
eth4/0/3       2          0        0         5                1
eth4/0/4       2          0        0         0                0
!--- Output suppressed.
eth5/0/24      2          2        0         0                0
eth5/0/25      2          1        1         0                0

Switch#
```

Display Parameters

MPS Absent	Increased if the PSE stops to provide power to the PI due to the PSE cannot monitor the valid MPS of PD on the PI.
Overload	If the PD is drawing too much power to exceed the maximum output power that the port can supply, then the overload counter is increased.
Short	If the PD's internal circuit is shorted for some reason, then this counter is increased.
Power Denied	If the PoE software system decides to disallow providing power to the attached PD, then this counter is increased.
Invalid Signature	Increased if the PSE detects a PD who has an invalid PD signature.

Example

This example shows how to display the PoE power inline measurement.

```
Switch# show poe power-inline measurement

Interface Voltage(V) Current(mA) Temperature(C) Power(W)
--------- ---------- ----------- --------------  --------
eth3/0/1     54.2       109         35              5.9
eth3/0/2     55         196         38              10.8
!--- Output suppressed.
eth4/0/1     54.6       197         32              10.7
eth4/0/2     54.8       286         36              15.7
eth4/0/3     n/a        n/a         n/a              n/a
eth4/0/4     n/a        n/a         n/a              n/a
!--- Output suppressed.
eth5/0/24    n/a        n/a         n/a              n/a
eth5/0/25    n/a        n/a         n/a              n/a

Switch#
```

This example shows how to display the PoE power inline LLDP classification.

```
Switch# show poe power-inline lldp-classification

Interface eth1/0/1
PSE TX information:

Power type; type 2 PSE
Power source: primary power source
Power priority: low
PD requested power value: 25.0W
PSE allocated power value: 25.0W

Information from PD:

Power type: type 2 PD
Power source: PSE
Power priority: unknown
PD requested power value: 25.0W
PSE allocated power value: 25.0W

Interface eth2/0/2
PSE TX information:

Power type; type 2 PSE
Power source: primary power source
Power priority: high
PD requested power value: 0.0W
PSE allocated power value: 0.0W

Information from PD:

none

Interface eth3/0/3
PSE TX information:

Power type; type 2 PSE
Power source: primary power source
Power priority: low
PD requested power value: 20.0W
PSE allocated power value: 20.0W

Information from PD:

Power type: type 2 PD
Power source: PSE
Power priority: unknown
PD requested power value: 20.0W
PSE allocated power value: 20.0W

Switch#
```

Display Parameters

Interface	The PoE interface ID.
Power type	The power type field which is in the Power via MDI TLV from PSE or PD LLDP packet.
Power source	The power source field which is in the Power via MDI TLV from PSE or PD LLDP packet.
Power priority	The power priority field which is in the Power via MDI TLV from PSE or PD LLDP packet.
PD requested power value	The PD requested power value field which is in the Power via MDI TLV from PSE or PD LLDP packet.
PSE allocated power value	The PSE allocated power value field which is in the Power via MDI TLV from PSE or PD LLDP packet.

51-10 show poe power module

This command is used to display the setting and actual values of the power modules.

show poe power module [unit *UNIT-ID***] [detail]**

Parameters

UNIT-ID	Specifies the stacking unit's ID to be displayed. This parameter is only available, if stacking is enabled.
detail	(Optional) Specifies to display more detailed chip parameter information.

Default

None

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the detailed power information and PoE chip parameters for PoE modules.

Example

This example shows how to display the PoE power system's power information.

```
Switch#show poe power module

Unit Delivered(W)  Power Budget(W)  Usage-Threshold(%)   Preempt   Trap State
-------------------------------------------------------------------------------
1      0             193                99              Disabled   Disabled

Switch#
```

Display Parameters

Unit	The unit ID of stacking device.
Delivered	The actual amount of power delivered to the PD in watts.
Power budget	The total power can be provided by the device in watts.
Usage-Threshold	The utilization threshold to record a log.
Policy Preempt	**Enabled** - The power management mode is policy preempt, high priority PD can preempt the provided power of lower priority PD. **Disabled** - The power management mode is first in first serviced.

Example

This example shows how to display the PoE detailed parameters for unit 1.

```
Switch#show poe power module unit 1 detail

Unit Delivered(W)  Power Budget(W)  Usage-Threshold(%)   Preempt   Trap State
-------------------------------------------------------------------------------
1      0             193                99              Disabled   Disabled

PoE system parameters:
Unit   Max Ports   Device ID    SW Version
----   ---------   ---------    ----------
1      24          E111         13

Switch#
```

Display Parameters

Max ports	The maximum port number of the PoE sub-system.
Device ID	The hardware version of the PoE chip.
S/W version	The firmware version of the PoE chip.

52. Power Saving Commands

52-1 dim led

This command is used to disable the port LED function. Use the **no** form of the 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 the 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)#
```

52-2 power-saving

This command is used to enable individual power saving functions. Use the **no** form of the command to disable these functions.

power-saving {link-detection | port-shutdown | dim-led | hibernation}

no power-saving {link-detection | port-shutdown | dim-led | hibernation}

Parameters

link-detection	Specifies that power saving will be applied by link status.
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 link detection, dimming LEDs, port shutdown, and hibernation using this command.

When link detection is enabled, the device can save power on the inactive ports.

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)#
```

52-3 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 the 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 eth1/0/1
Switch(config-if)# power-saving eee
Switch(config-if)#
```

52-4 power-saving dim-led time-range

This command is used to configure the time range profile for the dim LED schedule. Use the **no** form of the command to delete the specified time range 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 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 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)#
```

52-5 power-saving hibernation time-range

This command is used to configure the time range profile for the system hibernation schedule. Use the **no** form of the command to delete the specified time range profile.

power-saving hibernation time-range *PROFILE-NAME*

no power-saving hibernation time-range *PROFILE-NAME*

Parameters

PROFILE-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 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 time range profile for the hibernation schedule.

```
Switch# configure terminal
Switch(config)# power-saving hibernation time-range off-duty
Switch(config)#
```

52-6 power-saving shutdown time-range

This command is used to configure the time range profile for the port shutdown schedule. Use the **no** form of the command to delete the specified time range profile.

power-saving shutdown time-range *PROFILE-NAME*

no power-saving shutdown time-range *PROFILE-NAME*

Parameters

PROFILE-NAME	Specifies the name of the time range 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 time range profile for the port shutdown schedule.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# power-saving shutdown time-range off-duty
Switch(config-if)#
```

52-7 show power-saving

This command is used to display the power saving configuration information.

show power-saving [link-detection] [dim-led] [port-shutdown] [hibernation] [eee]

Parameters

link-detection	(Optional) Specifies to display the link detection state.
dim-led	(Optional) Specifies to display the dim LED state.
port-shutdown	(Optional) Specifies to display the port shutdown state.
hibernation	(Optional) Specifies to display the hibernation state.
eee	(Optional) Specifies to display the EEE state.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If no optional keywords were specified, all power saving configuration information will be displayed.

Example

This example shows how to display all power saving configuration information.

```
Switch#show power-saving
Function Version: 3.00

Link Detection Power Saving
  State: Disabled

Administrative Dim-LED
  State: Disabled

Scheduled Dim-LED Power Saving
  State: Disabled

Scheduled Port-shutdown Power Saving
  State: Disabled

EEE_Enabled Ports
  eth1/0/1

Switch#
```

53. Protocol Independent Commands

53-1 ip route

This command is used to create a static route entry. Use **no** command to remove a static route entry.

ip route *NETWORK-PREFIX NETWORK-MASK IP-ADDRESS* **[primary | backup]**

no ip route *NETWORK-PREFIX NETWORK-MASK IP-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)#
```

53-2 ipv6 route

This command is used to create an IPv6 static route entry. Use the **no** 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 vlan1 fe80::0000:00ff:1111:2233
Switch(config)#
```

53-3 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#
```

53-4 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#
```

53-5 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#
```

53-6 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#
```

54. Quality of Service (QoS) Commands

54-1 class

This command is used to specify the name of the class map to be associated with a traffic policy and then enter into policy map class configuration mode. Use the **no** command to remove the policy definition for the specified class.

class *NAME*

no class *NAME*

class class-default

Parameters

NAME	Specifies the name of the class map to be associated with a traffic policy.

Default

None.

Command Mode

Policy-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command enters the policy-map class configuration mode. All the traffic that does not match the proceeding defined class will be classified as class-default. If the specified name of class map does not exist, no traffic is classified to the class.

Example

This example shows how to define a policy map, policy1, which defines policies for the class “class-dscp-red”. The packets that match DSCP 10, 12, or 14 will all be marked as DSCP 10 and be policed by a single rate policer.

```
Switch# configure terminal
Switch(config)# class-map class-dscp-red
Switch(config-cmap)# match ip dscp 10,12,14
Switch(config-cmap)# exit
Switch(config)# policy-map policy1
Switch(config-pmap)# class class-dscp-red
Switch(config-pmap-c)# set ip dscp 10
Switch(config-pmap-c)# police 1000000 2000 exceed-action set-dscp-transmit 0
Switch(config-pmap-c)#
```

54-2 class-map

This command is used to create or modify a class-map that defines the criteria for packet matching. To remove an existing class map from the Switch, use the **no** command to remove an existing class map. The class-map command enters the class-map configuration mode.

class-map [match-all | match-any] *NAME*

no class-map *NAME*

Parameters

NAME	Specifies the name of the class map with a maximum of 32 characters.
match-all	(Optional) Specifies how to evaluate multiple match criteria. Multiple match statements in the class map will be evaluated based on the logical AND. If neither match-all nor match-any is specified, match-any is implied.
match-any	(Optional) Specifies how to evaluate multiple match criteria. Multiple match statements in the class map will be evaluated based on the logical OR. If neither match-all nor match-any is specified, match-any is implied.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to create or modify a class-map that defines the criteria for matching packets. This command enters the class-map configuration mode where match commands are entered to define the match criteria for this class.

When multiple match commands are defined for a class, use the **match-all** or **match-any** keyword to specify whether to evaluate the multiple match criteria based on either the logical AND or the logical OR.

Example

This example shows how to configure the “class_home_user “as the name of a class map. In this class map, a match statement specifies that the traffic that matches the access control list “acl_home_user” and matches the IPv6 protocol will be included under the class-map “class_home_user”.

```
Switch# configure terminal
Switch(config)# class-map match-all class_home_user
Switch(config-cmap)# match access-group name acl_home_user
Switch(config-cmap)# match protocol ipv6
Switch(config-cmap)#
```

54-3 match

This command is used to define the match criteria for a class-map. Use the **no** command to remove the match criteria.

match {access-group name *ACCESS-LIST-NAME* **| cos** *COS-LIST* **| [ip] dscp** *DSCP-LIST* **| [ip] precedence** *IP-PRECEDENCE-LIST* **| protocol** *PROTOCOL-NAME* **| vlan** *VLAN-ID-LIST***}**

no match {access-group name *ACCESS-LIST-NAME* **| cos** *COS-LIST* **| [ip] dscp** *DSCP-LIST* **| [ip] precedence** *IP-PRECEDENCE-LIST* **| protocol** *PROTOCOL-NAME* **| vlan** *VLAN-ID-LIST***}**

Parameters

access-group name *ACCESS-LIST-NAME*	Specifies an access list to be matched. Traffic that is permitted by the access list will be classified.
cos *COS-LIST*	Specifies a specific IEEE 802.1Q CoS value(s) to be matched. The *COS-LIST* parameter values are from 0 to 7. Enter one or more CoS values separated by commas or hyphen for a range list.
[ip] dscp *DSCP-LIST*	Specifies differentiated service code point values to be matched. Enter one or more differentiated service code point (DSCP) values separated by commas or hyphen for a range list. The valid range is from 0 to 63. (Optional) **ip** - Specifies that the match is for IPv4 packets only. If not specified, the match is for both IPv4 and IPv6 packets.
[ip] precedence *IP-PRECEDENCE-LIST*	Specifies IP precedence values to be matched. Enter one or more precedence values separated by commas or hyphen for a range list. The valid range is from 0 to 7. (Optional) **ip** - Specifies that the match is for IPv4 packets only. If not specified, the match is for both IP and IPv6 packets. For IPv6 packets, the precedence is most three significant bits of traffic class of IPv6 header.
protocol *PROTOCOL-NAME*	Specifies the protocol name to be matched.
vlan *VLAN-ID-LIST*	Specifies the VLAN identification number, numbers, or range of numbers to be matched. Valid VLAN identification numbers must be in the range of 1 to 4094. Enter one or more VLAN values separated by commas or hyphens for a range list.

Default

None.

Command Mode

Class-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

To use the **match** command, first enter the class-map command to specify the name of the class that will be used to establish the match criteria. The policy for handling these matched packets is defined in the policy-map class configuration mode.

The following lists the reference for the supported protocols for the match protocol command.

- **arp** - IP Address Resolution Protocol (ARP).
- **bgp** - Border Gateway Protocol.
- **dhcp** - Dynamic Host Configuration.
- **dns** - Domain Name Server lookup.
- **egp** - Exterior Gateway Protocol.
- **ftp** - File Transfer Protocol.
- **ip** - IP (version 4).
- **ipv6** - IP (version 6).
- **netbios** - NetBIOS.
- **nfs** - Network File System.
- **ntp** - Network Time Protocol.
- **ospf** - Open Shortest Path First.
- **pppoe** - Point-to-Point Protocol over Ethernet.
- **rip** - Routing Information Protocol.

- **rtsp** - Real-Time Streaming Protocol.
- **ssh** - Secured shell.
- **telnet** - Telnet.
- **tftp** - Trivial File Transfer Protocol.

Example

This example shows how to specify a class map called “class-home-user” and configures the access list named “acl-home-user” to be used as the match criterion for that class.

```
Switch# configure terminal
Switch(config)# class-map class-home-user
Switch(config-cmap)# match access-group name acl-home-user
Switch(config-cmap)#
```

This example shows how to specify a class map called “cos” and specifies that the CoS values of 1, 2, and 3 are match criteria for the class.

```
Switch# configure terminal
Switch(config)# class-map cos
Switch(config-cmap)# match cos 1,2,3
Switch(config-cmap)#
```

This example shows how classes called voice and video-n-data are created to classify traffic based on the CoS values. QoS treatment is then given to the appropriate packets in the cos-based-treatment policy map (in this example, the QoS treatment is a single rate policer and a two rate policer for class voice and video-n-data respectively). The service policy configured in this example is attached to Ethernet interface 3/0/1.

```
Switch# configure terminal
Switch(config)# Switch(config)# class-map voice
Switch(config-cmap)# match cos 7
Switch(config-cmap)# exit
Switch(config)# class-map video-n-data
Switch(config-cmap)# match cos 5
Switch(config-cmap)# exit
Switch(config)# police-map cos-based-treatment
Switch(config-pmap)# class voice
Switch(config-pmap-c)# police 8000 1000 exceed-action drop
Switch(config-pmap-c)# exit
Switch(config-pmap)# class video-n-data
Switch(config-pmap-c)# police cir 500000 bc 10000 pir 1000000 be 10000 exceed-action
set-dscp-transmit 2 violate-action drop
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
Switch(config)# interface eth3/0/1
Switch(config-if)# service-policy input cos-based-treatment
Switch(config-if)#
```

54-4 mls qos aggregate-policer

This command is used to define a named aggregate policer for use in policy maps. To delete a named aggregate policer, use the **no** form of this command. The **mls qos aggregate-policer** command is for single rate policing and the **mls qos aggregate-policer cir** command is for two-rate policing.

mls qos aggregate-policer *NAME KBPS* **[***BURST-NORMAL* **[***BURST-MAX***]] [conform-action** *ACTION***] exceed-action** *ACTION* **[violate-action** *ACTION***] [color-aware]**

mls qos aggregate-policer *NAME* **cir** *CIR* **[bc** *COMMITTED-BURST***] pir** *PIR* **[be** *PEAK-BURST***] [conform-action** *ACTION***] [exceed-action** *ACTION* **[violate-action** *ACTION***]] [color-aware]**

no mls qos aggregate-policer *NAME*

Parameters

NAME	Specifies the name of the aggregate policing rule. The *NAME* parameter can be up to 32 characters, is case sensitive. The policer names must start with an alphabetic character (not a digit) and must be unique across all aggregate policers.
KBPS	Specifies the average rate, in kilobits per second.
BURST-NORMAL	(Optional) Specifies the normal burst size in kilobytes.
BURST-MAX	(Optional) Specifies the maximum burst size, in kilobytes.
CIR	Specifies the committed information rate in Kbps. The committed packet rate is the first token bucket for the two-rate metering.
pir *PIR*	Specifies the peak information rate in Kbps. The peak information rate is the second token bucket for the two-rate metering.
bc *COMMITTED-BURST*	Specifies the burst size for the first token bucket in kilobytes.
be *PEAK-BURST*	Specifies the burst size for the second token bucket in kilobytes.
conform-action	(optional) Specifies the action to take on green color packets. If the **conform-action** is not specified, the default action is transmit.
exceed-action	Specifies the action to take on packets that exceed the rate limit. For two rate policer, if the **exceed-action** is not specified, the default action is drop.
violation-action	(Optional) Specifies the action to take on packets that violate the normal and maximum burst sizes for singe rate policing. Specifies the action to take for those packets that did not conform to both CIR and PIR. For a single rate policer, If **violation-action** is not specified, it will create a single rate two color policer. For a two rate policer, if the **violation-action** is not specified, the default action is equal to the **exceed-action**.
ACTION	Specifies the action to take on packets. Specify one of the following keywords: **drop** - Drops the packet. **set-dscp-transmit** *VALUE* - Sets the IP differentiated services code point (DSCP) value and transmits the packet with the new IP DSCP value. **set-1p-transmit** - Sets the 802.1p value and transmits the packet with the new value. **transmit** - Transmits the packet unaltered.
color-aware	(Optional) Specifies the option for the single rate three colors policer or two rates three colors policer. When color-aware is not specified, the policer works in the color blind mode. When color-aware is specified, the policer works in color aware mode.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

An aggregate policer can be shared by different policy map classes in a policy map. It cannot be shared by separate policy maps.

Example

This example shows how an aggregate policer named “agg-policer5” with a single rate two color policer is configured. This named aggregator policer is applied as the service policy for the class 1 and class 2 traffic class in the policy 2 policy map.

```
Switch# configure terminal
Switch(config)# mls qos aggregate-policer agg-policer5 10 1000 exceed-action drop
Switch(config)# policy-map policy2
Switch(config-pmap)# class class1
Switch(config-pmap-c)# police aggregate agg_policer5
Switch(config-pmap-c)# exit
Switch(config-pmap)# class class2
Switch(config-pmap-c)# police aggregate agg_policer5
Switch(config-pmap-c)#
```

54-5 mls qos cos

This command is used to configure the default Class of Service (CoS) value of a port. Use the **no** form of the command to revert the setting to default.

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 3/0/1 is set to 3.

```
Switch# configure terminal
Switch(config)# interface  eth3/0/1
switch(config-if)# mls qos cos 3
switch(config-if)#
```

54-6 mls qos dscp-mutation

This command is used to attach an ingress Differentiated Services Code Point (DSCP) mutation map to the interface. To remove the ingress DSCP mutation map association from the interface, use the **no** form of this command.

mls qos dscp-mutation *DSCP-MUTATION-TABLE-NAME*

no mls qos dscp-mutation

Parameters

DSCP-MUTATION-TABLE-NAME	Specifies the name of the DSCP mutation table. The string of the name is up to 32 characters and no space is allowed.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to attach an ingress DSCP mutation table to an interface. The ingress DSCP mutation will mutate the DSCP value right after the packet is received by the interface, and QoS handles the packet with this new value. The Switch sends the packet out the port with the new DSCP value.

Example

This example shows how to map DSCP 30 to the mutated DSCP value 8 and then attach the ingress-DSCP mutation map named “mutemap1” to port eth3/0/1.

```
Switch# configure terminal
Switch(config)# mls qos map dscp-mutation mutemap1 30 to 8
Switch(config)# interface eth3/0/1
Switch(config-if)# mls qos dscp-mutation mutemap1
Switch(config-if)#
```

54-7 mls qos map cos-color

This command is used to define the CoS to color map for mapping a packet's initial color. To return the map to the default setting, use the **no** form of this command.

mls qos map cos-color *COS-LIST* **to {green | yellow | red}**

no mls qos map cos-color

Parameters

COS-LIST	Specifies the list of CoS values to be mapped to a color. The range of CoS is from 0 to 7. The multiple CoS values in the list can be in the form separated by commas or a range list.

Default

By default, all CoS values are mapped to the green color.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When packets enter the ingress port, they will be colored based on either the DSCP to color map (if the port is a trusted DSCP port) or the CoS to color map (if the port is a trusted CoS port).

Use the **mls qos map cos-color** command, in the interface configuration mode, to configure the CoS to color map. If the ingress port is set to trusted CoS ports, the received packet will be initialized to a color based on this map.

Example

This example shows how to define CoS value 1 to 7 as the red color and 0 as the green color for packets arriving at eth 3/0/1.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# mls qos map cos-color 1-7 to red
Switch(config-if)#
```

54-8 mls qos map dscp-color

This command is used to define the DSCP to color map for the mapping of a packet's initial color. To return the color map to the default setting, use the **no** form of this command.

mls qos map dscp-color *DSCP-LIST* **to {green | yellow | red}**

no mls qos map dscp-color *DSCP-LIST*

Parameters

DSCP-LIST	Specifies the list of DSCP code point to be mapped to a color. The range is from 0 to 63. The multiple DSCP values in the list can be in the form separated by commas or a range list.

Default

There is no mapping. All DSCP code points are mapped to green color.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to define the DSCP to color map for the mapping of a packet's initial color.

Example

This example shows how to define DSCP 61 to 63 as the yellow color and any other IP packet is initialized with the green color at eth3/0/1.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# mls qos map dscp-color 61-63 to yellow
Switch(config-if)#
```

54-9 mls qos map dscp-cos

This command is used to define a Differentiated Services Code Point (DSCP)-to-class of service (CoS) map. To return to the default setting, use the **no** form of this command.

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 eth2/0/6.

```
Switch# configure terminal
Switch(config)# interface eth2/0/6
Switch(config-if)# mls qos map dscp-cos 12,16,18 to 1
Switch(config-if)#
```

54-10 mls qos map dscp-mutation

This command is used to define a named Differentiated Services Code Point (DSCP) mutation map. To remove the mutation map, use the **no** form of this command.

mls qos map dscp-mutation *MAP-NAME INPUT-DSCP-LIST* **to** *OUTPUT-DSCP*

no mls qos map dscp-mutation *MAP-NAME*

Parameters

MAP-NAME	Specifies the name of the DSCP mutation map in a string length up to 32 characters (no space is allowed)
INPUT-DSCP-LIST	Specifies the list of DSCP code point to be mutated to another DSCP value. The range is from 0 to 63. A series of DSCPs can be separated by commas (,) or hyphens (-). No space or hyphen is before and after.
OUTPUT-DSCP	Specifies the mutated DSCP value. Valid values are from 0 to 63.

Default

The output DSCP is equal to the input DSCP.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a packet is received by an interface, based on a DSCP mutation map, the incoming DSCP can be mutated to another DSCP immediately before any QoS operations. The DSCP mutation is helpful to integrate domains with different DSCP assignments.

When configuring a named DSCP mutation map, note the following:

- Enter multiple commands to map additional DSCP values to a mutated DSCP value.
- Enter a separate command for each mutated DSCP value.

The DSCP-CoS map and DSCP-color map will still be based on the packet's original DSCP. All the subsequent operations will base on the mutated DSCP.

Example

This example shows how to map DSCP 30 to the mutated DSCP value 8, DSCP 20 to the mutated DSCP 10, with the mutation map named “mutemap1”.

```
Switch# configure terminal
Switch(config)# mls qos map dscp-mutation mutemap1 30 to 8
Switch(config)# mls qos map dscp-mutation mutemap1 20 to 10
Switch(config)#
```

54-11 mls qos scheduler

This command is used to configure the scheduling mechanism. Use the **no** command to reset the packet scheduling mechanism to the default.

mls qos scheduler {sp | rr | wrr | wdrr}

no mls qos scheduler

Parameters

sp	Specifies that all queues are in strict priority scheduling.
rr	Specifies that all queues are in round-robin 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.
wdrr	Specifies the queues of all ports in the frame length (quantum) weighted deficit round-robin scheduling. If the weight of a queue be configured to zero, the queue is in the SP scheduling mode.

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, RR or WDRR 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 eth3/0/1
Switch(config-if)# mls qos scheduler sp
Switch(config-if)#
```

54-12 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 the 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 eth1/0/1 to trust the DSCP mode.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# mls qos trust dscp
Switch(config-if)#
```

54-13 police

This command is used to configure traffic policing to use the single rate. To remove traffic policing, use the **no** form of this command.

police *KBPS* **[***BURST-NORMAL* **[***BURST-MAX***]] [conform-action** *ACTION***] exceed-action** *ACTION* **[violate-action** *ACTION***] [color-aware]**

no police

Parameters

KBPS	Specifies the average rate, in kilobits per second.
BURST-NORMAL	(Optional) Specifies the normal burst size in kilobytes.
BURST-MAX	(Optional) Specifies the maximum burst size, in kilobytes.
conform-action	(optional) Specifies the action to take on green color packets. If the action is not specified, the default action is to transmit.
exceed-action	Specifies the action to take on yellow color packets that exceed the rate limit.
violate-action	(Optional) Specifies the action to take on red color packets. When violate-action is not specified, the policer is a single rate two color policer. When violate-action is specified, the policer is a single rate three color policer.
ACTION	Specifies the action to take on packets. Use one of the following keywords: **drop** - Drops the packet. **set-dscp-transmit** *VALUE* - Sets the IP differentiated services code point (DSCP) value and transmits the packet with the new IP DSCP value. **set-1p-transmit** - Sets the 802.1p value and transmits the packet with the new value. **transmit** - Transmits the packet. The packet is not altered. Only one of the set-dscp-transmit and set-1p-transmit parameters can be used when issuing this command. However, when selecting to use both, the set-dscp-transmit and set-1p-transmit parameters, the set-

	dscp-transmit parameter must be issued first followed by the set-1p-transmit parameter.
color-aware	(Optional) Specifies the option for the single rate three colors policer. When color-aware is not specified, the policer works in the color blind mode. When color-aware is specified, the policer works in the color aware mode.

Default

None.

Command Mode

Policy-map Class Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **police** command to drop the packet or mark the packet with different quality of service (QoS) values based on conformance level of the packet.

The combination of parameters used in this command defines the behavior of this command. The combinations mentioned below can be used followed by their descriptions.

- **police** *KBPS* **exceed-action** *ACTION* - The default burst-normal is used.
- **police** *KBPS BURST-NORMAL* **exceed-action** *ACTION* - The explicit burst-normal is used.
- **police** *KBPS* **exceed-action** *ACTION* **violate-action** *ACTION* - The default burst-normal and default burst-max values are used.
- **police** *KBPS BURST-NORMAL BURST-MAX* **exceed-action** *ACTION* **violate-action** *ACTION* - The explicit burst-normal burst-max values are used.
- **police** *KBPS BURST-NORMAL* **exceed-action** *ACTION* **violate-action** *ACTION* - The explicit burst-normal values are used and the default burst-max values are used.
- **police** *KBPS BURST-NORMAL BURST-MAX* **exceed-action** *ACTION* - The explicit burst-normal values are used, but the burst-max values are not used.

Use the **police** *KBPS* command to create a single rate policer. Use the **police cir** command to create a two rate policer. There are two kinds of single rate policers (1) a single rate two color policer and (2) a single rate three color policer. If the violate action is specified in the **police** *KBPS* command, then the policer is three colors. If not specified, the policer is two colors.

As a packet arrives at a port, the packet will be initialized with a color. If the receive port trusts DSCP then the initial color of the packet is mapped from the incoming DSCP based on the DSCP to color map. If the receipt port trusts CoS then the initial color is mapped from the incoming CoS based on the CoS to color map.

A single rate two color policer can only work in color-blind mode. Both single rate three color policers and two rate three color policers can work in color aware mode. In color-blind mode, the final color of the packet is determined by the policer metering result alone. In color-aware mode, the final color of the packet is determined by the initial color of the packet and the policer metering result. In this case the policer may further downgrade the initial color.

After the policer metering action will be based on the final color. Conform action will be taken on green color packets, exceed-action will be taken on yellow color packets, and violate action will be taken on red color packets. When specifying actions, you cannot specify contradictory actions such as violate-action transmit and exceed-action drop.

The actions configured by the set command for a traffic class will be applied to all the packets belonging to the traffic class.

Example

This example shows how to define a traffic class and associate the policy with the match criteria for the traffic class in a policy map. The **service-policy** command is then used to attach this service policy to the

interface. In this particular example, traffic policing is configured with an average rate of 8 kilobits per second and a normal burst size of 1 kilobyte for all ingress packets at eth3/0/1.

```
Switch# configure terminal
Switch(config)# class-map access-match
Switch(config-cmap)# match access-group name acl_rd
Switch(config-cmap)# exit
Switch(config)# policy-map police-setting
Switch(config-pmap)# class access-match
Switch(config-pmap-c)# police 8 1 exceed-action drop
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
Switch(config)# interface eth3/0/1
Switch(config-if)# service-policy input police-setting
Switch(config-if)#
```

54-14 police aggregate

This command is used to configure a named aggregate policer as the policy for a traffic class in a policy map. Use the **no** command to delete the name aggregate policer from a class policy.

police aggregate *NAME*

no police

Parameters

NAME	Specifies a previously defined aggregate policer name as the aggregate policer for a traffic class.

Default

None.

Command Mode

Policy-map Class Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **mls qos aggregate-policer** command in the global configuration mode to create a named aggregate policer. Then use the **police aggregate** command in the policy-map class configuration mode to configure the named aggregate policer as the policy for a traffic class. A named aggregate policer cannot be referenced from a different policy map. If a named aggregate policer is attached to multiple ingress ports, the metering operation of the policer will not be applied to the aggregate traffic but remains applied to the traffic received on the individual port.

Example

This example shows how to configure a named aggregate policer's parameters and apply the policer to multiple classes in a policy map: An aggregate policer with single rate policing named "agg_policer1" is created. This policer is configured as the policy for traffic class 1, 2, and 3.

```
Switch# configure terminal
Switch(config)# mls qos aggregate-policer agg_policer1 10000 16384 exceed-action drop
Switch(config)# policy-map policy2
Switch(config-pmap)# class class1
Switch(config-pmap-c)# police aggregate agg_policer1
Switch(config-pmap-c)# exit
Switch(config-pmap)# class class2
Switch(config-pmap-c)# police aggregate agg_policer1
Switch(config-pmap-c)# exit
Switch(config-pmap)# class class3
Switch(config-pmap-c)# police aggregate agg_policer1
Switch(config-pmap-c)#
```

54-15 police cir

This command is used to configure traffic policing for two rates, the committed information rate (CIR) and the peak information rate (PIR). Use the **no** command to remove two-rate traffic policing.

police cir *CIR* **[bc** *COMMITTED-BURST***] pir** *PIR* **[be** *PEAK-BURST***] [conform-action** *ACTION***] [exceed-action** *ACTION* **[violate-action** *ACTION***]] [color-aware]**

no police

Parameters

CIR	Specifies the committed information rate in kilobits per second. The committed packet rate is the first token bucket for the two-rate metering.
PIR	Specifies the peak information rate in kilobits per second. The peak information rate is the second token bucket for the two-rate metering.
COMMITTED-BURST	(Optional) Specifies the burst size for the first token bucket in kilobytes.
PEAK-BURST	(Optional) Specifies the burst size for the second token bucket in kilobytes.
confirm-action	(optional) Specifies the action to take on green color packets. If the action is not specified, the default action is transmit.
exceed-action	(Optional) Specifies the action to take for those packets that conform to PIR but not to CIR. These packets are referred to as yellow color traffic. If the exceed-action is not specified, the default action is drop.
violate-action	(Optional) Specifies the action to take for those packets that did not conform to both CIR and PIR. These packets are referred to as red color traffic. If the violate-action is not specified, the default action is equal to the exceed-action.
ACTION	Specifies the action to be taken. The actions can be: **drop** - Packets will be dropped. **set-dscp-transmit** *VALUE* - Sets the IP differentiated services code point (DSCP) value and transmits the packet with the new IP DSCP value. **set-1p-transmit** - Sets the 802.1p value and transmits the packet with the new value. **transmit** - Transmits the packet. The packet is not altered.

	Only one of the set-dscp-transmit and set-1p-transmit parameters can be used when issuing this command. However, when selecting to use both, the set-dscp-transmit and set-1p-transmit parameters, the set-dscp-transmit parameter must be issued first followed by the set-1p-transmit parameter.
color-aware	(Optional) Specifies the option for a two rate three color policer. When color-aware is not specified, the policer works in the color blind mode. When color-aware is specified, the policer works in the color aware mode.

Default

None.

Command Mode

Policy-map Class Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

As a packet arrives at a port, the packet will be initialized with a color. The receiving port either trusts DSCP or CoS. The initial color of the packet is mapped from the DSCP in the incoming packet if the receiving port trusts DSCP. The initial color of the packet is mapped from the CoS in the incoming packet if the receiving port trusts CoS.

Both single rate three colors policers and two rate three color policers can work in color aware mode. In color-blind mode, the final color of the packet is determined by the policer metering result alone. In color-aware mode, the final color of the packet is determined by the initial color of the packet and the policer metering result; The policer may further downgrade the initial color.

After the policer metering and based on the final color, the conform action will be taken on green color packets, exceed-action will be taken on yellow color packets, and violate action will be taken on red color packets. When specifying the actions, you cannot specify contradictory actions such as violate-action transmit and exceed-action drop.

The actions configured by the set command for the traffic class will be applied to all the packets belonging to the traffic class.

Example

This example shows how two-rate traffic policing is configured on a class called police to limit traffic to an average committed rate of 500 kbps and a peak rate of 1 Mbps, and the policy map named policy1 is attached to eth1/0/3.

```
Switch# configure terminal
Switch(config)# class-map police
Switch(config-cmap)# match access-group name myAcl101
Switch(config-cmap)# policy-map policy1
Switch(config-pmap)# class police
Switch(config-pmap-c)# police cir 500 bc 10 pir 1000 be 10 exceed-action set-dscp-transmit 2 violate-action drop
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
Switch(config)# interface eth1/0/3
Switch(config-if)# service-policy input policy1
Switch(config-if)#
```

54-16 policy-map

This command is used to enter the policy-map configuration mode and create or modify a policy map that can be attached to one or more interfaces as a service policy. To delete a policy map, use the **no** form of this command.

policy-map *NAME*

no policy-map *NAME*

Parameters

NAME	Specifies the name of the policy map. The name can be a maximum of 32 alphanumeric characters.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **policy-map** command to enter the policy-map configuration mode from where the user can configure or modify the policy for the traffic class. A single policy map can be attached to more than one interface concurrently. The succeeding policy-map attaches overwrite the previous one.

Policy maps contain traffic classes. Traffic classes contain one or more match commands that can be used to match packets (and organize them into groups) on the basis of a protocol type or application.

Example

This example shows how to create a policy map called policy and configures two class policies within the policy map. The class policy called class1 specifies a policy for traffic that matches an access control list (ACL) “acl_rd”. The second class is the default class, named class-default to include packets that do not match the defined classes.

```
Switch# configure terminal
Switch(config)# class-map class1
Switch(config-cmap)# match access-group name acl_rd
Switch(config-cmap)# exit
Switch(config)# policy-map policy
Switch(config-pmap)# class class1
Switch(config-pmap-c)# set ip dscp 46
Switch(config-pmap-c)# exit
Switch(config-pmap)# class class-default
Switch(config-pmap-c)# set ip dscp 00
Switch(config-pmap-c)#
```

54-17 priority-queue cos-map

This command is used to define a Class of Service (CoS) to queue map. To restore to the default setting, use the **no** form of this command.

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 receive a 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)#
```

54-18 queue rate-limit

This command is used to specify or modify the bandwidth allocated for a queue. To remove the bandwidth allocated for a queue, use the **no** form of this command.

queue *QUEUE-ID* **rate-limit {***MIN-BANDWIDTH-KBPS* **| percent** *MIN-PERCENTAGE***} {***MAX-BANDWIDTH-KBPS* **| percent** *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 eth3/0/1 to 100Kbps and 2000Kbps respectively. Set the minimum guaranteed bandwidth and maximum bandwidth of queue 2 to 10% and 50% respectively.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# queue 1 rate-limit 100 2000
Switch(config-if)# queue 2 rate-limit percent 10 percent 50
Switch(config-if)#
```

54-19 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. To disable the bandwidth limit, use the **no** form of this command.

rate-limit {input | output} {*NUMBER-KBPS* **| percent** *PERCENTAGE***} [***BURST-SIZE***]**

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.
BURST-SIZE	(Optional) Specifies the limit for burst traffic in Kbyte.

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 eth2/0/5. The ingress bandwidth is limited to 2000Kbps and 4096K bytes for burst traffic.

```
Switch# configure terminal
Switch(config)# interface eth2/0/5
Switch(config-if)# rate-limit input 2000 4096
Switch(config-if)#
```

54-20 service-policy

This command is used to attach a policy map to an input interface. To remove a service policy from an input interface, use the **no** form of this command.

service-policy input *NAME*

no service-policy input

Parameters

input	Specifies to apply the policy map for ingress flow on the interface.
NAME	Specifies the name of a service policy map. The name can be a maximum of 32 alphanumeric characters.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **service-policy** command to attach at most one policy map for input type on an interface. This policy is attached to the interface for aggregate and controls the number or rate of packets. A packet arriving at a port will be treated based on the service policy attached to the interface.

Example

This example shows how two policy maps are defined: (1) cust1-classes and (2) cust2-classes.

For cust1-classes, gold is configured to match CoS 6 and be policed by a single rate policer with a committed rate of 800 Kbps. Silver is configured to match CoS 5 and be policed by a single rate policer with a committed rate of 2000Kbps, and bronze is configured to match CoS 0 and be policed by a single rate policer with a committed rate of 8000Kbps.

For cust2-classes, gold is configured to use Cos Queue 6 and be policed by a single rate policer with a committed rate of 1600 Kbps. Silver is policed by a single rate policer with a committed rate of 4000 Kbps, and bronze is policed by a single rate policer with a committed rate of 16000 Kbps.

The cust1-classes policy map is configured and then attached to interfaces eth3/0/1 and eth3/0/2 for ingress traffic.

```
Switch# configure terminal
Switch(config)# class-map match-all gold
Switch(config-cmap)# match cos 6
Switch(config-cmap)# exit
Switch(config)# class-map match-all silver
Switch(config-cmap)# match cos 5
Switch(config-cmap)# exit
Switch(config)# class-map match-all bronze
Switch(config-cmap)# match cos 0
Switch(config-cmap)# exit
Switch(config)# policy-map cust1-classes
Switch(config-pmap)# class gold
Switch(config-pmap-c)# police 800 2000 exceed-action set-dscp-transmit 0
Switch(config-pmap-c)# exit
Switch(config-pmap)# class silver
Switch(config-pmap-c)# police 2000 2000 exceed-action set-dscp-transmit 0
Switch(config-pmap-c)# exit
Switch(config-pmap)# class bronze
Switch(config-pmap-c)# police 8000 2000 exceed-action set-dscp-transmit 0
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
Switch(config)# interface eth3/0/1
Switch(config-if)# service-policy input cust1-classes
Switch(config-if)# exit
Switch(config)# interface eth3/0/2
Switch(config-if)# service-policy input cust1-classes
Switch(config-if)#
```

The cust2-classes policy map is configured and then attached to interface eth4/0/1 for ingress traffic.

```
Switch# configure terminal
Switch(config)# policy-map cust2-classes
Switch(config-pmap)# class gold
Switch(config-pmap-c)# police 1600 2000 exceed-action set-dscp-transmit 0
Switch(config-pmap-c)# exit
Switch(config-pmap)# class silver
Switch(config-pmap-c)# police 4000 2000 exceed-action set-dscp-transmit 0
Switch(config-pmap-c)# exit
Switch(config-pmap)# class bronze
Switch(config-pmap-c)# police 16000 2000 exceed-action set-dscp-transmit 0
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
Switch(config)# interface eth4/0/1
Switch(config-if)# service-policy input cust2-classes
Switch(config-if)#
```

54-21 set

This command is used to configure the new precedence field, DSCP field, and CoS field of the outgoing packet. The user can also specify the CoS queue for the packet.

set {[ip] precedence *PRECEDENCE* **| [ip] dscp** *DSCP* **| cos** *COS* **| cos-queue** *COS-QUEUE***}**

no set {[ip] precedence *PRECEDENCE* **| [ip] dscp** *DSCP* **| cos** *COS* **| cos-queue** *COS-QUEUE***}**

Parameters

precedence *PRECEDENCE*	Specifies a new precedence for the packet. The range is from 0 to 7. If the optional keyword **ip** is specified, IPv4 precedence will be marked. If not specified, both IPv4 and IPv6 precedence will be marked. For IPv6 packets, the precedence is the most three significant bits of traffic class of IPv6 header. Setting the precedence will not affect the CoS queue selection.
dscp *DSCP*	Specifies a new DSCP for the packet. The range is from 0 to 63. If the optional keyword **ip** is specified, IPv4 DSCP will be marked. If not specified, both IPv4 and IPv6 DSCP will be marked. Setting DSCP will not affect the CoS queue selection.
cos *COS*	Specifies to assign a new CoS value to the packet. The range is from 0 to 7. Setting CoS will not affect the CoS queue selection.
cos-queue *COS-QUEUE*	Specifies to assign the CoS queue to the packets. This overwrites the original CoS queue selection.

Default

None.

Command Mode

Policy-map Class Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to set the DSCP field, CoS field, or precedence field of the matched packet to a new value. Use the **set cos-queue** command to directly assign the CoS queue to the matched packets.

Configure multiple set commands for a class if they are not conflicting.

The **set dscp** command will not affect the CoS queue selection. The **set cos-queue** command will not alter the CoS field of the outgoing packet. The user can use the **police** command and the **set** command for the same class. The **set** command will be applied to all colors of packets.

Example

This example shows how the policy map policy1 is configured with the policy for the class1 class. The packets that are included in the class1 class will be set to a DSCP of 10 and policed by a single rate policer with a committed rate of 1Mbps.

```
Switch# configure terminal
Switch(config)# policy-map policy1
Switch(config-pmap)# class class1
Switch(config-pmap-c)# set ip dscp 10
Switch(config-pmap-c)# police 1000 2000 exceed-action set-dscp-transmit 10
Switch(config-pmap-c)# exit
Switch(config-pmap)#
```

54-22 show class-map

This command is used to display the class map configuration.

show class-map [*NAME***]**

Parameters

NAME	(Optional) Specifies the name of the class map. The class map name can be a maximum of 32 alphanumeric characters.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display all class maps and their matching criteria.

Example

This example shows how two class maps are defined. Packets that match the access list “acl_home_user” belong to the class “c3”, IP packets belong to the class “c2”.

```
Switch# show class-map

Class Map match-any class-default
   Match any

 Class Map match-all c2
   Match protocol ip

Class Map match-all c3
   Match access-group acl_home_user

Switch#
```

54-23 show mls qos aggregate-policer

This command is used to display the configured aggregated policer.

show mls qos aggregate-policer [*NAME***]**

Parameters

NAME	(Optional) Specifies the name of the aggregate policer.

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 aggregated policer.

Example

This example shows how to display the aggregate policer.

```
Switch# show mls qos aggregate-policer

mls qos aggregate-policer agg-policer5 10 1000 conform-action transmit exceed-action
drop
mls qos aggregate-policer agg-policer5 cir 500 bc 10 pir 1000 be 10 conform-action
transmit exceed-action set-dscp-transmit 2 violate-action drop

Switch#
```

54-24 show mls qos interface

This command is used to display port level QoS configurations.

show mls qos interface *INTERFACE-ID* **[, | -] {cos | scheduler | trust | rate-limit | queue-rate-limit | dscp-mutation | map {dscp-color | cos-color | dscp-cos}}**

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-mutation	Specifies to displays the DSCP mutation map attached to the interface.
map dscp-color	Specifies to displays the DSCP to color map.
map cos-color	Specifies to displays the CoS to color map.
map dscp-cos	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 eth 1/0/2 to eth 1/0/5.

```
Switch# show mls qos interface eth1/0/2-5 cos

Interface  CoS   Override
---------- ----   ---------
eth1/0/2      3      Yes
eth1/0/3      4      No
eth1/0/4      4      No
eth1/0/5      3      No

Switch#
```

This example shows how to display the port trust state for eth 1/0/2 to eth 1/0/5.

```
Switch# show mls qos interface eth1/0/2-1/0/5 trust

Interface   Trust State
---------- ------------
eth1/0/2     trust DSCP
eth1/0/3     trust CoS
eth1/0/4     trust DSCP
eth1/0/5     trust CoS

Switch#
```

This example shows how to display the scheduling configuration for eth1/0/1 to eth1/0/2.

```
Switch# show mls qos interface eth1/0/1-1/0/2 scheduler

Interface   Scheduler Method
----------  ------------------
eth1/0/1      sp
eth1/0/2      wrr

Switch#
```

This example shows how to display the DSCP mutation maps attached to eth 1/0/1 to 1/0/2.

```
Switch# show mls qos interface eth1/0/1-2 dscp-mutation

Interface   DSCP Mutation Map
----------  ------------------
eth1/0/1       Mutate Map 1
eth1/0/2       Mutate Map 2

Switch#
```

This example shows how to display the bandwidth allocation for port 1/0/1 to 1/0/4.

```
Switch# show mls qos interface eth1/0/1-4 rate-limit

Interface    Rx Rate              Tx Rate             Rx Burst   Tx Burst
----------  ------------------    -----------------   ---------  --------
eth1/0/1    1000 kbps             No Limit            64 kbyte   No Limit
eth1/0/2    No Limit              2000 kbps           No Limit   2000 kbyte
eth1/0/3    10%(100000 kbps)      20%(200000 kbps)    64 kbyte   64 kbyte
eth1/0/4    2%                    2000 kbps           64 kbyte   64 kbyte

Switch#
```

This example shows how to display the CoS bandwidth allocation for eth 1/0/1 to 1/0/2.

```
Switch# show mls qos interface eth1/0/1-2 queue-rate-limit

eth1/0/1
  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
eth1/0/2
  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 color map for port 1/0/1 to port 1/0/2.

```
Switch# show mls qos interface eth1/0/1-2 map dscp-color

eth1/0/1
  DSCP 0–7 are mapped to green
  DSCP 8–40 are mapped to red
  DSCP 41-43 are mapped to yellow
eth1/0/2
  DSCP 0 – 7 are mapped to green

Switch#
```

This example shows how to display the CoS to color map for port 1/0/3 to port 1/0/4.

```
Switch# show mls qos interface eth1/0/3-4 map cos-color

eth1/0/3
  CoS 0,1,2 are mapped to green
  CoS 3-4 are mapped to yellow
  CoS 6 are mapped to red
eth1/0/4
  CoS 0,1-6 are mapped to green

Switch#
```

This example shows how to display the DSCP to CoS map for port 1/0/1.

```
Switch# show mls qos interface eth1/0/1 map dscp-cos

eth1/0/1
0  1  2  3  4  5  6  7  8  9
--------------------------------
00  00 00 00 00 00 00 00 00 01 01
10  01 01 01 01 01 01 02 02 02 02
20  02 02 02 02 03 03 03 03 03 01
30  03 03 04 04 04 04 04 04 04 04
40  05 05 05 05 05 05 05 05 06 06
50  06 06 06 06 06 06 07 07 07 07
60  07 07 07 07

Switch#
```

54-25 show mls qos map dscp-mutation

This command is used to display the QoS DSCP mutation map configuration.

show mls qos map dscp-mutation [*MAP-NAME***]**

Parameters

MAP-NAME	(Optional) Specifies the name of the DSCP mutation map 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 the QoS DSCP mutation map configuration.

Example

This example shows how to display the global DSCP mutation map.

```
Switch# show mls qos map dscp-mutation

DSCP Mutation: mutemapl
Attaching interface:
eth1/0/1-10,eth2/0/1-5
0  1  2  3  4  5  6  7  8  9
--------------------------------
00  00 01 02 03 04 05 06 07 08 09
10  10 11 12 13 14 15 16 17 18 19
20  20 21 22 23 24 25 26 27 28 29
30  30 31 32 33 34 35 36 37 38 39
40  40 41 42 43 44 45 46 47 48 49
50  50 51 52 53 54 55 56 57 58 59
60  60 61 62 63

Switch#
```

54-26 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 queueing

 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 eth1/0/3.

```
Switch# show mls qos queueing interface eth1/0/3

wrr bandwidth weights:
  QID  Weights
  ---  -------
   0      1
   1      2
   2      3
   3      4
   4      5
   5      6
   6      7
   7      8

wdrr bandwidth weights:
  QID  Quantum
  ---  -------
   0      1
   1      2
   2      3
   3      4
   4      5
   5      6
   6      7
   7      8

Switch#
```

54-27 show policy-map

This command is used to display the policy map configuration.

show policy-map [*POLICY-NAME* **| interface** *INTERFACE-ID***]**

Parameters

INTERFACE-ID	(Optional) Specifies the module and port number.
POLICY-NAME	(Optional) Specifies the name of the policy map. If not specified, all policy maps will be displayed.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

The **show policy-map** command displays the class policies configured for the policy map. Use the **show policy-map** command to display the class policy configurations of any or all the existing service policy maps.

Example

This example shows how in the policy map called policy1, two-rate traffic policing has been configured for the class called police. Two-rate traffic policing has been configured to limit the traffic to an average committed rate of 500 kbps and a peak rate of 1 Mbps.

```
Switch# configure terminal
Switch(config)# class-map police
Switch(config-cmap)# match access-group name acl_rd
Switch(config-cmap)# policy-map policy1
Switch(config-pmap)# class police
Switch(config-pmap-c)# police cir 500 bc 10 pir 1000 be 10 exceed-action set-dscp-
transmit 2 violate-action drop
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
Switch(config)# interface eth3/0/1
Router(config-if)# service-policy input policy1
Router(config-if)#
```

This example shows how to the display of the policy map called policy1, created above.

```
Switch# show policy-map policy1

Policy Map policy1
  Class police
police cir 500 bc 10 pir 1000 be 10 conform-action transmit exceed-action set-dscp-
transmit 2 violate-action drop

Switch#
```

This example shows how to display all policy maps at port 3/0/1.

```
Switch# show policy-map interface eth3/0/1

Policy Map: policy1 : input
  Class police
police cir 500 bc 10 pir 1000 be 10 conform-action transmit exceed-action set-dscp-
transmit 2 violate-action drop

Switch#
```

54-28 wdrr-queue bandwidth

This command is used to set the queue quantum in the WDRR scheduling mode. To restore to the default setting, use the **no** form of this command.

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 eth3/0/1.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# mls qos scheduler wdrr
Switch(config-if)# wdrr-queue bandwidth 1 2 3 4 5 6 7 8
Switch(config-if)#
```

54-29 wrr-queue bandwidth

This command is used to set the queue weight in the WRR scheduling mode. To restore to the default setting, use the **no** form of this command.

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 eth3/0/1.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# mls qos scheduler wrr
Switch(config-if)# wrr-queue bandwidth 1 2 3 4 5 6 7 8
Switch(config-if)#
```

55. Remote Network MONitoring (RMON) Commands

55-1 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 eth3/0/2.

```
Switch# configure terminal
Switch(config)# interface eth3/0/2
Switch(config-if)# rmon collection stats 65 owner guest
Switch(config-if)#
```

55-2 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 3/0/8.

```
Switch# configure terminal
Switch(config)# interface eth3/0/8
Switch(config-if)# rmon collection history 101 owner it@domain.com interval 2000
Switch(config-if)#
```

55-3 rmon alarm

This command is used to configure an alarm entry to monitor an interface. To remove an alarm entry, use the **no** form of this command.

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)#
```

55-4 rmon event

This command is used to configure an event entry. To remove an event entry, use the **no** form of this command.

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 configure an 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)#
```

55-5 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#
```

55-6 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#
```

55-7 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 eth4/0/2
  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#
```

55-8 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  eth4/0/3
  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#
```

55-9 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)#
```

56. Router Advertisement (RA) Guard Commands

56-1 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. Use the **no** 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.

Command Default Level

Level: 12.

Usage Guideline

This command is used to create an RA guard policy. This command will enter into 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)#
```

56-2 device-role

This command is used to configure the role of the attached device. Use the **no** form of the command to reset to the default setting.

device-role {host | router}

no device-role

Parameters

host	Specifies to set the role of the attached device to host.
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.

Command Default Level

Level: 12.

Usage Guideline

This command is used to set the role of the attached device. By default, the device role is **host**, and therefore 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)#
```

56-3 match ipv6 access-list

This command is used to filter the RA messages based on the sender IPv6 address. Use the **no** form of the 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.

Command Default Level

Level: 12.

Usage Guideline

This command is used 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)#
```

56-4 ipv6 nd raguard attach-policy

This command is used to apply an RA guard policy on a specified interface. Use the **no** command to remove the binding.

ipv6 nd raguard attach-policy [*POLICY-NAME***]**

no ipv6 nd raguard

Parameters

POLICY-NAME	(Optional) Specifies the IPv6 RA guard policy name.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only one RA policy can be attached. If the policy name is not specified, the default policy will set the device role to **host**.

Example

This example shows how to apply the RA guard policy on interface eth1/0/3.

```
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)#
```

56-5 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) Specifies the IPv6 RA guard policy name.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

If the policy name is specified, only the specified policy information is displayed. If the policy name is not specified, information is displayed for all policies.

Example

This example shows how to display the policy configuration for a policy named “raguard1” and all the interfaces where the policy is applied.

```
Switch# show ipv6 nd raguard policy raguard1

Policy raguard1 configuration:
      Device Role: host
      Target: eth1/0/1-1/0/2

Switch#
```

57. Safeguard Engine Commands

57-1 clear cpu-protect counters

This command is used to clear the CPU protect related counters.

clear cpu-protect counters {all | sub-interface [manage | protocol | route] | type [*PROTOCOL-NAME***]}**

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.

Command Default Level

Level: 12.

Usage Guideline

If this command is issued without parameters, then all CPU protect related counters will be cleared.

Example

This example shows how to clear all CPU protect related statistics.

```
Switch# clear cpu-protect counters all
Switch#
```

57-2 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 [threshold]

Parameters

threshold	(Optional) Specifies to configure the utilization to control when the Safeguard Engine function will activate.

RISING-THRESHOLD	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	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 disabled.

By default, the rising threshold of CPU utilization is 30.

By default, the falling threshold of CPU utilization is 20.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

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)#
```

57-3 cpu-protect sub-interface

This command is used to configure the rate limit for traffic destined to the CPU by sub-interface types.

cpu-protect sub-interface {manage | protocol | route} pps *RATE*

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.

Command Default Level

Level: 12.

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)#
```

57-4 cpu-protect type

This command is used to configure the rate limit of traffic destined to the CPU by the protocol type.

cpu-protect type *PROTOCOL-NAME* **pps** *RATE*

no cpu-protect type *PROTOCOL-NAME*

Parameters

PROTOCOL-NAME	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.

Command Default Level

Level: 12.

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.

The following table lists the supported protocol names for this command:

Protocol Name	Description	Classification (sub-interface)
8021x	Port-based Network Access Control	Protocol
arp	IP Address Resolution Protocol (ARP)	Protocol
dhcp	Dynamic Host Configuration	Protocol
dns	Domain Name Services	Protocol
gvrp	GARP VLAN Registration Protocol	Protocol
icmp	IPv4 Internet Control Message Protocol	Protocol
icmpv6-ndp	IPv6 ICMP Neighbor Discover Protocol (NS/NA/RS/RA)	Protocol
icmpv6-other	IPv6 ICMP except NDP NS/NA/RS/RA	Protocol
Igmp	Internet Group Management Protocol	Protocol
lacp	Link Aggregation Control Protocol	Protocol
snmp	Simple Network Management Protocol	Manage
ssh	Secured shell	Manage
stp	Spanning Tree Protocol (802.1D)	Protocol
telnet	Telnet	Manage
tftp	Trivial File Transfer Protocol	Manage
web	HTTP and HTTPS	Manage

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)#
```

57-5 show cpu-protect safeguard

This command is used to display the settings and status of the Safeguard Engine.

show cpu-protect safeguard

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 settings and status of the Safeguard Engine.

Example

This example shows how to display the settings and current status of the Safeguard Engine.

```
Switch#show cpu-protect safeguard

Safeguard Engine State: Disabled
Safeguard Engine Status: Normal
Utilization Thresholds:
 Rising   :30%
 Falling  :20%

Switch#
```

Display Parameters

Safeguard Engine Status	Displays the current mode that CPU utilization stays. The possible displayed strings are: **Exhausted:** If the CPU utilization is higher than the configured rising threshold, it will enter Exhausted Mode and Safeguard Engine will take actions. The Safeguard Engine mechanism ceases till the utilization is lower than the falling threshold. **Normal:** The Safeguard Engine is not triggered to take actions.

57-6 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} [*UNIT-ID***]**

Parameters

UNIT-ID	(Optional) Specifies the unit ID to display the rate limit configuration and statistics by sub-interface.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

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 manage

Sub-Interface: manage
Rate Limit : 1000 pps
Unit            Total     Drop
--------------  --------- ---------
1               50        0
3               50        0

Switch#
```

57-7 show cpu-protect type

This command is used to display the rate limit and statistics of CPU protection.

show cpu-protect type {*PROTOCOL-NAME* **[***UNIT-ID***] | unit** *UNIT-ID***}**

Parameters

PROTOCOL-NAME **[***UNIT-ID***]**	Specifies that the configured rate limit and statistics of the specified protocol on the CM-card and all existing IO-cards will be displayed if the optional unit ID is not specified. Otherwise, only the information on the specified unit ID will be displayed.
unit *UNIT-ID*	Specifies the unit ID to display the rate limit configuration and statistics.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

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 type arp

Type: arp
Rate Limit: 300  pps
Unit            Total     Drop
--------------  --------- ---------
1               30        0
3               30        0

Switch#
```

57-8 snmp-server enable traps safeguard-engine

This command is used to enable sending SNMP notifications for Safeguard Engine. Use the **no** form of the command to disable sending SNMP notifications for Safeguard Engine.

snmp-server enable traps safeguard-engine

no snmp-server enable traps safeguard-engine

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 sending SNMP notifications for Safeguard Engine.

Example

This example shows how to enable sending SNMP notifications for Safeguard Engine.

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

58. Secure Shell (SSH) Commands

58-1 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.
dsa	Specifies to generate the DSA key pair. The DSA key size is fixed as 1024 bit.
modulus *MODULUS-SIZE*	(Optional) Specifies the number of bits in the modulus. For RSA, the valid values are 360, 512, 768, 1024, and 2048.If not specified, a message will be promoted to the user to specify the value.

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 create an RSA key.

```
Switch# crypto key generate rsa

The RSA key pairs already existed.
Do you really want to replace them? (y/n) [n]y
Choose the size of the key modulus in the range of 360 to 2048.The process may take
a few minutes.
Number of bits in the modulus [768]: 768
Generating RSA key...Done

Switch#
```

58-2 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 deletes the public key pair of the SSH Server. If both RSA and DSA key pairs are deleted, the SSH server will not be in service.

Example

This example shows how to delete the RSA key.

```
Switch# crypto key zeroize rsa

Do you really want to remove the key? (y/n)[n]: y

Switch#
```

58-3 ip ssh timeout

This command is used to configure the SSH control parameters on the Switch. To restore the default values, use the **no** form of this command.

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 the SSH timeout value to 160 seconds.

```
Switch# configure terminal
Switch(config)# ip ssh timeout 160
Switch(config)#
```

This example shows how to configure the SSH authentication retries value to 2 times. The connection fails after 2 retry attempt fails.

```
Switch# configure terminal
Switch(config)# ip ssh authentication-retries 2
Switch(config)#
```

58-4 ip ssh server

This command is used to enable the SSH server function. Use the **no** command to disable the SSH server function.

ip ssh server

no ip ssh server

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 the SSH server function.

Example

This example shows how to enable the SSH server function.

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

58-5 ip ssh service-port

This command is used to specify the service port for SSH. Use the **no** command to return the service port to 23.

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, this value 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 change the service port number to 3000.

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

58-6 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 information regarding the RSA public key.
dsa	Specifies to display information regarding the DSA public key.

Default

None.

Command Mode

Privileged EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command displays the RSA or DSA public key pairs.

Example

This example shows how to information regarding the RSA public key.

```
Switch# show crypto key mypubkey rsa

% Key pair was generated at: 09:48:40, 2013-11-29
Key Size: 768 bits
Key Data:
AAAAB3Nz aC1yc2EA AAADAQAB AAAAQwCN 6IRFHCBf jsHvYjQG iCL0p2kz 2v38ULC8
kAKra/Ze mG7IW3eC 8STcrkr5 s7l9H/bh jG/oqkwj SlUJSGqR e/sj6Ws=

Switch#
```

58-7 show ip ssh

This command is used to display the user SSH configuration settings.

show ip ssh

Parameters

None.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to the SSH configuration settings.

Example

This example shows how to display the SSH configuration settings.

```
Switch# show ip ssh

IP SSH server             : Enabled
IP SSH service port       : 22
SSH server mode           : V2
Authentication timeout    : 120 secs
Authentication retries    : 3 times

Switch#
```

58-8 show ssh

This command is used to display the status of SSH server connections.

show ssh

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 SSH connections' status on the Switch.

Example

This example shows how to display SSH connections' information.

```
Switch# show ssh

SID Ver. Cipher                       Userid           Client IP Address
--- --- ---------------------------- ---------------- ------------------------
0   V2  3des-cbc/sha1-96             zhang3           192.168.0.100
1   V2  3des-cbc/hmac-sha1           lee4567890123456 2000::243

Total Entries: 2

Switch#
```

Display 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.

58-9 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 restore the default authentication method.

ssh user *NAME* **authentication-method {password | publickey** *URL* **| hostbased** *URL* **host-name** *HOSTNAME* **[***IP-ADDRESS* **|** *IPV6-ADDRESS***]}**

no ssh user *NAME* **authentication-method**

Parameters

user *NAME*	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 *URL*	Specifies to use the public key authentication method for this user account. Enter the URL of a local file to be used as the public key of this user.
hostbased *URL*	Specifies to use the host-based authentication method for this user account. Enter the URL of a local file to be used as client's host key.
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

The default authentication method for a user 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 login to 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.

- To authenticate a user via SSH public key authentication via SSH public key or the host-based method, the user's public key file or client's host key file must be specified. Both key files have the same format. A key file can contain multiple keys and each key is defined by one line. The maximum length of one line is 8 Kb.
- Each key consists of the following space-separated fields: *keytype*, *base64-encoded key*, and *comment*. The *keytype* and *base64-encoded key* fields are mandatory and the *comment* field is optional. The *keytype* field can be either be *ssh-dss* or *ssh-rsa*.

Example

This example shows how to configure the authentication method to public key for user user1.

```
Switch# configure terminal
Switch(config)# ssh user tom authentication-method publickey flash: c:/user1.pub
Switch(config)#
```

59. Secure Sockets Layer (SSL) Commands

59-1 no certificate

This command is used to delete the imported certificate.

no certificate *NAME*

Parameters

NAME	Specifies the name of the certificate to be deleted.

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. A warning message will be displayed when a private key is to be deleted.

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)#
```

59-2 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** *FILE-SYSTEM***:/[***DIRECTORY****/]****FILE-NAME*** [password** *PASSWORD-PHRASE***] {ca | local | both}**

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.
FILE-SYSTEM	Specifies the file system for certificates and key pairs. A colon (:) is required after the specified file system.
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

Privileged EXEC 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 (via eth1/0/5):!
[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 (via eth1/0/5):!
[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 (via eth1/0/5):!
[OK - 1289 bytes]
% PEM files import succeeded.

Switch#
```

59-3 crypto pki trustpoint

This command is used to declare the trust-point that the Switch will use. To delete all certificates and key pairs associated with the trust-point, use the **no** form of this command.

crypto pki trustpoint *NAME*

no crypto pki trustpoint *NAME*

Parameters

NAME	Specifies to create a name for the trust-point.

Default

None.

Command Mode

Global 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 trustpimport TP1
Switch(ca-trustpoint)# primary
Switch(ca-trustpoint)#
```

59-4 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(config-cert-chain)#
```

59-5 primary

This command is used to assign a specified trust-point as the primary trust-point of the Switch.

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 configure the trust-point "TP1" as the primary trust-point.

```
Switch# configure terminal
Switch(config)# crypto pki trustpoint TP1
Switch(ca-trustpoint)# primary
Switch(ca-trustpoint)#
```

59-6 show crypto pki trustpoints

This command is used to display the trust-points that are configured in the Switch.

show crypto pki trustpoints [*TRUSTPOINT***]**

Parameters

TRUSTPOINT	(Optional) Specifies the name of the trust-point to be displayed.

Default

None.

Command Mode

Privileged EXEC Mode or 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#
```

59-7 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 CipherSuites :
    RSA_WITH_RC4_128_MD5,
    RSA_WITH_3DES_EDE_CBC_SHA,
    RSA_EXPORT_WITH_RC4_40_MD5
  Session Cache Timeout: 600
  Secure Trustpoint    : TP1

SSL Policy Name        : policy2
  Enabled CipherSuites :
    RSA_WITH_RC4_128_MD5,
    RSA_WITH_3DES_EDE_CBC_SHA,
    RSA_EXPORT_WITH_RC4_40_MD5
  Session Cache Timeout: 1200
  Secure Trustpoint    : TP2

Switch#
```

59-8 ssl-service-policy

This command is used to configure the SSL service policy.

ssl-service-policy *POLICY-NAME* **[ciphersuite [dhe-dss-3des-ede-cbc-sha] [rsa-3des-ede-cbc-sha] [rsa-rc4-128-sha] [rsa-rc4-128-md5] [rsa-export-rc4-40-md5] | secure-trustpoint** *TRUSTPOINT* **| session-cache-timeout** *TIME-OUT***]**

no ssl-service-policy *POLICY-NAME* **[ciphersuite [dhe-dss-3des-ede-cbc-sha] [rsa-3des-ede-cbc-sha] [rsa-rc4-128-sha] [rsa-rc4-128-md5] [rsa-export-rc4-40-md5] | secure-trustpoint | session-cache-timeout]**

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. **dhe-dss-3des-ede-cbc-sha** - Use DH key exchange with 3DES-EDE-CBC encryption and SHA for message digest. **rsa-3des-ede-cbc-sha** - Use RSA key exchange with 3DES and DES-EDE3-CBC for message encryption and the Secure Hash Algorithm (SHA) for message digest. **rsa-rc4-128-sha** - Use RSA key exchange with RC4 128-bit encryption for message encryption and SHA for message digest. **rsa-rc4-128-md5** - Use RSA key exchange with RC4 128-bit encryption for message encryption and Message Digest 5 (MD5) for message digest. **rsa-export-rc4-40-md5** - Use RSA EXPORT key exchange with RC4 40 bits for message encryption and MD5 for message digest. When the cipher suite is not configured, the SSL client and server will negotiate the best cipher suite that they both support from the list of available cipher suites. Multiple cipher suites can be specified to be

	used. Use the **no** form of this command to disable the selected cipher suites.
secure-trustpoint *TRUSTPOINT*	(Optional) Specifies the name of the trust-point that should be used in SSL handshake. When this parameter is not specified, the trust-point which is specified as the primary will be used. If no primary trust-point is specified, the built-in certificate/key pairs will be used. In **no** form of this command, the specified trust-point will be canceled and then the built-in certificate/key pairs will be used.
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 “TP1” trust-point.

```
Switch# configure terminal
Switch(config)# ssl-service-policy ssl-server secure-trustpoint TP1
Switch(config)#
```

60. Simple Network Management Protocol (SNMP) Commands

60-1 show snmp trap link-status

This command is used to display the per interface link status trap state.

show snmp trap link-status [interface *INTERFACE-ID* **[, | -]]**

Parameters

INTERFACE-ID	(Optional) Specifies the interface ID. If no interface is specified, then 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 per interface link up/down trap state.

Example

This example shows how to display the interface's link up/down trap state for port eth1/0/1 to eth1/0/9.

```
Switch# show snmp trap link-status interface eth1/0/1-1/0/9

Interface       Trap state
-------       -------------
 eth1/0/1        Enabled
 eth1/0/2        Enabled
 eth1/0/3        Disabled
 eth1/0/4        Enabled
 eth1/0/5        Enabled
 eth1/0/6        Disabled
 eth1/0/7        Enabled
 eth1/0/8        Enabled
 eth1/0/9        Enabled

Switch#
```

60-2 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

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#
```

60-3 show snmp-server trap-sending

This command is used to display the per port SNMP trap sending state.

show snmp-server trap-sending [interface *INTERFACE-ID* **[, | -]]**

Parameters

INTERFACE-ID	(Optional) Specifies the interface ID. If no interface is specified, then all ports 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 per port trap sending state.

Example

This example shows how to display the trap sending state for ports eth1/0/1 to eth1/0/9.

```
Switch# show snmp-server trap-sending interface eth1/0/1-1/0/9

Port          Trap Sending
-------       -------------
 eth1/0/1        Enabled
 eth1/0/2        Enabled
 eth1/0/3        Disabled
 eth1/0/4        Enabled
 eth1/0/5        Enabled
 eth1/0/6        Disabled
 eth1/0/7        Enabled
 eth1/0/8        Enabled
 eth1/0/9        Enabled

Switch#
```

60-4 snmp-server

This command is used to enable the SNMP agent. Use the **no** 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)#
```

60-5 snmp-server contact

This command is used to configure the system contact information for the device. Use the **no** 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)#
```

60-6 snmp-server enable traps

This command is used to enable the sending of trap packets globally. Use the **no** 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)#
```

60-7 snmp-server enable traps snmp

This command is used to enable the sending of all or specific SNMP notifications. To disable sending of all or specific SNMP notifications, use the **no** form of this command.

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)#
```

60-8 snmp-server location

This command is used to configure the system's location information Use the **no** 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)#
```

60-9 snmp-server name

This command is used to configure the system's name information. Use the **no** 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)#
```

60-10 snmp-server trap-sending disable

This command is used to disable the port's trap sending state. Use the **no** command to disable the port's trap sending state.

snmp-server trap-sending disable

no snmp-server trap-sending disable

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 disable the port to send SNMP notification traps out of the configured port. If the sending is disabled, then SNMP notification traps generated by the system are not allowed to transmit out of the port. The SNMP traps generated by other system and forwarded to the port is not subject to this restriction.

Example

This example shows how to disable the sending of the notification traps out of Ethernet interface eth3/0/8.

```
Switch# configure terminal
Switch(config)# interface eth3/0/8
Switch(config-if)# snmp-server trap-sending disable
Switch(config-if)#
```

60-11 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)#
```

60-12 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)#
```

60-13 snmp trap link-status

This command is used to enable the notification of link-up and link-down events that occurred on the interface. Use the **no** form of this command to disable the notification.

snmp trap link-status

no snmp trap link-status

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enable or disable the sending of link-up and link-down traps on an interface.

Example

This example shows how to disable the generation of link-up and link-down traps on eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# no snmp trap link-status
Switch(config-if)#
```

60-14 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 engine ID.

```
Switch# show snmp engineID

Local SNMP engineID: 000000090200000000C025808

Switch#
```

60-15 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#
```

60-16 snmp-server community

This command is used to configure the community string to access the SNMP. Use the **no** command to remove the community string,

snmp-server community [0 | 7] *COMMUNITY-STRING* **[view** *VIEW-NAME***] [ro | rw] [***IP-ACL-NAME***]**

no snmp-server community [0 | 7] *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.
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 1.3.6.1.2.1.2 included
Switch(config)# snmp-server community comaccess view interfacesMibView rw
Switch(config)#
```

60-17 snmp-server engineID local

This command is used to specify the SNMP engine ID on the local device. Use the **no** 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)#
```

60-18 snmp-server group

This command is used to configure an SNMP group. Use the **no** 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)#
```

60-19 snmp-server host

This command is used to specify the recipient of the SNMP notification. Use the **no** 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)#
```

60-20 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. To revert to default setting, use the **no** form of this command.

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 VLAN 100 as the sourcing interface for sending SNMP trap packets.

```
Switch# configure terminal
Switch(config)# snmp-server trap source-interface vlan100
Switch(config)#
```

60-21 snmp-server user

This command is used to create an SNMP user. Use the **no** 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 the private password 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)#
```

60-22 snmp-server view

This command is used to create or modify a view entry. Use the **no** 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)#
```

61. Single IP Management (SIM) Commands

61-1 sim

This command is used to enable single IP management. The **no** form of this command disables single IP management.

sim

no sim

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 the single IP management function of the device and the **no** form of the command to disable the single IP management function of the device.

Example

This example shows how to enable single IP management.

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

61-2 sim role

This command is used to configure the device's single IP management role from Candidate to Commander or from Commander to Candidate.

sim role {commander [*GROUP-NAME***] | candidate}**

Parameters

commander	Specifies to configure the device to Commander switch.
GROUP-NAME	(Optional) Specifies to assign a name for the group when configuring the device to the Commander mode.
candidate	Specifies to configure the device to Candidate switch.

Default

By default, the single IP management group name is "default".

By default, the Switch role is **candidate**.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

There are 3 roles in the single IP management system: Candidate, Commander and Member.

The roles of Candidate and Commander can be specified by the user. The Member role can be specified by the command **sim group-member** on the commander switch.

The SIM group consists of the Commander switch and many member switches If the switch roles change, like Commander to Candidate, all of the members in the SIM group will be changed to Candidate.

Example

This example shows how to create a single IP management group.

```
Switch# configure terminal
Switch(config)# sim role commander my-group
Switch(config)#
```

61-3 sim group-member

This command is used to add one Candidate switch to the single IP management group. Use **no** form to remove one member from this single IP management group.

sim group-member *CANDIDATE-ID* **[***PASSWORD***]**

no sim group-member *MEMBER-ID*

Parameters

CANDIDATE-ID	Specifies one Candidate switch in one SIM group.
MEMBER-ID	Specifies one Member switch in one SIM group.
PASSWORD	(Optional) Specifies the password of the Candidate switch.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

On the Commander switch, the Candidate switch can be joined to the group and it will be changed to the member switch. The Commander switch must pass the Candidate switch Level-15 password authentication.

Example

This example shows how to add one candidate switch to the single IP management group.

```
Switch# configure terminal
Switch(config)# sim group-member 1 secret
Switch(config)#
```

61-4 sim holdtime

This command is used to configure the hold-time duration in seconds. One switch (ether the Commander or Member switch) will clear the information of the other switch, after not receiving single IP management messages in the duration time. Use the **no** form to reset the hold-time to the default.

sim holdtime *SECONDS*

no sim holdtime

Parameters

SECONDS	Specifies the hold-time in seconds. The range is from 100 to255.

Default

By default, this value is 100 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

During the hold time, If no SIM protocol message were received, it will:

- For the Commander switch, clear Member switch information.
- For the Member switch, clear the Commander switch information and change the role to Candidate.

Example

This example shows how to configure the single IP management hold-time.

```
Switch# configure terminal
Switch(config)# sim holdtime 120
Switch(config)#
```

61-5 sim interval

This command is used to configure the SIM interval in seconds for single IP management protocol sending messages. Use the **no** form to set the interval as default.

sim interval *SECONDS*

no sim interval

Parameters

SECONDS	Specifies the interval value in seconds. The range is from 30 to 90.

Default

By default, this value is 30 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the SIM interval in seconds for single IP management protocol sending messages.

Example

This example shows how to configure the interval for the single IP management protocol.

```
Switch# configure terminal
Switch(config)# sim interval 60
Switch(config)#
```

61-6 sim management vlan

This command is used to configure SIM management VLAN. Use the **no** form of the command to revert to the default setting.

sim management vlan *VLAN-ID*

no sim management vlan

Parameters

VLAN-ID	Specifies the single IP management message VLAN.

Default

By default, this option is set the VLAN 1.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The single IP management group commander and member will send and receive the SIM message on the SIM management VLAN.

Example

This example shows how to configure the single IP management VLAN to 100.

```
Switch# configure terminal
Switch(config)# sim management vlan 100
Switch(config)#
```

61-7 sim remote-config

This command is used to remotely login and configure the single IP management group member or exit from the remote configuration.

sim remote-config {member *MEMBER-ID* **| exit}**

Parameters

MEMBER-ID	Specifies the member that login.
exit	Specifies to exit from the current configuring member.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

The SIM Commander switch can login to its group members and configure them by the member ID. This command only can be used on the Commander switch.

Example

This example shows how to login the single IP management group member device.

```
Switch# sim remote-config member 1
Switch#
```

61-8 copy sim

This command is used to copy a file to single IP management group members.

copy sim *SOURCE-URL DESTINATION-URL* **[member** *MEMBER-LIST***]**

Parameters

SOURCE-URL	Specifies the source URL to be uploaded to the server. The source URL is located on the member switch. When the running configuration is specified as the source URL, the purpose is to upload the running configuration to the TFTP server. When the system log is specified as source URL, the system log can be retrieved to the TFTP server.
DESTINATION-URL	Specifies the destination URL for the file download. The destination

	URL is located on the member switch. When the running configuration is specified as the destination URL, the purpose is to download the running configuration from the TFTP server to member switches. When the firmware is specified as the destination URL, the purpose is to download the firmware from the TFTP server to member switches. The boot image on the member switches will be replaced by the downloaded file.
MEMBER-LIST	(Optional) Specifies the member switch to download the file. Multiple members can be specified at a time. Use ‘,’ to separate multiple IDs, or “-“ to denote a range of interface IDs.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command can be used on Commander Switch to upload files to the server from member switches. In order to distinguish the different member switch’s ID, the file name will be appended to the member switch’s ID.

Example

This example shows how to download firmware to the member switch 1.

```
Switch# copy sim tftp://10.10.10.58/switch.had firmware member 1

Download firmware 10.10.10.58/ switch.had to member 1 ?(y/n)[n] y
Download Status:
ID   MAC Address       Status
---------------------------------------
1    00-02-01-03-01-03 SUCCESS

Switch#
```

This example shows how to upload the system log from the member switch 1.

```
Switch# copy sim system-log tftp: //10.10.10.58/switchlog member 1

Upload system log  from member 1 to 10.10.10.58/switchlog ?(y/n)[n]y
Upload Status
ID   MAC Address       Status
---------------------------------------
1    00-02-01-03-01-03 SUCCESS

Switch#
```

61-9 snmp-server enable traps sim

This command is used to enable sending single IP management trap. Use **no** form of the command to disable sending single IP management trap.

snmp-server enable traps sim

no snmp-server enable traps sim

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 sending single IP management trap.

Example

This example shows how to enable sending single IP management trap.

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

61-10 show sim

This command is used to display single IP management information.

show sim [{candidates [*CANDIDATE-ID***] | members [***MEMBER-ID***] | group [***COMMANDER-MAC***] | neighbor}]**

Parameters

candidates	Specifies to display the information of Candidate switches.
CANDIDATE-ID	Specifies to display detailed information of a Candidate.
members	Specifies to display the information of Member switches.
MEMBER-ID	Specifies to display detailed information of a Member.
group	Specifies to display the information of other SIM Groups.
COMMANDER-MAC	Specifies to display detailed information of a Group.
neighbor	Specifies to display the neighbor information.

Default

None.

Command Mode

EXEC Mode or Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display single IP management information.

Example

This example shows how to display detailed local SIM information on the Commander.

```
Switch# show sim

SIM Version        : VER-1.61
 Firmware Version   : 1.10.001
 Management VLAN    : 1
 Device  Name       : Switch
 MAC Address        : 00-01-02-03-04-00
 Platform           : DGS-1510-28P
 SIM State          : Disabled
 Role State         : Candidate
 Discovery Interval : 30 sec
 Hold Time          : 100 sec

Switch#
```

This example shows how to display detailed local SIM information on the Member switch.

```
Switch# show sim

 SIM Version        : VER-1.61
 Firmware Version   : 1.10.001
 Device Name        :Switch
 MAC Address        : EE-FF-00-00-12-12
 Platform           : DGS-1510-28P
 SIM State          : Enabled
 Role State         : Member
 Discovery Interval : 30 sec
 Hold Time          : 100 sec
----------------CS Info----------------
 CS Group Name   : my-group
 CS MAC Address  : 00-02-01-03-01-03
 CS Hold Time    : 90 s

Switch#
```

This example shows how to display the SIM member list.

```
Switch# show sim members
Member                                    Hold  Firmware
ID    MAC Address         Platform        Time  Version   Device Name
-------------------------------------------------------------------------
   1    00-01-00-00-12-12 DGS-1510-28P   100   1.10.001  Switch
   2    00-02-00-00-12-13 DGS-1510-28P   80    1.10.001  Switch

Total Entries : 2

Switch#
```

This example shows how to display one of the SIM member's information in detail.

```
Switch# show sim members 1

Sim Member Information :
Member ID             : 1
Firmware Version      : 1.10.001
Device Name           : Switch
MAC Address           : 00-01-02-03-04-00
Platform              : DGS-1510-28P
Hold Time             : 100 sec

Switch#
```

This example shows how to display the SIM candidate list.

```
Switch# show sim candidates

Candidate                                 Hold  Firmware
ID      MAC Address         Platform      Time  Version     Device Name
-------------------------------------------------------------------------
 1      EE-FF-00-00-12-12   DGS-1510-28P 90    1.10.001    Switch

Total Entries : 1

Switch#
```

This example shows how to display one of the SIM candidate's information in detail.

```
Switch# show sim candidates 1

 Sim Candidate Information :
 Candidate ID          : 1
 Firmware Version      : 1.10.001
 Device Name           :
 MAC Address           : EE-FF-00-00-12-12
 Platform              : DGS-1510-28P
 Hold Time             : 100 sec

Switch#
```

This example shows how to display group information in a summary.

```
Switch# show sim group
* -means Commander switch.

SIM Group Name : default
                                        Hold   Firmware
ID  MAC Address         Platform        Time   Version    Device Name
-------------------------------------------------------------------------
*1  00-01-02-03-04-00   DGS-1510-28P    40     1.10.001   Switch
 2  00-07-15-34-00-50
 3  00-01-02-03-00-10

SIM Group Name : SIM2
                                             Hold   Firmware
ID  MAC Address         Platform        Time  Version    Device Name
-------------------------------------------------------------------
*1  00-01-02-03-04-02   DGS-1510-28P    40     1.10.001  Switch
 2  00-55-55-00-55-11

Total Entries : 2

Switch#
```

This example shows how to display SIM group detailed information.

```
Switch# show sim group 00-01-02-03-04-00

Sim Group Information :

[*** Commander Info ***]

Group Name : default
MAC Address           : 00-01-02-03-04-00
Device Name           :
Firmware Version      : 1.10.001
Platform              : DGS-1510-28P
Number of Members     : 2
Hold Time             : 100 sec

[*** Member Info (1/2)***]
MAC Address    : 00-07-15-34-00-50

[*** Member Info (2/2)***]
MAC Address    : 00-01-02-03-00-10

Switch#
```

This example shows how to display SIM neighbors' summary.

```
Switch# show sim neighbor

Port        MAC Address        Role
----------------------------------
eth1/0/1    00-02-00-00-08-12  Member
eth1/0/2    00-01-00-00-12-12  Member
eth1/0/3    EE-FF-00-00-12-12  Candidate

Total Entries : 3

Switch#
```

62. Spanning Tree Protocol (STP) Commands

62-1 clear spanning-tree detected-protocols

This command is used to restart the protocol migration.

clear spanning-tree detected-protocols {all | interface *INTERFACE-ID***}**

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.

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#
```

62-2 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* **[, | -]]**

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 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

Use this command to display the Spanning Tree 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

Protocol state: Enabled
protocol mode: RSTP
NNI BPDU Address: Dot1d(01-80-C2-00-00-00)
Root ID Priority      : 4096
    Address        : 00-04-9B-78-08-00
 Hello Time      : 2 sec, Max Age: 20 sec, Forward Delay: 15 sec
Bridge ID Priority    : 4096 (priority 4096 sys-id-ext 0)
       Address        : 00-04-9B-78-08-00
       Hello Time     : 2 sec, Max Age: 20 sec, Forward Delay: 15 sec
Topology Changes Count : 0
                                          Priority  Link
Interface  Role       State      Cost    .Port#    Type        Edge
---------  -----      -----      ------  --------- ------      --------
eth1/0/3   designated forwarding 20000     128.3   p2p         non-edge
eth1/0/5   backup     blocking   200000    128.5   p2p         non-edge
eth1/0/6   backup     blocking   200000    128.6   shared      non-edge
eth1/0/7   root       forwarding 2000      128.7   P2p         non-edge

Switch#
```

62-3 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* **[, | -]]**

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 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

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 eth1/0/1.

```
Switch#show spanning-tree configuration interface ethe1/0/1

eth1/0/1
 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

Switch#
```

62-4 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 the 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)#
```

62-5 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)#
```

62-6 spanning-tree (timers)

This command is used to configure the Spanning Tree timer value. Use the **no** form of the command to restore the default setting.

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 transmissions of 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.

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 Spanning Tree 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)#
```

62-7 spanning-tree state

This command is used to enable or disable the STP operation. Use the **no** command to revert to 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 enabled.

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 eth3/0/1.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# spanning-tree state enable
Switch(config-if)#
```

62-8 spanning-tree cost

This command is used to configure the value of the port path-cost on the specified port. Use the **no** 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 eth1/0/7.

```
Switch# configure terminal
Switch(config)# interface eth1/0/7
Switch(config-if)# spanning-tree cost 20000
Switch(config-if)#
```

62-9 spanning-tree guard root

This command is used to enable the root guard mode. To return to the default settings, use the **no** form of this command.

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 eth3/0/1 from being a root port.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# spanning-tree guard root
Switch(config-if)#
```

62-10 spanning-tree link-type

This command is used to configure a link-type for a port. To return to the default settings, use the **no** form of this command.

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 eth1/0/7.

```
Switch# configure terminal
Switch(config)# interface eth1/0/7
Switch(config-if)# spanning-tree link-type point-to-point
Switch(config-if)#
```

62-11 spanning-tree mode

This command is used to configure the STP mode. To return to the default settings, use the **no** form of this command.

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)#
```

62-12 spanning-tree portfast

This command is used to specify the port's fast mode. Use the **no** form of the 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 **network**.

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 eth1/0/7 to the port-fast edge mode.

```
Switch# configure terminal
Switch(config)# interface eth1/0/7
Switch(config-if)# spanning-tree portfast edge
Switch(config-if)#
```

62-13 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 **no** form of this command to reset to the default priority.

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 eth1/0/7.

```
Switch# configure terminal
Switch(config)# interface eth1/0/7
Switch(config-if)# spanning-tree port-priority 0
Switch(config-if)#
```

62-14 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)#
```

62-15 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 eth1/0/7.

```
Switch# configure terminal
Switch(config)# interface eth1/0/7
Switch(config-if)# spanning-tree tcnfilter
Switch(config-if)#
```

62-16 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 the command to restore 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 transmit hold count value to 5.

```
Switch# configure terminal
Switch(config)# spanning-tree tx-hold-count 5
Switch(config)#
```

62-17 spanning-tree forward-bpdu

This command is used to enable the forwarding of the spanning tree BPDU. Use the **no** form of the command to disable the forwarding of the spanning tree 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 eth6/0/1
Switch(config-if)# spanning-tree forward-bpdu
Switch(config-if)#
```

---

63. Stacking Commands

63-1 stack

This command is used to enable the daisy-chain stacking function and use the **no stack** command to disable the daisy-chain stacking function.

stack

no stack

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

The ports on a stackable switch unit, used to chain with other switch units, can either work as stacking ports or work as ordinary Ethernet ports based on the setting of the stack command. The stack command setting of a switch unit must be enabled before the switch unit can be chained with other switch units. The setting will be saved in the individual switch unit if the user saves the configuration.

Example

This example shows how to enable stacking mode.

```
Switch# stack

 WARNING: The command does not take effect until the next reboot.
Switch#
```

63-2 stack renumber

This command is used to manually assign a unit ID to a switch unit. Use the **no** form of the command to set the unit ID of the Switch to auto-assigned.

stack *CURRENT-UNIT-ID* **renumber** *NEW-UNIT-ID*

no stack *CURRENT-UNIT-ID* **renumber**

Parameters

CURRENT-UNIT-ID	Specifies the switch unit being configured.
NEW-UNIT-ID	Specifies the new unit ID assigned to the Switch.

Default

The unit ID is assigned automatically.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Initially, a switch unit has no unit ID assigned. When this switch unit is initialized or is added to a stack, it will get a unit ID auto-assigned by the master unit. After a unit ID was assigned, the unit ID can be kept in configuration file by issuing the **copy running-config startup-config** command and will be used after the next reboot.

The user can use this command to re-assign a unit ID to the specified switch unit. The assigned unit ID will be used after the next reboot. The switch unit cannot be added to a switch stack if its unit ID is conflicting with an existing switch unit in the stack.

The master unit automatically assigns unit IDs to switch units based on the following rules:

- If the unit ID of the master unit is auto-assigned, it will get 1 as its unit ID.
- If a switch unit to be added to the stack has a unit ID conflicting with a unit ID of a switch unit already added, then this switch unit ID cannot be successfully added.

Example

This example shows how to configure the renumbered unit ID of a switch unit 2 to 3.

```
Switch# stack 2 renumber 3

WARNING: The command does not take effect until the next reboot.

Switch#
```

63-3 stack priority

This command is used to configure the priority of the switch stacking unit. Use the **no** form of the command to set the priority to default.

stack *CURRENT-UNIT-ID* **priority** *NEW-PRIORITY-NUMBER*

no stack *CURRENT-UNIT-ID* **priority**

Parameters

CURRENT-UNIT-ID	Specifies the switch stacking unit being configured.
NEW-PRIORITY-NUMBER	Specifies the priority assigned to the switch stacking unit. The lower number means a higher priority. The range is between 1 and 63.

Default

By default, this value is 32.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the priority for the specified switch unit. When switch units are daisy-chained together as a stack, the unit with the best priority will be elected as the master. The unit with the next best priority will be elected as the backup master. A lower value means the higher priority. When two switch units have the same priority, the unit with the smaller MAC address will get the higher priority. The new priority setting will be saved in individual switch units when the user saves the configuration.

Example

This example shows how to configure the priority of the switch unit 2 to 10.

```
Switch# stack 2 priority 10
Switch#
```

63-4 stack preempt

This command is used to enable preemption of the master role to come into play when a unit with a better priority is added to the Switch later. Use the **no** form of the command to disable preemption.

stack preempt

no stack preempt

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

When this command is disabled, the unit that assumes the master role will not change when units with a better priority are added to the stack. If this command is enabled, then the unit that assumes the master role will change as units with a better priority are added to the stack.

Example

This example shows how to enable preemption.

```
Switch# stack preepmt
Switch#
```

63-5 snmp-server enable traps stack

This command is used to to enable sending of stacking related traps. Use the **no** form of the command to disable sending of stacking related traps.

snmp-server enable traps stack

no snmp-server enable traps stack

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable sending of stacking related traps.

Example

This example shows how to enable sending of stacking related traps.

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

Switch(config)#
```

63-6 show stack

This command is used to display the stacking information.

show stack

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 stacking information.

Example

This example shows how to display stacking information.

```
Switch#show stack

Stacking Mode       : Enabled
Stack Preempt       : Enabled
Trap State          : Disabled

Topology            : Duplex_Chain
My Box ID           : 1
Master ID           : 1
Box Count           : 1

Box User Module              Prio-                    Prom      Runtime   H/W
ID  Set  Name          Exist rity  MAC                Version   Version   Version
--- ---- ------------- ----- ----- ------------------ --------- --------- -------
1   Auto DGS-1510-28P  Exist 32    00-01-02-03-04-00 1.00.006  1.10.001  A1
2   -    NOT_EXIST     No
3   -    NOT_EXIST     No
4   -    NOT_EXIST     No
5   -    NOT_EXIST     No
6   -    NOT_EXIST     No

Switch#
```

64. Storm Control Commands

64-1 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 the 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)#
```

64-2 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 | unicast} level {pps *PPS-RISE* **[***PPS-LOW***] | kbps** *KBPS-RISE* **[***KBPS-LOW***] |** *LEVEL-RISE* **[***LEVEL-LOW***]} | action {shutdown | drop | none}}**

no storm-control {broadcast | multicast | unicast | action}

Parameters

broadcast	Specifies to set the broadcast rate limit.
multicast	Specifies to set the multicast rate limit.
unicast	Specifies to set the unicast 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 1 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 1 to 2147483647. If the low KBPS is not specified, the default value is 80% of the specified risen KBPS.
level *LEVEL-RISE* **[***LEVEL-LOW***]**	Specifies the threshold value as a percentage of the total bandwidth per port at which traffic is received on the port. The range is from 0 to 100. If the low level is not specified, the default value is 80% of the specified risen level.
action shutdown	Specifies to shut down 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 (DLF) 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.

Example

This example shows how to enable broadcast storm control on eth3/0/1 and eth3/0/2. It sets the threshold of eth3/0/1 to 500 packets per second with the shutdown action and sets the threshold of the interface port 3.2 to 70% with the drop action.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# storm-control broadcast level pps 500
Switch(config-if)# storm-control action shutdown
Switch(config)# interface eth3/0/2
Switch(config-if)# storm-control broadcast level 70 60
Switch(config-if)# storm-control action drop
Switch(config-if)#
```

64-3 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)#
```

64-4 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 display the current broadcast storm control settings.

```
Switch# show storm-control interface range ethernet 3/0/1-3/0/6 broadcast

Polling Interval       : 15 sec           Shutdown Retries       : Infinite
Interface    Action    Threshold         Current    State
-------------------------------------------------------------
eth3/0/1     Drop      500/300 pps       200 pps    Forwarding
eth3/0/2     Drop      80/64 %           20 %       Forwarding
eth3/0/3     Drop      80/64 %           70 %       Dropped
eth3/0/4     Shutdown  60/50 %           20 %       Forwarding
eth3/0/5     None      60000/50000 kbps  2000 kbps  Forwarding
eth3/0/6     None      -                 -          Inactive

Total Entries: 6

Switch#
```

This example shows how to display all interface settings for the range from port 3/0/1 to port 3/0/2.

```
Switch# show storm-control interface eth3/0/1-2

Polling Interval       : 15 sec           Shutdown Retries       : Infinite
Trap                      : Disabled
Interface      Storm         Action      Threshold     Current    State
---------------------- ---------------------------------------------
eth3/0/1      Broadcast     Drop         80/64 %       50%        Forwarding
eth3/0/1      Multicast     Drop         80/64 %       50%        Forwarding
eth3/0/1      Unicast       Drop         80/64 %       50%        Forwarding
eth3/0/2      Broadcast     Shutdown     500/300 pps   -          Error Disabled
eth3/0/2      Multicast     Shutdown     500/300 pps   -          Error Disabled
eth3/0/2      Unicast       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.

65. Surveillance VLAN Commands

65-1 surveillance vlan

This command is used to enable the global surveillance VLAN state and configure the surveillance VLAN. Use **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)#
```

65-2 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 the 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)#
```

65-3 surveillance vlan enable

This command is used to enable the surveillance VLAN state of ports. Use the **no** form of the 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 eth1/0/1.

```
Switch# configure terminal
Switch(config)#interface eth1/0/1
Switch(config-if)#surveillance vlan enable
Switch(config-if)#
```

65-4 surveillance vlan mac-address

This command is used to add the user-defined surveillance device OUI. Use **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 the surveillance 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)#
```

65-5 surveillance vlan qos

This command is used to configure the CoS priority for the incoming surveillance VLAN traffic. Use the **no** form of the command to reset to default setting.

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)#
```

65-6 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 ID  : 100
 Surveillance VLAN CoS : 5
 Aging Time            : 30 minutes
 Member Ports          :
 Dynamic Member Ports  :

 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#
```

66. Switch Port Commands

66-1 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 | half | auto}

no duplex

Parameters

full	Specifies that the port operates in the full-duplex mode.
half	Specifies that the port operates in the half-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

For 1000BASE-T modules, if the speed is set to 1000, 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.

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 eth1/0/1 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 eth1/0/1
Switch(config-if)# speed 100
Switch(config-if)# duplex auto
Switch(config-if)#
```

66-2 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 eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# flowcontrol on
Switch(config-if)#
```

66-3 mdix

This command is used to configure the port Media-Dependent Interface Crossover (MDIX) state. Use the **no** form of command to revert to the default setting.

mdix {auto | normal | cross}

no mdix

Parameters

auto	Specifies to set the port interface's MDIX state to the auto-MDIX mode.

normal	Specifies to force the port interface's MDIX state to the normal mode.
cross	Specifies to force the port interface's MDIX state to the cross mode.

Default

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

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command cannot be applied to a port when the medium of the port interface is fiber.

Example

This example shows how to configure the MDIX state of interface eth1/0/1 to auto:

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# mdix auto
Switch(config-if)#
```

66-4 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 {10 | 100 | 1000 [master | slave] | 10giga | auto [*SPEED-LIST***]}**

no speed

Parameters

10	Specifies to force the speed to 10 Mbps.
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.
master | slave	Specifies the port operates as master or slave timing. This parameter is only applicable to 1000BASE-T connections.
10giga	Specifies to force the speed to 10 Gbps.
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.
SPEED-LIST	(Optional) Specifies a list of speeds that the Switch will only auto-negotiate to. The speed can be **10**, **100**, and/or **1000**. Use a comma (,)

	to separate multiple speeds. If the speed list is not specified, all speed will be advertised.

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. For a 1000BASE-T connection, if the speed is specified to 1000 Mbps, the port must be configured as master or slave.

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 eth1/0/1 to only auto-negotiate to 10 or 100 Mbps.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# speed auto 10,100
Switch(config-if)#
```

66-5 speed auto-downgrade

This command is used to enable automatically downgrading advertised speed in case a link cannot be established at the available speed. Use the **no** form of the command to disable it.

speed auto-downgrade

no speed auto-downgrade

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 automatically downgrading advertised speed in case a link cannot be established at the available speed.

Example

This example shows how to enable speed auto-downgrade.

```
Switch#configure terminal
Switch(config)#interface eth1/0/5
Switch(config-if)#speed auto-downgrade
Switch(config-if)#
```

67. System File Management Commands

67-1 boot config

This command is used to specify the file that will be used as the configuration file for the next boot.

boot config *URL*

Parameters

URL	Specifies the URL of the file to be used as the startup configuration file.

Default

By default, the *config.cfg* file is used.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

The command is used to specify the startup configuration file. The default startup configuration file is *config.cfg*. If there is no valid configuration file, the device will be configured to the default state.

Example

This example shows how to configure the file 'switch-config.cfg' as the startup configuration file.

```
Switch# configure terminal
Switch(config)# boot config c:/switch-config.cfg
Switch(config)#
```

67-2 boot image

This command is used to specify the file that will be used as the image file for the next boot.

boot image [check] *URL*

Parameters

check	(Optional) Specifies to display the firmware information for the specified file. This information includes the version number and model description.
URL	Specifies the URL of the file to be used as the boot image file.

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 image c:/switch-image1.had
Switch(config)#
```

This example shows how to check a specified image file called “c:/runtime.switch.had”. The checksum of the image file has been verified is okay and the information of the image file is displayed.

```
Switch# configure terminal
Switch(config)# boot image check c:/runtime.switch.had

----------------------
Image information
----------------------
Version: 1.10.001
Description: D-Link Gigabit Ethernet SmartPro Switch

Switch(config)#
```

This example shows how to checks a specified image file called “runtime.wrongswitch.had”. The checksum of the image file has been verified wrong and an error message is displayed.

```
Switch# configure terminal
Switch(config)#boot image check runtime.wrongswitch.had
ERROR: File not found.

Switch(config)#
```

67-3 clear running-config

This command is used to clear the system’s running configuration.

clear running-config

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 retained in DRAM. The configuration data will revert to the default settings. Before using this command, save a backup of the configuration using the **copy** command or upload the configuration profile to the TFTP server.

This command will clear the system's configuration settings, including IP parameters, but not the stacking information. Thus, all the existing remote connections will be disconnected. After this command was applied, the user needs to setup the IP address via the local console.

Example

This example shows how to clear the system's running configuration.

```
Switch# clear running-config

This command will clear all of system configuration as factory default setting
including IP parameters.
Clear running configuration? (y/n) [n] y

Switch#
```

67-4 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...
```

67-5 configure replace

This command is used to replace the current running configuration with the indicated configuration file.

configure replace {{tftp: *//location/filename* **| flash:** *FILENAME***} [force]**

Parameters

tftp:	Specifies that the configuration file is from the TFTP server.
//location/filename	Specifies the URL of the configuration file on the TFTP server.
flash:	Specifies that the configuration file is from the NVRAM of the device.
FILENAME	Specifies the name of the configuration file stored in the NVRAM.
force	(Optional) Specifies to execute the command immediately with no confirmation needed.

Default

None.

Command Mode

Privilege EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command is used to execute the indicated configuration file to replace the current running configuration. The current running configuration will be cleared before applying the indicated configuration.

NOTE: The command will replace the current running configuration with the contents of the specified configuration file. So the specified configuration file is assumed to be a complete configuration, not a partial configuration.

Before using the **configure replace** 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 download the “config.cfg” from the TFTP server and replace the current running configuration with it.

```
Switch# configure replace tftp: //10.0.0.66/config.cfg

This will apply all necessary additions and deletions
to replace the current running configuration with the
contents of the specified configuration file, which is
assumed to be a complete configuration, not a partial
configuration. [y/n]:  y

 Accessing tftp://10.0.0.66/config.cfg...
 Transmission start...
 Transmission finished, file length 45422 bytes.
 Executing script file config.cfg ......
 Executing done

Switch#
```

This example shows how to replace the current running configuration with the specified configuration file “config.cfg” stored in the NVRAM of the device. Execute the command immediately without confirmation.

```
Switch# configure replace flash: config.cfg force

 Executing script file config.cfg ......
 Executing done

Switch#
```

67-6 copy

This command is used to copy a file to another file.

copy *SOURCE-URL DESTINATION-URL*

copy *SOURCE-URL* **tftp: [***IILOCATIONIDESTINATION-URL***]**

copy tftp: [*IILOCATIONISOURCE-URL***]** *DESTINATION-URL*

Parameters

SOURCE-URL	Specifies the source URL for the source file to be copied. One special form of the URL is represented by the following keywords. If **startup-config** is specified as the *SOURCE-URL*, the purpose is to upload the startup configuration, save the startup configuration as the file in the file system, or to execute the startup configuration as the running configuration. If **running-config** is specified as the *SOURCE-URL*, the purpose is to upload the running configuration or save the running configuration as

	the startup configuration or to save it as the file in the file system. If **flash: [***PATH-FILE-NAME***]** is specified as the *SOURCE-URL*, the purpose is to specify the source file to be copied in the file system. If **log** is specified as the *SOURCE-URL*, the system log can be retrieved to the TFTP server or saved as the file in the file system. If **attack-log** *UNIT-ID* is specified as the *SOURCE-URL*, the purpose is to upload one unit's attack log.
DESTINATION-URL	Specifies the destination URL for the copied file. One special form of the URL is represented by the following keywords. If **running-config** is specified as the *DESTINATION-URL*, the purpose is to apply a configuration to the running configuration. If **startup-config** is specified as the *DESTINATION-URL*, the purpose is to save a configuration to the next-boot configuration. That is to keep the current configuration into the NVRAM and the file name will be the same as the file name specified with the **boot config** command. If **flash: [***PATH-FILE-NAME***]** is specified as the *DESTINATION-URL*, the purpose is to specify the copied file in the file system. If the input relative path is specified, the file will be downloaded to all units in stack and stored in the current path of each unit. If the input absolute path is specified, the file will be downloaded to the place which of the absolute path indicates. If there is no unit information in the absolute path, the master unit will be assigned.
LOCATION	(Optional) Specifies the IPv4 address or IPv6 address of the TFTP server.

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-URL*. To save the running configuration to the startup configuration, specify **startup-config** as the *DESTINATION-URL*.

As the destination is the startup configuration, the source file is directly copied to the file specified in the **boot 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-URL* 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 image** command to specify it as the boot image file.

Example

This example shows how to configure the Switch's running configuration by using the increment method using the configuration called "switch-config.cfg" that is download from the TFTP server 10.1.1.254.

```
Switch# copy tftp: //10.1.1.254/switch-config.cfg running-config

Address of remote host []? 10.1.1.254
Source filename []? switch-config.cfg
Destination filename running-config? [y/n]:  y

 Accessing tftp://10.1.1.254/switch-config.cfg...
 Transmission start...
 Transmission finished, file length 45421 bytes.
 Executing script file switch-config.cfg ......
 Executing done

Switch#
```

This example shows how to upload the running configuration to the TFTP server for storage.

```
Switch# copy running-config tftp: //10.1.1.254/switch-config.cfg

Address of remote host []? 10.1.1.254
Destination filename []? switch-config.cfg
 Accessing tftp://10.1.1.254/switch-config.cfg...
 Transmission start...
 Transmission finished, file length 45421 bytes.

Switch#
```

This example shows how to save the system's running configuration into the FLASH memory and uses it as 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#
```

This example shows how to execute the "switch-config.cfg" file in the NVRAM immediately by using the increment method.

```
Switch# copy flash: switch-config.cfg running-config

Source filename [switch-config.cfg]?
Destination filename running-config? [y/n]:  y

 Executing script file switch-config.cfg ......
 Executing done

Switch#
```

This example shows how to download an image file from the TFTP server to all units in the stack.

```
Switch# copy tftp: //10.1.1.254/image.had flash: image.had

Address of remote host [10.1.1.254]?
Source filename [image.had]?
Destination filename [image.had]?
 Accessing tftp://10.1.1.254/image.had...
 Transmission start...
 Transmission finished, file length 8315060 bytes.
 Transmission to slave start.................   Done.
 Transmission to slave finished, file length 8315060 bytes.
 Please wait, programming flash.............. Done.
 Wait slave programming flash complete...
 Done.

Switch#
```

67-7 ip tftp source-interface

This command is used to specify the interface IP address to be used as the source address for initiating TFTP packets. To revert to default setting, use the **no** form of this command.

ip tftp source-interface *INTERFACE-ID*

no ip tftp source-interface

Parameters

INTERFACE-ID	Specifies the interface ID. The interface IP address will be used as the source address for initiating TFTP packets.

Default

The IP address of the closest interface will be used.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to specify the interface IP address to be used as the source address for initiating TFTP packets. To use this command together with the out of band management port, specify the interface ID for the out of band management port.

Example

This example shows how to download software using interface IP of VLAN 100.

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

67-8 show boot

This command is used to display the boot configuration file and the boot image setting.

show boot [unit *UNIT-ID***]**

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 the boot configuration file and the boot image setting.

Example

This example shows how to display system boot information.

```
Switch# show boot

Unit 1
Boot image: c:/bootimage.had
Boot config: c:/def_usr.cfg

Unit 2
Boot image: c:/bootimage.had
Boot config: c:/def_usr.cfg

Switch#
```

67-9 show running-config

This command is used to display the commands in the running configuration file.

show running-config

Parameters

None.

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
Building configuration...

Current configuration : 32950 bytes

#------------------------------------------------------------------------------
#                 DGS-1510-28P Gigabit Ethernet SmartPro Switch
#                                 Configuration
#
#                            Firmware: Build 1.10.001
#           Copyright(C) 2014 D-Link Corporation. All rights reserved.
#------------------------------------------------------------------------------


# STACK

end
end

# DEVICE
configure terminal
end


# AAA
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

67-10 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-1510-28P Gigabit Ethernet SmartPro Switch
#                                Configuration
#
#                            Firmware: Build 1.10.001
#           Copyright(C) 2014 D-Link Corporation. All rights reserved.
#------------------------------------------------------------------------------


# STACK

end
end

# DEVICE
configure terminal
end


# AAA

configure terminal
# AAA START
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

68. System Log Commands

68-1 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#
```

68-2 logging buffered

This command is used to enable logging of system messages to the local message buffer. Use the **no** command to disable 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***}] [discriminator** *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.
discriminator	(Optional) Specifies to filter the message to be sent to local buffer based on the discriminator.
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)#
```

68-3 logging console

This command is used to enable the logging of system messages to the local console. Use the **no** command to disable the logging of messages to the local console and revert to the default setting.

logging console [severity {*SEVERITY-LEVEL* **|** *SEVERITY-NAME***}] [discriminator** *NAME***]**

no logging console

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

	the local console. 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.
discriminator	(Optional) Specifies to filter the message to be sent to the local console based on the discriminator.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The system messages can be logged to the local message buffer, local console or other destinations. Messages must enter the local message buffer first before it can further be dispatched to the console.

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 to the console. The messages which are at the specified severity level or higher will be dispatched to the local console.

Example

This example shows how to enable the logging of messages to the local console and restrict the logging of messages with a security level of errors or higher.

```
Switch# configure terminal
Switch(config)# logging console severity errors
Switch(config)#
```

68-4 logging discriminator

This command is used to create a discriminator that can be further used to filter SYSLOG messages sent to various destinations.

logging discriminator *NAME* **[facility {drops** *STRING* **| includes** *STRING***}] [severity {drops** *SEVERITY-LIST* **| includes** *SEVERITY-LIST***}]**

no discriminator *NAME*

Parameters

NAME	Specifies the name of the discriminator.
facility	(Optional) Specifies a sub-filter based on the facility string.
STRING	Specifies one or more facility names. If multiple facility names are used, they should be separated by commas without spaces before and after the comma.

includes	Specifies to include the matching message. The unmatched messages are filtered.
drops	Specifies to filter the matching message.
severity	(Optional) Specifies a sub-filter based on severity matching.
SEVERITY-LIST	Specifies a list of severity levels to be filtered or to be included.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

An existing discriminator can be configured. The later setting will overwrite the previous setting. Associate a discriminator with the logging buffered and the logging server command.

Example

This example shows how to create a discriminator named “buffer-filter” which specifies two sub-filters, one based on the severity level and the other based on the facility.

```
Switch# configure terminal
Switch(config)# logging discriminator buffer-filter facility includes STP severity includes 1-4,6
Switch(config)#
```

68-5 logging server

This command is used to create a SYSLOG server host to log the system messages or debug output. Use the **no** command to remove a SYSLOG server host.

logging server {*IP-ADDRESS* **|** *IPV6-ADDRESS***} [severity {***SEVERITY-LEVEL* **|** *SEVERITY-NAME***}] [facility** *FACILITY-TYPE***] [discriminator** *NAME***] [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 local7 (23).

discriminator	(Optional) Specifies to filter the message to the log server based on discriminator.
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)#
```

68-6 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. To revert to default setting, use the **no** form of this command.

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 VLAN 100 as the source interface for SYSLOG packets.

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

68-7 show logging

This command is used to display the system messages logged in the local message buffer.

show logging [all | [*REF-SEQ***] [+** *NN* **| -** *NN***]]**

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.
+ *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.
- *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.

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 eth1/0/1 link up, 1000Mbps FULL duplex

switch#
```

68-8 show attack-logging

This command is used to display attack log messages.

show attack-logging unit *UNIT-ID* **[index** *INDEX***]**

Parameters

UNIT-ID	Specifies the unit on which the attack log messages will be displayed.
INDEX	Specifies the list of index numbers of the entries that need to be displayed. If no index is specified, all entries in the attack log DB 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 attack log messages. The attack log message refers to log messages driven by modules such as DOS and the port-security module. This type of log message may generate a large amount of messages and quickly cause the system to run out of system log storage. Therefore, for this type of log messages only the first log that is generated each minute can be stored in the system log, with the rest of them being stored in a separate table named attack log.

Example

This example shows how to display the first attack log entry.

```
Switch# show attack-logging index 1
Attack log messages:
1  2013-10-17 15:00:14 CRIT(2) Land attack is blocked from (IP: 10.72.24.1 Port: 7)
Switch#
```

68-9 clear attack-logging

This command is used to delete the attack log.

clear attack-logging {unit *UNIT-ID* **| all}**

Parameters

UNIT-ID	Specifies the unit on which the attack log messages will be cleared.
all	Specifies to clear all attack log entries.

Default

None.

Command Mode

Privilege EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command used to delete the attack log messages.

Example

This example shows how to delete all the attack log messages.

```
Switch# clear attack-logging all
Switch#
```

69. Time and SNTP Commands

69-1 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 Jul 4, 2014.

```
Switch# clock set 18:00:00 4 Jul 2014
Switch#
```

69-2 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 (by name, January, February, and so on).
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 April 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 April 2:00 last sun October 2:00
Switch(config)#
```

69-3 clock timezone

This command is used to set the time zone for display purposes. To set the time to the Coordinated Universal Time (UTC), use the **no** form of this command.

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)#
```

69-4 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         : 18:20:04, 2014-07-04
Time Zone            : UTC +02:30
Daylight Saving Time : Recurring
Offset in Minutes    : 30
    Recurring From   : Apr 2nd Tue 15:00
              To     : Oct 2nd Wed 15:30

Switch#
```

69-5 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#
```

69-6 sntp server

This command is used to allow the system clock to be synchronized with an SNTP time server. To remove a server from the list of SNTP servers, use the **no** form of this command.

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** 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)#
```

69-7 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)#
```

69-8 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)#
```

70. Time Range Commands

70-1 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)#
```

70-2 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#
```

70-3 time-range

This command is used to enter the time range configuration mode to define a time range. Use the **no** 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)#
```

71. Traffic Segmentation Commands

71-1 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 eth3/0/1.

```
Switch# show traffic-segmentation forward interface eth3/0/1

Interface        Forwarding Domain
------------ ----------------------------------------
eth1/0/1        eth1/0/1, eth1/0/4, eth1/0/5, eth1/0/6

Total Entries: 1

Switch#
```

71-2 traffic-segmentation forward

This command is used to restrict the Layer 2 packet forwarding domain of packets received by the configured port. Use **no** form of this command to remove the specification of forwarding domain.

traffic-segmentation forward interface *INTERFACE-ID* **[, | -]**

no traffic-segmentation forward interface *INTERFACE-ID* **[, | -]**

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.

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 eth3/0/1 to a set of ports, which are eth4/0/1 – eth4/0/6.

```
Switch# configure terminal
Switch(config)# interface eth3/0/1
Switch(config-if)# traffic-segmentation forward interface range eth4/0/1-6
Switch(config-if)#
```

72. Virtual LAN (VLAN) Commands

72-1 acceptable-frame

This command is used to set the acceptable types of frames by a port. Use the **no** form of the command to reset to the default setting.

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 eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# acceptable-frame tagged-only
Switch(config-if)#
```

72-2 ingress-checking

This command is used to enable ingress checking for frames received by a port. Use the **no** 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 eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# ingress-checking
Switch(config-if)#
```

72-3 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 eth1/0/1-1/0/4.

```
Switch#show vlan interface eth1/0/1-1/0/4

 eth1/0/1
   VLAN mode             : Hybrid
   Native VLAN           : 1
   Hybrid untagged VLAN  : 1
   Hybrid tagged VLAN    :
   Ingress checking      : Enabled
   Acceptable frame type : Admit-All
   Dynamic tagged VLAN   :

 eth1/0/2
   VLAN mode             : Hybrid
   Native VLAN           : 1
   Hybrid untagged VLAN  : 1
   Hybrid tagged VLAN    :
   Ingress checking      : Enabled
   Acceptable frame type : Admit-All
   Dynamic tagged VLAN   :

 eth1/0/3
   VLAN mode             : Hybrid
   Native VLAN           : 1
   Hybrid untagged VLAN  : 1
   Hybrid tagged VLAN    :
   Ingress checking      : Enabled
   Acceptable frame type : Admit-All
   Dynamic tagged VLAN   :

 eth1/0/4
   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#
```

72-4 switchport access vlan

This command is used to specify the access VLAN for an interface. Use the **no** form of the command to reset 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 configure the interface 1/0/1 to access mode with access VLAN 1000.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# switchport mode access
Switch(config-if)# switchport access vlan 1000
Switch(config-if)#
```

72-5 switchport hybrid allowed vlan

This command is used to specify the tagged or untagged VLANs for a hybrid port. Use the **no** form of the command to reset 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 no option 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 eth1/0/1 to be a tagged member of VLAN 1000 and an untagged member of VLAN 2000 and 3000.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
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)#
```

72-6 switchport hybrid native vlan

This command is used to specify the native VLAN ID of a hybrid port. Use the **no** 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 eth1/0/1 to become a hybrid interface and configure the PVID to 20.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
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)#
```

72-7 switchport mode

This command is used to specify the VLAN mode for the port. Use the **no** command to reset the VLAN mode 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 all VLANs 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 eth1/0/1 as a trunk port.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# switchport mode trunk
Switch(config-if)#
```

72-8 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** command to reset 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 eth1/0/1 as a tagged member of VLAN 1000.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport trunk allowed vlan add 1000
Switch(config-if)#
```

72-9 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 eth1/0/1 as a trunk interface and configures the native VLAN to 20.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport trunk native vlan 20
Switch(config-if)#
```

72-10 vlan

This command is used to add VLANs and enter the VLAN configuration mode. Use the **no** 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)#
```

72-11 name

This command is used to specify the name of a VLAN. Use the **no** 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)#
```

73. Voice VLAN Commands

73-1 voice vlan

This command is used to enable the global voice VLAN state and configure the voice VLAN. Use **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)#
```

73-2 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 the command to reset the aging time 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)#
```

73-3 voice vlan enable

This command is used to enable the voice VLAN state of ports. Use the **no** form of the command to disable the voice VLAN's port 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 eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# voice vlan enable
Switch(config-if)#
```

73-4 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)#
```

73-5 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 the 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 eth1/0/1 to be in the **auto tag** mode.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# voice vlan mode auto tag
Switch(config-if)#
```

73-6 voice vlan qos

This command is used to configure the CoS priority for the incoming voice VLAN traffic. Use the **no** form of the command to reset 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)#
```

73-7 show voice vlan

This command is used to display the voice VLAN configurations.

show voice vlan [interface [*INTERFACE-ID* **[, | -]]]**

show voice vlan {device | lldp-med 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           : eth1/0/1-1/0/5
 Dynamic Member Ports : eth1/0/1-1/0/3
 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 eth1/0/1-5

Interface     State       Mode
------------  ----------  ------------
eth1/0/1      Enabled     Auto/Tag
eth1/0/2      Enabled     Manual
eth1/0/3      Enabled     Manual
eth1/0/4      Enabled     Auto/Untag
eth1/0/5      Disabled    Manual

Switch#
```

This example shows how to display the learned voice devices on ports eth1/0/1-1/0/2.

```
Switch# show voice vlan device interface eth1/0/1-2

Interface  Device Address     Start Time         Status
---------  ------------------ -----------------  -------
eth1/0/1   00-03-6B-00-00-01  2012-03-19 09:00   Active
eth1/0/1   00-03-6B-00-00-02  2012-03-20 10:09   Aging
eth1/0/1   00-03-6B-00-00-05  2012-03-20 12:04   Active
eth1/0/2   00-03-6B-00-00-0a  2012-03-19 08:11   Aging
eth1/0/2   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 eth1/0/1-1/0/2.

```
Switch# show voice vlan lldp-med device interface eth1/0/1-2

Index                 : 1
Interface            : eth1/0/1
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            : eth1/0/2
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#
```

74. Web Authentication Commands

74-1 web-auth enable

This command is used to enable the Web authentication function on the port. Use the **no** form of this command to disable the Web authentication function.

web-auth enable

no web-auth enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command allows hosts connected to the port to do authentication via the Web browser.

Example

This example shows how to enable the Web authentication function on interface eth1/0/1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# web-auth enable
Switch(config-if)#
```

74-2 web-auth page-element

This command is used to customize the Web authentication page elements. Use the **no** form of this command to return to the default setting.

web-auth page-element {page-title *STRING* **| login-window-title** *STRING* **| username-title** *STRING* **| password-title** *STRING* **| logout-window-title** *STRING* **| copyright-line** *LINE-NUMBER* **title** *STRING***}**

no web-auth page-element {page-title | login-window-title | username-title | password-title | logout-window-title | copyright-line}

Parameters

page-title *STRING*	Specifies the title of the Web authentication page. The maximum number can be up to 128 characters.
login-window-title *STRING*	Specifies the title of the Web authentication login window. The

	maximum number can be up to 64 characters.
username-title *STRING*	Specifies the user name title of Web authentication login window. The maximum number can be up to 32 characters.
password-title *STRING*	Specifies the password title of Web authentication login window. The maximum number can be up to 32 characters.
logout-window-title *STRING*	Specifies the title of the Web authentication logout window. The maximum number can be up to 64 characters.
copyright-line *LINE-NUMBER* **title** *STRING*	Specifies the copyright information by lines in Web authentication pages. The total copyright information can be up to 5 lines and 128 characters for each line.

Default

By default, the page title is not set.

By default, the login window title is “Authentication Login”.

By default, the username title is “User Name”.

By default, the password title is “Password”.

By default, the logout window title is “Logout From The Network”.

By default, the copyright information is not set.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Administrators can customize Web authentication page elements. There are two Web authentication pages, (1) the authentication login page and (2) the authentication logout page.

The Web authentication login page will be displayed to the user to get the username and password when the system doing Web authentication for the user.

Users can logout from the network by clicking the **Logout** button on the authentication login page after success login to the network.

Example

This example shows how to modify two lines of the copyright information at the bottom of the authentication page with:

Line 1: Copyright @ 2014 All Rights Reserved

Line 2: Site: http://support.website.com

```
Switch# configure terminal
Switch(config)# web-auth page-element copyright-line 1 title Copyright @ 2014 All
Rights Reserved
Switch(config)# web-auth page-element copyright-line 2 title Site:
http://support.website.com
Switch(config)#
```

74-3 web-auth success redirect-path

This command is used to configure the default URL the client Web browser will be redirected to after successful authentication. Use the **no** form of this command to remove the specification.

web-auth success redirect-path *STRING*

no web-auth success redirect-path

Parameters

STRING	Specifies the default URL the client Web browser will be redirected to after successful authentication. If no default redirect URL is specified, the Web authentication logout page will be displayed. The default redirect path can be up to 128 characters.

Default

By default, the Web authentication logout page is displayed.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the Web page to display to the hosts who passes the Web authentication.

Example

This example shows how to configure the default redirect path to be “http://www.website.com” after passing Web authentication.

```
Switch# configure terminal
Switch(config)# web-auth success redirect-path http://www.website.com
Switch(config)#
```

74-4 web-auth system-auth-control

This command is used to enable the Web authentication function globally on the Switch. Use the **no** form of this command to disable the Web authentication function globally on the Switch.

web-auth system-auth-control

no web-auth system-auth-control

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Web authentication is a feature designed to authenticate a user by using the Web browser when the user is trying to access the Internet via the Switch. The Switch itself can be the authentication server and do the authentication based on a local database or be a RADIUS client and perform the authentication process via RADIUS protocol with remote RADIUS server. The authentication process uses either the HTTP or HTTPS protocol.

Example

This example shows how to enable the Web authentication function globally on the Switch.

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

74-5 web-auth virtual-ip

This command is used to configure the Web authentication virtual IP address which is used to accept authentication requests from host. Use the **no** form of this command to return to the default setting.

web-auth virtual-ip {ipv4 *IP-ADDRESS* **| ipv6** *IPV6-ADDRESS* **| url** *STRING***}**

no web-auth virtual-ip {ipv4 | ipv6 | url}

Parameters

ipv4 *IP-ADDRESS*	Specifies the Web authentication virtual IPv4 address.
url *STRING*	Specifies the FQDN URL for Web authentication The FQDN URL can be up to 128 characters.
ipv6 *IPV6-ADDRESS*	Specifies the Web authentication virtual IPv6 address.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The virtual IP of Web authentication is just the characterization of the Web authentication function on the Switch. All Web authentication processes communicate with this IP address, however, the virtual IP does not respond to any ICMP packet or ARP request. So it's not allowed to configure virtual IP in the same subnet as the Switch's IP interface or the same subnet as the host PCs' subnet, otherwise the Web authentication cannot operate correctly.

The defined URL only takes effect when the virtual IP address is configured. The users get the FQDN URL stored on the DNS server to get the virtual IP address. The obtained IP address must match the virtual IP address configured by the command.

If the IPv4 virtual IP is not configured, the IPv4 access cannot start a Web authentication. If the IPv6 virtual IP is not configured, the IPv6 access cannot start a Web authentication.

Example

This example shows how to configure the Web authentication virtual IPv4 to be “1.1.1.1” and the FQDN URL to be “www.website4.co”.

```
Switch# configure terminal
Switch(config)# web-auth virtual-ip  ipv4 1.1.1.1
Switch(config)# web-auth virtual-ip  url www.website4.co
Switch(config)#
```

This example shows how to Switch# configure terminal configure the Web authentication virtual IPv6 to be “2000::2” and the FQDN URL to be “www.website6.co”.

```
Switch# configure terminal
Switch(config)# web-auth virtual-ip ipv6 2000::2
Switch(config)# web-auth virtual-ip url www.website6.co
Switch(config)#
```

74-6 snmp-server enable traps web-auth

This command is used to enable sending SNMP notifications for Web-Authentication. Use the **no** form of this command to disable sending SNMP notifications.

snmp-server enable traps web-auth

no snmp-server enable traps web-auth

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 sending SNMP notifications for Web-Authentication.

Example

This example shows how to enable sending SNMP notifications for Web-Authentication

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

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.

802.1X

Log Description	Severity
Event description: 802.1X Authentication failure. Log Message: 802.1X authentication fail [due to <reason>] from (Username: <username>, <interface-id>, MAC: <mac-address>) Parameters description: reason: The reason for the failed authentication. The possible reason may be: (1) user authentication failure. (2) no server(s) responding. (3) no servers configured. (4) no resources. (5) user timeout expired. username: The user that is being authenticated.. interface-id: The switch interface number. mac-address: The MAC address of the authenticated device.	Critical
Event description:802.1X fails to work due to H/W ACL resource is exhausted. Log Message: 802.1X cannot work correctly because ACL rule resource is not available.	Alert
Event description: 802.1X Authentication successful. Log Message: 802.1X authentication success (Username: <username>, <interface-id>, MAC: <mac-address>) Parameters description: username: The user that is being authenticated. interface-id: The interface name. mac-address: The MAC address of the authenticated device.	Informational

AAA

Log Description	Severity
Event description: This log will be generated when AAA global state is enabled or disabled. Log Message: AAA is <status>. Parameters description: status: The status indicates the AAA enabled or disabled.	Informational
Event description: This log will be generated when login successfully. Log Message: Successful login through <exec-type> <from client-ip> authenticated by AAA <aaa-method> <server-ip> (Username: <username>). Parameters description: exec-type: It indicates the EXEC types, e.g.: Console, Telnet, SSH, Web, Web(SSL).	Informational

client-ip: It indicates the client's IP address if valid through IP protocol. aaa-method: It indicates the authentication method, e.g.: none, local, server. server-ip: It indicates the AAA server IP address if authentication method is remote server. Username: It indicates the username for authentication.	
Event description: This log will be generated when login failure. Log Message: Login failed through <exec-type> <from client-ip> authenticated by AAA <aaa-method> <server-ip> (Username: <username>). Parameters description: exec-type: It indicates the EXEC types, e.g.: Console, Telnet, SSH, Web, Web(SSL). client-ip: It indicates the client's IP address if valid through IP protocol. aaa-method: It indicates the authentication method, e.g.: local, server. server-ip: It indicates the AAA server IP address if authentication method is remote server. username: It indicates the username for authentication.	Warning
Event description: This log will be generated when the remote server does not respond to the login authentication request. Log Message: Login failed through <exec-type> <from client-ip> due to AAA server <server-ip> timeout (Username: <username>). Parameters description: exec-type: It indicates the EXEC types, e.g.: Console, Telnet, SSH, Web, Web(SSL). client-ip: It indicates the client's IP address if valid through IP protocol. server-ip: It indicates the AAA server IP address. username: It indicates the username for authentication.	Warning
Event description: This log will be generated when enable privilege successfully. Log Message: Successful enable privilege through <exec-type> <from client-ip> authenticated by AAA <aaa-method> <server-ip> (Username: <username>). Parameters description: exec-type: It indicates the EXEC types, e.g.: Console, Telnet, SSH, Web, Web(SSL). client-ip: It indicates the client's IP address if valid through IP protocol. aaa-method: It indicates the authentication method, e.g.: none, local, server. server-ip: It indicates the AAA server IP address if authentication method is remote server. Username: It indicates the username for authentication.	Informational
Event description: This log will be generated when enable privilege failure. Log Message: Enable privilege failed through <exec-type> <from client-ip> authenticated by AAA <aaa-method> <server-ip> (Username: <username>). Parameters description: exec-type: It indicates the EXEC types, e.g.: Console, Telnet, SSH, Web, Web(SSL). client-ip: It indicates the client's IP address if valid through IP protocol. aaa-method: It indicates the authentication method, e.g.: local, server. server-ip: It indicates the AAA server IP address if authentication method is remote server. username: It indicates the username for authentication.	Warning

Event description: This log will be generated when the remote server does not respond to the enable password authentication request. Log Message: Enable privilege failed through <exec-type> <from client-ip> due to AAA server <server-ip> timeout (Username: <username>). Parameters description: exec-type: It indicates the EXEC types, e.g.: Console, Telnet, SSH, Web, Web(SSL). client-ip: It indicates the client's IP address if valid through IP protocol. server-ip: It indicates the AAA server IP address. username: It indicates the username for authentication.	Warning
Event description: This log will be generated when RADIUS assigned a valid VLAN ID attributes. Log Message: RADIUS server <server-ip> assigned VID: <vid> to port <interface-id> (Username: <username>) Parameters description: server-ip: It indicates the RADIUS server IP address. vid: The assign VLAN ID that authorized by from RADIUS server. interface–id: It indicates the port number of the client authenticated. Username: It indicates the username for authentication.	Informational
Event description: This log will be generated when RADIUS assigned a valid bandwidth attributes. Log Message: RADIUS server <server-ip> assigned <direction> bandwidth: <threshold> to port < interface -id> (Username: <username>) Parameters description: server-ip: It indicates the RADIUS server IP address. Direction: It indicates the direction for bandwidth control, e.g.: ingress or egress. Threshold: The assign threshold of bandwidth that authorized by from RADIUS server. Interface-id: It indicates the port number of the client authenticated. Username: It indicates the username for authentication.	Informational
Event description: This log will be generated when RADIUS assigned a valid priority attributes. Log Message: RADIUS server <server-ip> assigned 802.1p default priortiy: <priority> to port < interface -id> (Username: <username>) Parameters description: server-ip: It indicates the RADIUS server IP address. priority: The assign priority that authorized by from RADIUS server. interface–id: It indicates the port number of the client authenticated. Username: It indicates the username for authentication.	Informational
Event description: This log will be generated when RADIUS assigned ACL script but fails to apply to the system due to insufficient resource. Log Message: RADIUS server <server-ip> assigns <username> ACL failure at port < interface -id> (<acl-script>) Parameters description: server-ip: It indicates the RADIUS server IP address. username: It indicates the username for authentication. interface-id: It indicates the port number of the client authenticated. acl-script: The assign ACL script that authorized by from RADIUS server.	Warning

Auto Surveillance VLAN

Log Description	Severity
Event description: When a new surveillance device is detected on an interface. Log Message: New surveillance device detected (<interface-id>, MAC: < mac-address >) Parameters description: interface-id: Interface name. mac-address: Surveillance device MAC address.	Informational
Event description: When an interface which is enabled surveillance VLAN joins the surveillance VLAN automatically. Log Message: <interface-id> add into surveillance VLAN <vid > Parameters description: interface-id: Interface name. vid:VLAN ID	Informational
Event description: When an interface leaves the surveillance VLAN and at the same time, no surveillance device is detected in the aging interval for that interface, the log message will be sent. Log Message: <interface-id> remove from surveillance VLAN <vid > Parameters description: interface-id: Interface name. vid:VLAN ID	Informational

BPDU Attack Protection

Log Description	Severity
Event description: Record the event when the BPDU attack happened. Log Message: <interface-id> enter STP BPDU under protection state (mode: <mode>) Parameters description: interface-id: Interface on which detected STP BPDU attack. mode: BPDU Protection mode of the interface. Mode can be drop, block, or shutdown	Informational
Event description: Record the event when the STP BPDU attack recovered. Log Message: <interface-id> recover from BPDU under protection state. Parameters description: interface-id: Interface on which detected STP BPDU attack.	Informational

Configuration/Firmware

Log Description	Severity
Event description: Firmware upgraded successfully. Log Message: [Unit <unitID>,]Firmware upgraded by <session> successfully (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description:	Informational

unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	
Event description: Firmware upgraded unsuccessfully. Log Message: [Unit <unitID>,]Firmware upgraded by <session> unsuccessfully (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Warning
Event description: Firmware uploaded successfully. Log Message: [Unit <unitID>,]Firmware uploaded by <session> successfully (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Informational
Event description: Firmware uploaded unsuccessfully. Log Message: [Unit <unitID>,]Firmware uploaded by <session> unsuccessfully (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Warning
Event description: Configuration downloaded successfully. Log Message: [Unit <unitID>,]Configuration downloaded by <session> successfully. (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID.	Informational

session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	
Event description: Configuration downloaded unsuccessfully. Log Message: [Unit <unitID>,]Configuration downloaded by <session> unsuccessfully. (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Warning
Event description: Configuration uploaded successfully. Log Message: [Unit <unitID>,]Configuration uploaded by <session> successfully. (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Informational
Event description: Configuration uploaded unsuccessfully. Log Message: [Unit <unitID>,] Configuration uploaded by <session> unsuccessfully. (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Warning

DAI

Log Description	Severity
Event description: This log will be generated when DAI detect invalid ARP packet. Log Message: Illegal ARP <type> packets (IP: <ip-address>, MAC: <mac-	Warning

address>, VLAN <vlan-id>, on <interface-id>). Parameters description: type: The type of ARP packet, it indicates that ARP packet is request or ARP response.	
Event description: This log will be generated when DAI detect valid ARP packet. Log Message: Legal ARP <type> packets (IP: <ip-address>, MAC: <mac-address>, VLAN <vlan-id>, on <interface-id>). Parameters description: type: The type of ARP packet, it indicates that ARP packet is request or ARP response.	Informational

DDM

Log Description	Severity
Event description: when the any of SFP parameters exceeds from the warning threshold. Log Message: Optical transceiver <interface-id> <component> <high-low> warning threshold exceeded. Parameters description: interface-id: port interface ID. component: DDM threshold type. It can be one of the following types: temperature supply voltage bias current TX power RX power high-low: High or low threshold.	Warning
Event description: when the any of SFP parameters exceeds from the alarm threshold. Log Message: Optical transceiver <interface-id> <component> <high-low> alarm threshold exceeded. Parameters description: interface-id: port interface ID. component: DDM threshold type. It can be one of the following types: temperature supply voltage bias current TX power RX power high-low: High or low threshold.	Critical
Event description: when the any of SFP parameters recovers from the warning threshold. Log Message: Optical transceiver <interface-id> <component> <high-low> warning threshold exceeding back to normal. Parameters description: interface-id: port interface ID. component: DDM threshold type. It can be one of the following types: temperature	Warning

supply voltage bias current TX power RX power high-low: High or low threshold.	
Event description: when the any of SFP parameters recovers from the alarm threshold. Log Message: Optical transceiver <interface-id> <component> <high-low> alarm threshold exceeding back to normal. Parameters description: interface-id: port interface ID. component: DDM threshold type. It can be one of the following types: temperature supply voltage bias current TX power RX power high-low: High or low threshold.	Critical

DHCPv6 Client

Log Description	Severity
Event description: DHCPv6 client interface administrator state changed. Log Message: DHCPv6 client on interface <ipif-name> changed state to [enabled | disabled]. Parameters description: <ipif-name>: Name of the DHCPv6 client interface.	Informational
Event description: DHCPv6 client obtains an ipv6 address from a DHCPv6 server. Log Message: DHCPv6 client obtains an ipv6 address < ipv6address > on interface <ipif-name>. Parameters description: ipv6address: ipv6 address obtained from a DHCPv6 server. ipif-name: Name of the DHCPv6 client interface.	Informational
Event description: The ipv6 address obtained from a DHCPv6 server starts renewing. Log Message: The IPv6 address < ipv6address > on interface <ipif-name> starts renewing. Parameters description: ipv6address: ipv6 address obtained from a DHCPv6 server. ipif-name: Name of the DHCPv6 client interface.	Informational
Event description: The ipv6 address obtained from a DHCPv6 server renews success. Log Message: The IPv6 address < ipv6address > on interface <ipif-name> renews success. Parameters description: ipv6address: ipv6 address obtained from a DHCPv6 server. ipif-name: Name of the DHCPv6 client interface.	Informational
Event description: The ipv6 address obtained from a DHCPv6 server starts	Informational

rebinding Log Message: The IPv6 address < ipv6address > on interface <ipif-name> starts rebinding. Parameters description: ipv6address: ipv6 address obtained from a DHCPv6 server. ipif-name: Name of the DHCPv6 client interface.	
Event description: The ipv6 address obtained from a DHCPv6 server rebinds success Log Message: The IPv6 address < ipv6address > on interface <ipif-name> rebinds success. Parameters description: ipv6address: ipv6 address obtained from a DHCPv6 server. ipif-name: Name of the DHCPv6 client interface.	Informational
Event description: The ipv6 address from a DHCPv6 server was deleted. Log Message: The IPv6 address < ipv6address > on interface <ipif-name> was deleted. Parameters description: ipv6address: ipv6 address obtained from a DHCPv6 server. ipif-name: Name of the DHCPv6 client interface.	Informational
Event description: DHCPv6 client PD interface administrator state changed. Log Message: DHCPv6 client PD on interface <intf-name> changed state to <enabled | disabled> Parameters description: intf-name: Name of the DHCPv6 client PD interface.	Informational
Event description: DHCPv6 client PD obtains an IPv6 prefix from a delegation router. Log Message: DHCPv6 client PD obtains an ipv6 prefix < ipv6networkaddr> on interface <intf-name> Parameters description: ipv6networkaddr: ipv6 preifx obtained from a delegation router. intf-name: Name of the DHCPv6 client PD interface.	Informational
Event description: The IPv6 prefix obtained from a delegation router starts renewing. Log Message: The IPv6 prefix < ipv6networkaddr > on interface <intf-name> starts renewing. Parameters description: ipv6networkaddr: IPv6 prefix obtained from a delegation router. intf-name: Name of the DHCPv6 client PD interface.	Informational
Event description: The IPv6 prefix obtained from a delegation router renews success. Log Message: The IPv6 prefix < ipv6networkaddr > on interface <intf-name> renews success. Parameters description: ipv6anetworkaddr: IPv6 prefix obtained from a delegation router. intf-name: Name of the DHCPv6 client PD nterface.	Informational
Event description: The IPv6 prefix obtained from a delegation router starts rebinding. Log Message: The IPv6 prefix < ipv6networkaddr > on interface <intf-name> starts rebinding.	Informational

Parameters description: ipv6address: IPv6 prefix obtained from a delegation router. intf-name: Name of the DHCPv6 client PD interface.	
Event description: The IPv6 prefix obtained from a delegation router rebinds success. Log Message: The IPv6 prefix < ipv6networkaddr > on interface <intf-name> rebinds success. Parameters description: ipv6address: IPv6 prefix obtained from a delegation router. intf-name: Name of the DHCPv6 client PD interface.	Informational
Event description: The IPv6 prefix from a delegation router was deleted. Log Message: The IPv6 prefix < ipv6networkaddr > on interface <intf-name> was deleted. Parameters description: ipv6address: IPv6 prefix obtained from a delegation router. intf-name: Name of the DHCPv6 client PD interface.	Informational

DHCPv6 Relay

Log Description	Severity
Event description: DHCPv6 relay on a specify interface's administrator state changed Log Message: DHCPv6 relay on interface <ipif-name> changed state to [enabled | disabled] Parameters description: <ipif-name>: Name of the DHCPv6 relay agent interface.	Informational

DNS Resolver

Log Description	Severity
Event description: Duplicate Domain name cache added, leads a dynamic domain name cache be deleted Log Message: [DNS_RESOLVER(1):]Duplicate Domain name case name: <domainname>, static IP: <ipaddr>, dynamic IP:<ipaddr> Parameters description: domainame: the domain name string. ipaddr: IP address.	Informational

DOS Prevention

Log Description	Severity
Event description: Detect DOS attack. Log Message: <dos-type> is dropped from (IP: <ip-address> Port <interface-id>). Parameters description: dos-type: DOS attack type ip-address: IP address.	Notice

interface-id: Interface name

Interface

Log Description	Severity
Event description: When port is down Log Message: Port <port-type>< interface-id> link down Parameters description: port-type: port type interface-id: Interface name	Informational
Event description: When port is up Log Message: Port <port-type>< interface-id> link up, <link-speed> Parameters description: port-type: port type interface-id: Interface name link-speed: port link speed.	Informational

JWAC

Log Description	Severity
Event description: when a host has passed the authentication. Log Message: JWAC host login success (Username: <string>, IP: <ipaddr | ipv6address>, MAC: <mac-address>, <interface-id>, VID: <vlan-id>). Parameters description: Username: The host username. IP: The host IP address mac-address: The host MAC addresses. interface-id: The interface on which the host is authenticated. vlan-id: The VLAN ID on which the host exists	Informational
Event description: When a host fail to pass the authentication. Log Message: JWAC host login fail (Username: <string>, IP: <ipaddr | ipv6address>, MAC: <mac-address>, <interface-id>, VID: <vlan-id>) Parameters description: Username: The host username. IP: The host IP address mac-address: The host MAC addresses.. interface-id: The interface on which the host is authenticated. vlan-id: The VLAN ID on which the host exists	Critical
Event description: when the authorized user number on the whole device has reached the maximum user limit. Log Message: JWAC enters stop learning state.	Warning
Event description: when the authorized user number on the whole device is below the maximum user limit in a time interval. Log Message: JWAC recovers from stop learning state.	Warning
Event description: When the ACL hardware resource is exhausted. Log Message: JWAC cannot work correctly because ACL rule resource is not	Alert

available.

LACP

Log Description	Severity
Event description: Link Aggregation Group link up. Log Message: Link Aggregation Group < group_id > link up. Parameters description: group_id: The group id of the link down aggregation group.	Informational
Event description: Link Aggregation Group link down. Log Message: Link Aggregation Group < group_id > link down. Parameters description: group_id: The group id of the link down aggregation group.	Informational
Event description: Member port attach to Link Aggregation Group. Log Message: <ifname> attach to Link Aggregation Group <group_id>. Parameters description: ifname: The interface name of the port that attach to aggregation group. group_id: The group id of the aggregation group that port attach to.	Informational
Event description: Member port detach from Link Aggregation Group. Log Message: <ifname> detach from Link Aggregation Group <group_id>. Parameters description: ifname: The interface name of the port that detach from aggregation group. group_id: The group id of the aggregation group that port detach from.	Informational

LBD

Log Description	Severity
Event description: Record the event when an interface detect loop. Log Message: <interface-id> LBD loop occurred. Parameters description: interface-id: Interface on which loop is detected.	Critical
Event description: Record the event when an interface detect loop. Log Message: <interface-id > VLAN <vlan-id> LBD loop occurred. Parameters description: interface-id: Interface on which loop is detected. vlan-id: VLAN on which loop is detected.	Critical
Event description: Record the event when an interface loop recovered Log Message: <interface-id> LBD loop recovered. Parameters description: interface-id: Interface on which loop is detected.	Critical
Event description: Record the event when an interface loop recovered. Log Message: <interface-id> VLAN <vlan-id> LBD loop recovered. Parameters description: interface-id: Interface on which loop is detected. vlan-id: VLAN on which loop is detected.	Critical

Event description: Record the event when the number of VLANs that loop back has occurred exceeds a reserved number. Log Message: Loop VLAN numbers overflow.	Critical
Event description: When the ACL hardware resource is exhausted. Log Message: Web-Authentication cannot work correctly because ACL rule resource is not available.	Alert

LLDP-MED

Log Description	Severity
Event description: LLDP-MED topology change detected Log Message: LLDP-MED topology change detected (on port <portNum>. chassis id: <chassisType>, <chassisID>, port id: <portType>, <portID>, device class: <deviceClass>) Parameters description: portNum: The port number. chassisType: chassis ID subtype. Value list: 1. chassisComponent(1) 2. interfaceAlias(2) 3. portComponent(3) 4. macAddress(4) 5. networkAddress(5) 6. interfaceName(6) 7. local(7) chassisID: chassis ID. portType: port ID subtype. Value list: 1. interfaceAlias(1) 2. portComponent(2) 3. macAddress(3) 4. networkAddress(4) 5. interfaceName(5) 6. agentCircuitId(6) 7. local(7) portID: port ID. deviceClass: LLDP-MED device type.	Notice
Event description: Conflict LLDP-MED device type detected Log Message: Conflict LLDP-MED device type detected (on port < portNum >, chassis id: < chassisType>, <chassisID>, port id: < portType>, <portID>, device class: <deviceClass>) Parameters description: portNum: The port number. chassisType: chassis ID subtype. Value list: 1. chassisComponent(1) 2. interfaceAlias(2) 3. portComponent(3)	Notice

4. macAddress(4) 5. networkAddress(5) 6. interfaceName(6) 7. local(7) chassisID: chassis ID. portType: port ID subtype. Value list: 1. interfaceAlias(1) 2. portComponent(2) 3. macAddress(3) 4. networkAddress(4) 5. interfaceName(5) 6. agentCircuitId(6) 7. local(7) portID: port ID. deviceClass: LLDP-MED device type.	
Event description: Incompatible LLDP-MED TLV set detected Log Message: Incompatible LLDP-MED TLV set detected (on port < portNum >, chassis id: < chassisType>, <chassisID>, port id: < portType>, <portID>, device class: <deviceClass>) Parameters description: portNum: The port number. chassisType: chassis ID subtype. Value list: 1. chassisComponent(1) 2. interfaceAlias(2) 3. portComponent(3) 4. macAddress(4) 5. networkAddress(5) 6. interfaceName(6) 7. local(7) chassisID: chassis ID. portType: port ID subtype. Value list: 1. interfaceAlias(1) 2. portComponent(2) 3. macAddress(3) 4. networkAddress(4) 5. interfaceName(5) 6. agentCircuitId(6) 7. local(7) portID: port ID. deviceClass: LLDP-MED device type.	Notice

Login/Logout CLI

Log Description	Severity

Event description: Login through console successfully. Log Message: [Unit <unitID>,]Successful login through Console (Username: <username>) Parameters description: unitID: The unit ID. username: Represent current login user.	Informational
vent description: Login through console unsuccessfully. Log Message: [Unit <unitID>,] Login failed through Console (Username: <username>) Parameters description: unitID: The unit ID. username: Represent current login user.	Warning
Event description: Console session timed out. Log Message: [Unit <unitID>,] Console session timed out (Username: <username>) Parameters description: unitID: The unit ID. username: Represent current login user.	Informational
Event description: Logout through console. Log Message: [Unit <unitID>,] Logout through Console (Username: <username>) Parameters description: unitID: The unit ID. username: Represent current login user.	Informational
Event description: Login through telnet successfully. Log Message: Successful login through Telnet (Username: <username>, IP: <ipaddr>) Parameters description: username: Represent current login user. ipaddr: Represent client IP address.	Informational
Event description: Login through telnet unsuccessfully. Log Message: Login failed through Telnet (Username: <username>, IP: <ipaddr>) Parameters description: username: Represent current login user. ipaddr: Represent client IP address.	Warning
Event description: Telnet session timed out. Log Message: Telnet session timed out (Username: <username>, IP: <ipaddr>) Parameters description: username: Represent current login user. ipaddr: Represent client IP address.	Informational
Event description: Logout through telnet. Log Message: Logout through Telnet (Username: <username>, IP: <ipaddr>) Parameters description: username: Represent current login user. ipaddr: Represent client IP address.	Informational
Event description: Login through SSH successfully. Log Message: Successful login through SSH (Username: <username>, IP: <ipaddr>)	Informational

Parameters description: username: Represent current login user. ipaddr: Represent client IP address.	
Event description: Login through SSH unsuccessfully. Log Message: Login failed through SSH (Username: <username>, IP: <ipaddr>) Parameters description: username: Represent current login user. ipaddr: Represent client IP address.	Critical
Event description: SSH session timed out. Log Message: SSH session timed out (Username: <username>, IP: <ipaddr>) Parameters description: username: Represent current login user. ipaddr: Represent client IP address.	Informational
Event description: Logout through SSH. Log Message: Logout through SSH (Username: <username>, IP: <ipaddr>) Parameters description: username: Represent current login user. ipaddr: Represent client IP address.	Informational

MAC-based Access Control

Log Description	Severity
Event description: A host has passed the authentication. Log Message: MAC-based Access Control host login success (MAC: <mac-address>, <interface-id>, VID: <vlan-id>). Parameters description: mac-address: The host MAC address interface-id: The interface on which the host is authenticated vlan-id: The VLAN ID on which the host exists	Informational
Event description: A host has aged out. Log Message: MAC-based Access Control host aged out (MAC: <mac-address>, <interface-id>, VID: <vlan-id>). Parameters description: mac-address: The host MAC address interface-id: The interface on which the host is authenticated vlan-id: The VLAN ID on which the host exists	Informational
Event description: A host failed to pass the authentication. Log Message: MAC-based Access Control host login fail (MAC: <mac-address>, <interface-id>, VID: <vlan-id>). Parameters description: mac-address: The host MAC address interface-id: The interface on which the host is authenticated vlan-id: The VLAN ID on which the host exists	Critical
Event description: The authorized user number on the whole device has reached the maximum user limit. Log Message: MAC-based Access Control enters stop learning state.	Warning

Event description: The authorized user number on the whole device is below the maximum user limit in a time interval. Log Message: MAC-based Access Control recovers from stop learning state.	Warning
Event description: The authorized user number on an interface has reached the maximum user limit. Log Message: <interface-id> enters MAC-based Access Control stop learning state. Parameters description: interface-id: The interface on which the host is authenticated	Warning
Event description: The authorized user number on a interface is below the maximum user limit in a time interval. Log Message: <interface-id> recovers from MAC-based Access Control stop learning state. Parameters description: interface-id: The interface on which the host is authenticated	Warning

MSTP Debug Enhancement

Log Description	Severity
Event description: Used to record the event that Spanning Tree Protocol is enabled. Log Message: Spanning Tree Protocol is enabled	Informational
Event description: Used to record the event that Spanning Tree Protocol is disabled Log Message: Spanning Tree Protocol is disabled.	Informational
Event description: Used to record MSTP instance topology change event. Log Message: Topology changed (Instance : < Instance-id >,<interface_id>, MAC:<macaddr>) Parameters description: Instance-id: MST instance id. Instance 0 represents for default instance, CIST. interface_id: The port number which detect or reive topochange information. macaddr: The system of bridge mac address.	Notice
Event description: Used to record MSTP instance new root bridge selected. Log Message: [CIST | CIST Regional | MSTI Regional] New Root bridge selected ([Instance: <Instance-id>] MAC: <macaddr> Priority :< priority>) Parameters description: Instance-id: MST instance id. Instance 0 represents for default instance, CIST. macaddr: The system of bridge mac address. priority: The bridge priority value must be divisible by 4096	Informational
Event description: Used to record MSTP instance new root port selected. Log Message: New root port selected (Instance:<Instance-id >, <interface_id >) Parameters description: Instance-id: MST instance id. Instance 0 represents for default instance, CIST. interface_id: The port number which detect or rereive topochange	Notice

information.	
Event description: Used to record MSTP instance port state change event. Log Message: Spanning Tree port status change (Instance :< Instance-id >, <interface_id>) <old_status> -> <new_status> Parameters description: Instance-id: MST instance id. Instance 0 represents for default instance, CIST. interface_id: The port number which detect or rereive topochange information. old status: new status: The port of STP state.The value may be Disable, Discarding, Learning, Forwarding	Notice
Event description: Used to record MSTP instance port role change event. Log Message: Spanning Tree port role change (Instance :< Instance-id >, <interface_id>) <old_role> -> <new_role> Parameters description: Instance-id: MST instance id. Instance 0 represents for default instance, CIST. Interface_id: The port number which detect or rereive topochange information. old role: new role : The port role of stp.The value may be Disable, Alternate, Backup, Root, Designated	Informational
Event description: Use to record action to create an MST instance. Log Message: Spanning Tree instance created (Instance :< Instance-id >) Parameters description: Instance-id: MST instance id. Instance 0 represents for default instance, CIST.	Informational
Event description: Use to record action to delete an MST instance. Log Message: Spanning Tree instance deleted (Instance :< Instance-id >) Parameters description: Instance-id: MST instance id. Instance 0 represents for default instance, CIST.	Informational
Event description: Use to record action to change the STP version. Log Message: Spanning Tree version change (new version :< new_version>) Parameters description: new_version: Running under which version of STP.	Informational
Event description: Spanning Tree MST configuration ID name and revision level change (name :< name>, revision level <revision_level>). Log Message: Used to record the configuration name and revision level changed in the MST Configuration Identification. Parameters description: name: The name given for a specified MST region. revision_level: Switches using the same given name but with a different revision level are considered members of different MST regions.	Informational
Event description: Use to record action to maps a VLAN(s) to an MST instance. Log Message: Spanning Tree MST configuration ID VLAN mapping table change	Informational

(instance: <Instance-id> add vlan <startvlanid> [- <endvlanid>]) Parameters description: Instance-id: MST instance id. Instance 0 represents for default instance, CIST. startvlanid: The start vid of add vlan range. endvlanid: The end vid of add vlan range.	
Event description: Use to record action to delete a VLAN(s) from an MST instance. Log Message: Spanning Tree MST configuration ID VLAN mapping table change (instance: <Instance-id> delete vlan <startvlanid> [- <endvlanid>]) Parameters description: Instance-id: MST instance id. Instance 0 represents for default instance, CIST. startvlanid: The start vid of add vlan range. endvlanid: The end vid of add vlan range.	Informational
Event description: Used to record the event that port role change to alternate due to guard root. Log Message: Spanning Tree port role change (Instance :< instance-id >, <interface-id>) to alternate port due to the guard root Parameters description: Instance-id: MST instance id. Instance 0 represents for default instance, CIST. Interface_id: The port number which detect the event.	

Peripheral

Log Description	Severity
Event description: Fan Recovered. Log Message: Unit <id>, <fan-descr> back to normal. Parameters description: Unit <id>: The unit ID. fan-descr: The FAN ID and position.	Critical
Event description: Fan Fail Log Message: Unit <id> <fan-descr> failed Parameters description: Unit <id>: The unit ID. fan-descr: The FAN ID and position.	Critical
Event description: Temperature sensor enters alarm state. Log Message: Unit <unit-id> <thermal-sensor-descr> detects abnormal temperature <degree> Parameters description: unitID: The unit ID. thermal-sensor-descr: The sensor ID and position. degree: The current temperature.	Critical
Event description: Temperature recovers to normal. Log Message: Unit <unit-id> <thermal-sensor-descr> temperature back to normal Parameters description: unitID: The unit ID.	Critical

thermal-sensor-descr: The sensor ID and position.	
Event description: Power failed. Log Message: Unit <unit-id> <power-descr> failed Parameters description: unitID: The unit ID. power-descr: The power position and ID.	Critical
Event description: Power is recovered. Log Message: Unit <unit-id> <power-descr> back to normal Parameters description: unitID: The unit ID. power-descr: The power position and ID.	Critical
Event description: Press the factory reset button. Log Message: Unit <unit-id> factory reset button pressed. Parameters description: unitID: The unit ID.	Critical

PoE

Log Description	Severity
Event description: Total power usage threshold is exceeded Log Message: Unit <unit-id> usage threshold <percentage> is exceeded Parameters description: unit-id : box id percentage : usage threshold	Warning
Event description: Total power usage threshold is recovered. Log Message: Unit <unit-id> usage threshold <percentage> is recovered Parameters description: unit-id : box id percentage : usage threshold	Warning

Port Security

Log Description	Severity
Event description: Address full on a port Log Message: MAC address <macaddr> causes port security violation on <interface-id>. Parameters description: macaddr: The violation MAC address. interface-id: The interface name.	Warning
Event description: Address full on system Log Message: Limit on system entry number has been exceeded.	Warning

Safeguard

Log Description	Severity

Event description: the host enters the mode of exhausted. Log Message: Unit <unit-id>, Safeguard Engine enters EXHAUSTED mode. Parameters description: unit-id: The Unit ID	Warning
Event description: the host enters the mode of normal. Log Message: Unit <unit-id>, Safeguard Engine enters NORMAL mode. Parameters description: unit-id: The Unit ID	Informational

SNMP

Log Description	Severity
Event Description: SNMP request received with invalid community string Log Message: SNMP request received from <ipaddr> with invalid community string. Parameters Description: ipaddr: The IP address.	Informational

SSH

Log Description	Severity
Event description: SSH server is enabled. Log Message: SSH server is enabled	Informational
Event description: SSH server is disabled. Log Message: SSH server is disabled	Informational
Event description: Login failed through SSH. Log Message: Login failed through SSH (Username: <username>, IP: <ipaddr | ipv6address>). Parameters description: username: User name which logs in fail. ipaddr: IP address of host from which the user logged in. ipv6address: IPv6 address of host from which the user logged in.	Critical

Stacking

Log Description	Severity
Event description: Hot insertion. Log Message: Unit: <unitID>, MAC: <macaddr> Hot insertion. Parameters description: unitID: Box ID. Macaddr: MAC address.	Informational
Event description: Hot removal. Log Message: Unit: <unitID>, MAC: <macaddr> Hot removal. Parameters description: unitID: Box ID.	Informational

Macaddr: MAC address.	
Event description: Stacking topology change. Log Message: Stacking topology is <Stack_TP_TYPE>. Master(Unit <unitID>, MAC:<macaddr>). Parameters description: Stack_TP_TYPE: The stacking topology type is one of the following: 1. Ring, 2. Chain. unitID: Box ID. Macaddr: MAC address.	Informational
Event description: Backup master changed to master. Log Message: Backup master changed to master. Master (Unit: <unitID>). Parameters description: unitID: Box ID.	Informational
Event description: Slave changed to master Log Message: Slave changed to master. Master (Unit: <unitID>). Parameters description: unitID: Box ID.	Informational
Event description: Box ID conflict. Log Message: Hot insert failed, box ID conflict: Unit <unitID> conflict (MAC: <macaddr> and MAC: <macaddr>). Parameters description: unitID: Box ID. macaddr: The MAC addresses of the conflicting boxes.	Critical

Storm Control

Log Description	Severity
Event description: Storm occurrence. Log Message: <Broadcast | Multicast | Unicast> storm is occurring on <interface-id>. Parameters description: Broadcast: Storm is resulted by broadcast packets(DA = FF:FF:FF:FF:FF:FF). Multicast: Storm is resulted by multicast packets, including unknown L2 multicast, known L2 multicast, unknown IP multicast and known IP multicast. Unicast: Storm is resulted by unicast packets, including both known and unknown unicast packets interface-id: The interface ID on which a storm is occurring.	Warning
Event description: Storm cleared. Log Message: <Broadcast | Multicast | Unicast> storm is cleared on <interface-id>. Parameters description: Broadcast: Broadcast storm is cleared. Multicast: Multicast storm is cleared. Unicast: Unicast storm (including both known and unknown unicast packets) is cleared.	Informational

interface-id: The interface ID on which a storm is cleared.	
Event description: Port shut down due to a packet storm Log Message: <interface-id> is currently shut down due to the <Broadcast | Multicast | Unicast> storm. Parameters description: interface-id: The interface ID on which is error-disabled by storm. Broadcast: The interface is disabled by broadcast storm. Multicast: The interface is disabled by multicast storm. Unicast: The interface is disabled by unicast storm (including both known and unknown unicast packets).	Warning

Voice-VLAN

Log Description	Severity
Event description: When a new voice device is detected on an interface. Log Message: New voice device detected (<interface-id>, MAC: < mac-address >) Parameters description: interface-id: Interface name. mac-address: Voice device MAC address	Informational
Event description: When an interface which is in auto voice VLAN mode joins the voice VLAN Log Message: < interface-id > add into voice VLAN <vid > Parameters description: interface-id: Interface name. vid:VLAN ID	Informational
Event description: When an interface leaves the voice VLAN and at the same time, no voice device is detected in the aging interval for that interface, the log message will be sent. Log Message: < interface-id > remove from voice VLAN <vid > Parameters description: interface-id: Interface name. vid:VLAN ID	Informational

Web

Log Description	Severity
Event description: Successful login through Web. Log Message: Successful login through Web (Username: <username>, IP: <ipaddr>). Parameters description: username: The use name that used to login HTTP server. ipaddr: The IP address of HTTP client.	Informational
Event description: Login failed through Web. Log Message: Login failed through Web (Username: <username>, IP: <ipaddr>). Parameters description: username: The use name that used to login HTTP server. ipaddr: The IP address of HTTP client.	Warning

Event description: Web session timed out. Log Message: Web session timed out (Username: <usrname>, IP: <ipaddr>). Parameters description: username: The use name that used to login HTTP server. ipaddr: The IP address of HTTP client.	Informational
Event description: Logout through Web. Log Message: Logout through Web (Username: %S, IP: %S). Parameters description: username: The use name that used to login HTTP server. ipaddr: The IP address of HTTP client.	Informational

Web-Authentication

Log Description	Severity
Event description: When a host has passed the authentication. Log Message: Web-Authentication host login success (Username: <string>, IP: <ipaddr | ipv6address>, MAC: <mac-address>, <interface-id>, VID: <vlan-id>) Parameters description: Username: The host username. IP: The host IP address mac-address: The host MAC addresses. interface-id: The interface on which the host is authenticated. vlan-id: The VLAN ID on which the host exists	Informational
Event description: When a host fail to pass the authentication. Log Message: Web-Authentication host login fail (Username: <string>, IP: <ipaddr | ipv6address>, MAC: <mac-address>, <interface-id>, VID: <vlan-id>). Parameters description: Username: The host username. IP: The host IP address mac-address: The host MAC addresses.. interface-id: The interface on which the host is authenticated. vlan-id: The VLAN ID on which the host exists	Critical
Event description: when the authorized user number on the whole device has reached the maximum user limit. Log Message: Web-Authentication enters stop learning state.	Warning
Event description: when the authorized user number on the whole device is below the maximum user limit in a time interval. Log Message: Web-Authentication recovers from stop learning state.	Warning

Appendix B - Trap Entries

The following table lists all possible trap log entries and their corresponding meanings that will appear in the switch.

802.1X

Trap Name	Description	OID
dDot1xExtLoggedSuccess	The trap is sent when a host has successfully logged in (passed 802.1X authentication). Binding objects: (1) ifIndex (2) dnaSessionClientMacAddress (3) dnaSessionAuthVlan (4) dnaSessionAuthUserName	1.3.6.1.4.1.17 1.14.30.0.1
dDot1xExtLoggedFail	The trap is sent when a host failed to pass 802.1X authenitcation (login failed). Binding objects: (1) ifIndex (2) dnaSessionClientMacAddress (3) dnaSessionAuthVlan (4) dnaSessionAuthUserName (5) dDot1xExtNotifyFailReason	1.3.6.1.4.1.17 1.14.30.0.2

Authentication Fail

Trap Name	Description	OID
authenticationFailure	An authenticationFailure trap signifies that the SNMPv2 entity, acting in an agent role, has received a protocol message that is not properly authenticated. While all implementations of the SNMPv2 must be capable of generating this trap, the snmpEnableAuthenTraps object indicates whether this trap will be generated.	1.3.6.1.6.3.1. 1.5.5

BPDU Attack Protection

Trap Name	Description	OID
dBpduProtectionAttackOccur	This trap is sent when the BPDU attack happened on an interface. Binding objects: (1) ifIndex (2) dBpduProtectionIfCfgMode	1.3.6.1.4.1.17 1.14.47.0.1
dBpduProtectionAttackRecover	This trap is sent when the BPDU attack recovered on an interface. Binding objects: (1) ifIndex	1.3.6.1.4.1.17 1.14.47.0.2

DDM

Trap Name	Description	OID
dDdmAlarmTrap	A notification is generated when an abnormal alarm situation occurs, or recovers from an abnormal alarm situation to normal status. Binding objects: (1) dDdmNotifyInfoIfIndex (2) dDdmNotifyInfoComponent (3) dDdmNotifyInfoAbnormalLevel (4) dDdmNotifyInfoThresholdExceedOrRecover	1.3.6.1.4.1.17 1.14.72.0.1
dDdmWarningTrap	A notification is generated when an abnormal warning situation occurs, or recovers from an abnormal warning situation to normal status. Binding objects: (1) dDdmNotifyInfoIfIndex, (2) dDdmNotifyInfoComponent (3) dDdmNotifyInfoAbnormalLevel (4) dDdmNotifyInfoThresholdExceedOrRecover	1.3.6.1.4.1.17 1.14.72.0.2

DHCP Server Screen Prevention

Trap Name	Description	OID
dDhcpFilterAttackDetected	When DHCP Server Screen is enabled, if the switch received the forge DHCP Server packet, the switch will trap the event if any attacking packet is received. Binding objects: (1) dDhcpFilterLogBufServerIpAddr (2) dDhcpFilterLogBufClientMacAddr (3) dDhcpFilterLogBufferVlanId (4) dDhcpFilterLogBufferOccurTime	1.3.6.1.4.1.17 1.14.133.0.1

DOS Prevention

Trap Name	Description	OID
dDosPreveAttackDetectedPacke t	The trap is sent when detect DOS attack. Binding objects: (1) dDoSPrevCtrlAttackType (2) dDosPrevNotiInfoDropIpAddr (3) dDosPrevNotiInfoDropPortNumber	1.3.6.1.4.1.17 1.14.59.0.2

ErrDisable

Trap Name	Description	OID
dErrDisNotifyPortDisabledAssert	The trap is sent when a port enters into error disabled state.	1.3.6.1.4.1.17 1.14.45.0.1

	Binding objects: (1) dErrDisNotifyInfoPortIfIndex (2) dErrDisNotifyInfoReasonID	
dErrDisNotifyPortDisabledClear	The trap is sent when a port loop restarts after the interval time. Binding objects: (1) dErrDisNotifyInfoPortIfIndex (2) dErrDisNotifyInfoReasonID	1.3.6.1.4.1.17 1.14.45.0.2

General Management

Trap Name	Description	OID
dGenMgmtLoginFail	This trap is sent when the user login failed to the switch. Binding objects: (1) dGenMgmtNotifyInfoLoginType (2) dGenMgmtNotifyInfoUserName	1.3.6.1.4.1.17 1.14.165.0.1

Gratuitous ARP Function

Trap Name	Description	OID
agentGratuitousARPTrap	The trap is sent when IP address conflicted. Binding objects: (1) ipaddr (2) macaddr (3) portNumber (4) agentGratuitousARPInterfaceName	1.3.6.1.4.1.17 1.14.75.0.1

IMPB

Trap Name	Description	OID
dImpbViolationTrap	The address violation notification is generated when IP-MAC-Port Bindingaddress violation is detected. Binding objects: (1) ifIndex (2) dImpbViolationIpAddrType (3) dImpbViolationIpAddress (4) dImpbViolationMacAddress	1.3.6.1.4.1.17 1.14.22.0.1

LACP

Trap Name	Description	OID
linkUp	A linkUp trap signifies that the SNMP entity, acting in an agent role, has detected that the ifOperStatus object for one of its communication links left the down state and transitioned into some other state	1.3.6.1.6.3.1. 1.5.4

	(but not into the notPresent state). This other state is indicated by the included value of ifOperStatus. Binding objects: (1) ifIndex, (2) if AdminStatus (3) ifOperStatu	
linkDown	A linkDown trap signifies that the SNMP entity, acting in an agent role, has detected that the ifOperStatus object for one of its communication links is about to enter the down state from some other state (but not from the notPresent state). This other state is indicated by the included value of ifOperStatus. Binding objects: (1) ifIndex, (2) if AdminStatus (3) ifOperStatu	1.3.6.1.6.3.1.1.5.3

LBD

Trap Name	Description	OID
dLbdLoopOccurred	his trap is sent when an interface loop occurs. Binding objects: (1) dLbdNotifyInfoIfIndex	1.3.6.1.4.1.171.14.46.0.1
dLbdLoopRestart	This trap is sent when an interface loop restarts after the interval time. Binding objects: (1) dLbdNotifyInfoIfIndex	1.3.6.1.4.1.171.14.46.0.2
dLbdVlanLoopOccurred	This trap is sent when an interface with a VID loop occurs. Binding objects: (1) dLbdNotifyInfoIfIndex (2) dLbdNotifyInfoVlanId	1.3.6.1.4.1.171.14.46.0.3
dLbdVlanLoopRestart	This trap is sent when an interface loop with a VID restarts after the interval time. Binding objects: (1) dLbdNotifyInfoIfIndex (2) dLbdNotifyInfoVlanId	1.3.6.1.4.1.171.14.46.0.4

LLDP

Trap Name	Description	OID
lldpRemTablesChange	A lldpRemTablesChange notification is sent when the value of lldpStatsRemTableLastChangeTime changes. It can be utilized by an NMS to trigger LLDP remote systems table maintenance polls. Binding objects: (1) lldpStatsRemTablesInserts (2) lldpStatsRemTablesDeletes	1.0.8802.1.1.2.0.0.1

	(3) lldpStatsRemTablesDrops (4) lldpStatsRemTablesAgeouts	
lldpXMedTopologyChangeDetected	A notification generated by the local device sensing a change in the topology that indicates that a new remote device attached to a local port, or a remote device disconnected or moved from one port to another. Binding objects: (1) lldpRemChassisIdSubtype (2) lldpRemChassisId (3) lldpXMedRemDeviceClass	1.0.8802.1.1.2.1.5.4795.0.1

MAC-based Access Control

Trap Name	Description	OID
dMacAuthLoggedSuccess	The trap is sent when a MAC-based Access Control host is successfully logged in. Binding objects: (1) ifIndex, (2) dnaSessionClientMacAddress (3) dnaSessionAuthVlan	1.3.6.1.4.1.171.14.153.0.1
dMacAuthLoggedFail	The trap is sent when a MAC-based Access Control host login fails. Binding objects: (1) ifIndex, (2) dnaSessionClientMacAddress (3) dnaSessionAuthVlan	1.3.6.1.4.1.171.14.153.0.2
dMacAuthLoggedAgesOut	The trap is sent when a MAC-based Access Control host ages out. Binding objects: (1) ifIndex, (2) dnaSessionClientMacAddress (3) dnaSessionAuthVlan	1.3.6.1.4.1.171.14.153.0.3

MAC-notification

Trap Name	Description	OID
dL2FdbMacNotificatio	This trap indicate the MAC addresses variation in the address table. Binding objects: (1) dL2FdbMacChangeNotifyInfo	1.3.6.1.4.1.171.14.3.0.1

MSTP

Trap Name	Description	OID
newRoot	The newRoot trap indicates that the sending agent has become the new root of the Spanning Tree; the	1.3.6.1.2.1.17.0.1

	trap is sent by a bridge soon after its election as the new root, e.g., upon expiration of the Topology Change Timer, immediately subsequent to its election. Implementation of this trap is optional.	
topologyChange	A topologyChange trap is sent by a bridge when any of its configured ports transitions from the Learning state to the Forwarding state, or from the Forwarding state to the Blocking state. The trap is not sent if a newRoot trap is sent for the same transition. Implementation ofthis trap is optional	1.3.6.1.2.1.17 .0.2

Peripheral

Trap Name	Description	OID
dEntityExtPowerStatusChg	Power Status change notification. Binding objects: (1) dEntityExtEnvPowerUnitId (2) dEntityExtEnvPowerIndex (3) dEntityExtEnvPowerStatus	1.3.6.1.4.1.17 1.14.5.0.3
dEntityExtFanStatusChg	Fan status change notification. Binding objects: (1) dEntityExtEnvFanUnitId (2) dEntityExtEnvFanIndex (3) dEntityExtEnvFanStatus	1.3.6.1.4.1.17 1.14.5.0.1
dEntityExtThermalStatusChg	Temperature status change notification. Binding objects: (1) dEntityExtEnvTempUnitId (2) dEntityExtEnvTempIndex (3) dEntityExtEnvTempStatus	1.3.6.1.4.1.17 1.14.5.0.2
dEntityExtFactoryResetButton	Press factory reset button notification Binding objects: (1) dEntityExtUnitIndex	1.3.6.1.4.1.17 1.14.5.0.5

PoE

Trap Name	Description	OID
pethMainPowerUsageOnNotification	This trap indicates PSE Threshold usage indication is on, the usage power is above the threshold. At least 500 msec must elapse between notifications being emitted by the same object instance. Binding objects: (1) pethMainPseConsumptionPower	1.3.6.1.2.1.10 5.0.2
pethMainPowerUsageOffNotification	This trap indicates PSE Threshold usage indication is off, the usage power is below the threshold. At least 500 msec must elapse between notifications being emitted by the same object instance. Binding objects: (1) pethMainPseConsumptionPower	1.3.6.1.2.1.10 5.0.3

dPoeIfPowerDeniedNotification	This Notification indicates if PSE state diagram enters the state POWER_DENIED. At least 500 msec must elapse between notifications being emitted by the same object instance. Binding objects: (1) pethPsePortPowerDeniedCounter	1.3.6.1.4.1.17 1.14.24.0.1
dPoeIfPowerOverLoadNotification	This trap indicates if PSE state diagram enters the state ERROR_DELAY_OVER. At least 500 msec must elapse between notifications being emitted by the same object instance. Binding objects: (1) pethPsePortOverLoadCounter	1.3.6.1.4.1.17 1.14.24.0.2
dPoeIfPowerShortCircuitNotification	This trap indicates if PSE state diagram enters the state ERROR_DELAY_SHORT. At least 500 msec must elapse between notifications being emitted by the same object instance. Binding objects: (1) pethPsePortShortCounter	1.3.6.1.4.1.17 1.14.24.0.3

Port

Trap Name	Description	OID
linkUp	A notification is generated when port linkup. Binding objects: (1) ifIndex (2) if AdminStatus (3) ifOperStatu	1.3.6.1.6.3.1. 1.5.4
linkDown	A notification is generated when port linkdown. Binding objects: (1) ifIndex (2) if AdminStatus (3) ifOperStatu	1.3.6.1.6.3.1. 1.5.3

Port Security

Trap Name	Description	OID
dPortSecMacAddrViolation	When the port security trap is enabled, new MAC addresses that violate the pre-defined port security configuration will trigger trap messages to be sent out. Binding objects: (1) ifIndex (2) dPortSecIfCurrentStatus (3) dPortSecIfViolationMacAddress	1.3.6.1.4.1.17 1.14.8.0.1

RMON

Trap Name	Description	OID
risingAlarm	The SNMP trap that is generated when an alarm entry crosses its rising threshold and generates an event that is configured for sending SNMP traps. Binding objects: (1)alarmIndex (2)alarmVariable (3)alarmSampleType (4) alarmValue (5) alarmRisingThreshold	1.3.6.1.2.1.16.0.1
fallingAlarm	The SNMP trap that is generated when an alarm entry crosses its falling threshold and generates an event that is configured for sending SNMP traps. Binding objects: (1)alarmIndex (2) alarmVariable (3)alarmSampleType (4)alarmValue (5) alarmFallingThreshold	1.3.6.1.2.1.16.0.2

Safeguard

Trap Name	Description	OID
dSafeguardChgToExhausted	This trap indicates System change operation mode from normal to exhaust. Binding objects: (1) dSafeguardEngineCurrentMode	1.3.6.1.4.1.171.14.19.1.1.0.1
dSafeguardChgToNormal	This trap indicates system change operation mode from exhausted to normal. Binding objects: (1) dSafeguardEngineCurrentMode	1.3.6.1.4.1.171.14.19.1.1.0.2

Stack

Trap Name	Description	OID
dStackInsertNotification	Unit Hot Insert notification. Binding objects: (1) dStackNotifyInfoBoxId (2) dStackInfoMacAddr	1.3.6.1.4.1.171.14.9.0.1
dStackRemoveNotification	Unit Hot Remove notification. Binding objects: (1) dStackNotifyInfoBoxId (2) dStackInfoMacAddr	1.3.6.1.4.1.171.14.9.0.2
dStackFailureNotification	Unit Failure notification. Binding objects: (1) dStackNotifyInfoBoxId	1.3.6.1.4.1.171.14.9.0.3

dStackTPChangeNotification	The stacking topology change notification. Binding objects: (1) dStackNotifyInfoTopologyType (2) dStackNotifyInfoBoxId (3) dStackInfoMacAddr	1.3.6.1.4.1.17 1.14.9.0.4
dStackRoleChangeNotification	The stacking unit role change notification. Binding objects: (1) dStackNotifyInfoRoleChangeType (2) dStackNotifyInfoBoxId	1.3.6.1.4.1.17 1.14.9.0.5

SIM

Trap Name	Description	OID
swSingleIPMSColdStart	The commander switch will send this notification when its member generates a cold start notification. Binding objects: (1) swSingleIPMSID (2) swSingleIPMSMacAddr	1.3.6.1.4.1.17 1.12.8.6.0.11
swSingleIPMSWarmStart	The commander switch will send this notification when its member generates a warm start notification. Binding objects: (1) swSingleIPMSID (2) swSingleIPMSMacAddr	1.3.6.1.4.1.17 1.12.8.6.0.12
swSingleIPMSLinkDown	The commander switch will send this notification when its member generates a link down notification. Binding objects: (1) swSingleIPMSID (2) swSingleIPMSMacAddr (3) ifIndex	1.3.6.1.4.1.17 1.12.8.6.0.13
swSingleIPMSLinkUp	The commander switch will send this notification when its member generates a link up notification. Binding objects: (1) swSingleIPMSID (2) swSingleIPMSMacAddr (3) ifIndex	1.3.6.1.4.1.17 1.12.8.6.0.14
swSingleIPMSAuthFail	The commander switch will send this notification when its member generates an authentation failure notification. Binding objects: (1) swSingleIPMSID (2) swSingleIPMSMacAddr	1.3.6.1.4.1.17 1.12.8.6.0.15
swSingleIPMSnewRoot	The commander switch will send this notification when its member generates a new root notification. Binding objects: (1) swSingleIPMSID (2) swSingleIPMSMacAddr	1.3.6.1.4.1.17 1.12.8.6.0.16
swSingleIPMSTopologyChange	The commander switch will send this notification	1.3.6.1.4.1.17

	when its member generates a topology change notification. Binding objects: (1) swSingleIPMSID (2) swSingleIPMSMacAddr	1.12.8.6.0.17

Start

Trap Name	Description	OID
coldStart	A coldStart trap signifies that the SNMPv2 entity, acting in an agent role, is reinitializing itself and that its configuration may have been altered.	1.3.6.1.6.3.1.1.5.1
warmStart	A warmStart trap signifies that the SNMPv2 entity, acting in an agent role, is reinitializing itself such that its configuration is unaltered.	1.3.6.1.6.3.1.1.5.2

Storm Control

Trap Name	Description	OID
dStormCtrlOccurred	This trap is sent when dStormCtrlNotifyEnable is 'stormOccurred' or 'both' and a storm is detected. Binding objects: (1) ifIndex, (2) dStormCtrlNotifyTrafficType	1.3.6.1.4.1.171.14.25.0.1
dStormCtrlStormCleared	This trap is sent when dStormCtrlNotifyEnable is 'stormCleared' or 'both' and a storm is cleared. Binding objects: (1) ifIndex, (2) dStormCtrlNotifyTrafficType	1.3.6.1.4.1.171.14.25.0.2

System File

Trap Name	Description	OID
dsfUploadImage	The notification is sent when the user uploads image file successfully.	1.3.6.1.4.1.171.14.14.0.1
dsfDownloadImage	The notification is sent when the user downloads image file successfully.	1.3.6.1.4.1.171.14.14.0.2
dsfUploadCfg	The notification is sent when the user uploads configuration file successfully.	1.3.6.1.4.1.171.14.14.0.3
dsfDownloadCfg	The notification is sent when the user downloads configuration file successfully.	1.3.6.1.4.1.171.14.14.0.4
dsfSaveCfg	The notification is sent when the user saves configuration file successfully.	1.3.6.1.4.1.171.14.14.0.5

Web-Authentication

Trap Name	Description	OID
dWebAuthLoggedSuccess	The trap is sent when a host has successfully logged in (passed Web-Authentication). Binding objects: (1) ifIndex (2) dnaSessionAuthVlan (3) dnaSessionClientMacAddress (4) dnaSessionClientAddrType (5) dnaSessionClientAddress (6) dnaSessionAuthUserName	1.3.6.1.4.1.17 1.14.154.0.1
dWebAuthLoggedFail	The trap is sent when a host has failed to pass Web-Authentication (login failed). Binding objects: (1) ifIndex (2) dnaSessionAuthVlan (3) dnaSessionClientMacAddress (4) dnaSessionClientAddrType (5) dnaSessionClientAddress (6) dnaSessionAuthUserName	1.3.6.1.4.1.17 1.14.154.0.2

Appendix C - RADIUS Attributes Assignment

The RADIUS Attributes Assignment on the DGS-1510 is used in the following modules: Console, Telnet, SSH, Web, 802.1X, MAC-based Access Control, JWAC, and WAC.

The description that follows explains the following RADIUS Attributes Assignment types:

- Privilege Level
- Ingress/Egress Bandwidth
- 802.1p Default Priority
- VLAN
- ACL

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.	Range (1-15)	Required

If the user has configured the privilege level attribute of the RADIUS server (for example, level 15) 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.

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, MAC-based Access Control, JWAC or WAC 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

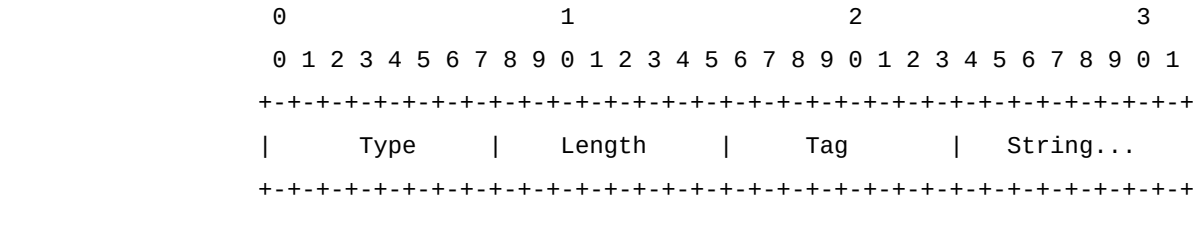
If the user has configured the 802.1p priority attribute of the RADIUS server (for example, priority 7) and 802.1X, MAC-based Access Control, JWAC or WAC authentication is successful, the device will assign the 802.1p default priority (according to the RADIUS server) to the port. However, if the user 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, RFC 3580 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 being used.	6 (802)	Required
Tunnel-Private-Group-ID	This attribute indicates group ID for a particular tunneled session.	A string (VID)	Required

A summary of the Tunnel-Private-Group-ID Attribute format is shown below.



The table below shows the definition of Tag field (different with RFC 2868):

Tag field value	String field format
0x01	VLAN name (ASCII)
0x02	VLAN ID (ASCII)
Others (0x00, 0x03 ~ 0x1F, >0x1F)	When the switch receives the VLAN setting string, it will think it is the VLAN ID first. In other words, the switch will check all existing VLAN IDs and check if there is one matched. If the switch can find one matched, it will move to that VLAN. If the switch cannot find the matched VLAN ID, it will think the VLAN setting string as a “VLAN Name”. Then it will check that it can find out a matched VLAN Name.

NOTE: A tag field of greater than 0x1F is interpreted as the first octet of the following field.

If the user has configured the VLAN attribute of the RADIUS server (for example, VID 3) and the 802.1X, MAC-based Access Control, JWAC, or WAC authentication is successful, the port will be assigned to VLAN 3. However, if the user does not configure the VLAN attributes, when the port is not guest VLAN member, it will be kept in its current authentication VLAN, and when the port is guest VLAN member, it will be assigned to its original VLAN.

To assign the **ACL** by the RADIUS server, the proper parameters should be configured on the RADIUS server. The table below shows the parameters for an ACL.

The parameters of the Vendor-Specific Attribute are:

RADIUS Tunnel Attribute	Description	Value	Usage
Vendor-ID	Defines the vendor.	171 (DLINK)	Required
Vendor-Type	Defines the attribute.	14 (for ACL script)	Required
Attribute-Specific Field	Used to assign the ACL script. The format is based on **Access Control List (ACL) Commands**.	ACL Script For example: **ip access-list a1;permit host 10.90.90.100;exit; mac access-list extended m1;permit host 00-00-00-01-90-10 any; exit;**	Required

If the user has configured the ACL attribute of the RADIUS server (for example, ACL script: ip access-list a1;permit host 10.90.90.100;exit; mac access-list extended m1;permit host 00-00-00-01-90-10 any; exit;), and the 802.1X, MAC-based Access Control, JWAC, or WAC is successful, the device will assign the ACL script according to the RADIUS server. The enter **Access-List Configuration Mode** and exit **Access-List Configuration Mode** must be a pair, otherwise the ACP script will be reject. For more information about the ACL module, please refer to **Access Control List (ACL) Commands** chapter.

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
3	CHAP-Password
4	NAS-IP-Address
5	NAS-Port
6	Service-Type
7	Framed-Protocol
8	Framed-IP-Address
12	Framed-MTU
18	Reply-Message
24	State
26	Vendor-Specific
27	Session-Timeout
29	Termination-Action
30	Called-Station-ID
31	Calling-Station-ID
32	NAS-Identifier
60	CHAP-Challenge
61	NAS-Port-Type
64	Tunnel-Type
65	Tunnel-Medium-Type
77	Connect-Info
79	EAP-Message

80	Message-Authenticator
81	Tunnel-Private-Group-ID
85	Acct-Interim-Interval
87	NAS-Port-ID
95	NAS-IPv6-Address

RADIUS Accounting Attributes:

Number	IETF Attribute
1	User-Name
4	NAS-IP-Address
5	NAS-Port
6	Service-Type
8	Framed-IP-Address
31	Calling-Station-ID
32	NAS-Identifier
40	Acct-Status-Type
41	Acct-Delay-Time
42	Acct-Input-Octets
43	Acct-Output-Octets
44	Acct-Session-ID
45	Acct-Authentic
46	Acct-Session-Time
47	Acct-Input-Packets
48	Acct-Output-Packets
49	Acct-Terminate-Cause
52	Acct-Input-Gigawords
53	Acct-Output-Gigawords
61	NAS-Port-Type
95	NAS-IPv6-Address