



# CLI Reference Guide

Product Model: DGS-1250 Series

Gigabit Ethernet Smart Managed Switch

Release 2.03

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# 1. Introduction

This manual's command descriptions are based on the software release **2.03**. The commands listed here are the subset of commands that are supported by the DGS-1250 Series switch.

## Audience

This reference manual 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 one of the management interfaces to the DGS-1250 Series 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 experience with 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 either from the CD, bundled with this switch, or from the D-Link website. Other documents related to this switch are:

- DGS-1250 Series Hardware Installation Guide
- DGS-1250 Series Web UI Reference Guide

## Conventions

Convention	Description
<b>Boldface Font</b>	Commands, command options and keywords are printed in boldface. Keywords, in the command line, are to be entered exactly as they are displayed.
<i>UPPERCASE ITALICS Font</i>	Parameters or values that must be specified are printed in <i>UPPERCASE ITALICS</i> . 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.
<i>Blue Courier Font</i>	This convention is used to represent an example of a screen console display including example entries of CLI command input with the corresponding output. All examples used in this manual are based on the DGS-1250-28XMP switch in the DGS-1250 Series.

## 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.

## Connecting to the Console Port

The Console port is used to connect to the CLI of the Switch. Connect the DB9 connector of the console cable (included in the packaging) to the Serial (COM) port of the computer. Connect the RJ45 connector of the console cable to the Console port on the Switch.

To access the CLI through the Console port, Terminal Emulation Software must be used like *PuTTY* or *Tera Term*. The Switch uses a connection of **115200** bits per second with **no flow control** enabled.

After the boot sequence completed, the CLI login screen is displayed.

## 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 functionality of the command.
- **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.
- **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 the mode the user is currently in. 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 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 a **administrator** level will log into the Switch in the **Privileged EXEC Mode**.

## User EXEC Mode

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

Users logged in with this command mode can monitor all system information and change any system configuration settings mentioned in this Configuration Guide.

## Global Configuration Mode

The primary purpose of the global configuration mode is to apply global settings to the entire switch. In addition to applying global settings to the entire switch, the user can also access other sub-configuration modes. In order to access the global configuration mode, enter the **configure terminal** command in the Privileged EXEC Mode.

The following example shows how to enter 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.

## Creating a User Account

You can create multiple user accounts. This section will assist a user with creating a user account by means of the Command Line Interface.



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

Observe the following example.

```
Switch#configure terminal
Switch(config)#username account password account
```

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

- We entered the **configure terminal** command to access the Global Configuration Mode. The **username** command can be used in the Global Configuration Mode.
- The **username account password account** command creates an account with the username of *account* and a password of *account*.

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 has rebooted, or after the users log out and back in, the newly created username and password must be entered to access the CLI interface again, as seen below.

```

DGS-1250-28XMP Gigabit Ethernet Smart Managed Switch

Command Line Interface
Firmware: Build 2.03.001
Copyright (C) 2021 D-Link Corporation. All rights reserved.

User Access Verification

Username:admin
Password:*****
```

## Error Messages

When 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 the 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 line console
line console
  session-timeout 0
!
line telnet
!
line ssh
!
protected-ports route-deny
!
ssh user admin authentication-method password
!
interface ethernet 1/0/1
  authentication host-mode multi-host
  ddp
!
interface ethernet 1/0/2
  authentication host-mode multi-host
  ddp
!
interface ethernet 1/0/3
  authentication host-mode multi-host
  ddp
!
interface ethernet 1/0/4
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 Firmware
!
                                Firmware: Build 2.03.001

Switch#
```

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

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

Current configuration : 2654 bytes

line console
  session-timeout 0
line telnet
line ssh
protected-ports route-deny
ssh user admin authentication-method password
interface ethernet 1/0/1
  authentication host-mode multi-host
  ddp
interface ethernet 1/0/2
  authentication host-mode multi-host
  ddp
interface ethernet 1/0/3
  authentication host-mode multi-host
  ddp
interface ethernet 1/0/4
  authentication host-mode multi-host
  ddp
interface ethernet 1/0/5
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

User/Privileged EXEC Mode.

Any Configuration Mode.

#### Usage Guideline

This 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?
```

```
reset                renew                rename                reboot
```

```
Switch#re
```

This example shows how to use the **command syntax** help to display the next argument of a partially complete **telnet** 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#telnet ?
```

```
A.B.C.D              IP address of a remote system
WORD                 Telnet destination hostname
X:X:X:X::X           IPv6 address of a remote system
```

```
Switch#telnet
```

## 2-2 enable

This command is used to enter the Privileged EXEC Mode.

**enable**

### Parameters

None.

### Default

None.

## Command Mode

User EXEC Mode.

## 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  
password:***  
Switch#
```

---

## 2-3 disable

This command is used to downgrade to the User EXEC Mode.

**disable**

### Parameters

None.

### Default

None.

### Command Mode

Privileged EXEC Mode.

### Usage Guideline

Use this command to downgrade to the User EXEC Mode.

### Example

This example shows how to downgrade to the User EXEC Mode.

```
Switch#disable  
Switch>
```

---

## 2-4 configure terminal

This command is used to enter the Global Configuration Mode.

**configure terminal**

### Parameters

None.

---

**Default**

None.

**Command Mode**

Privileged EXEC Mode.

**Usage Guideline**

Use this command to enter the Global Configuration Mode.

**Example**

This example shows how to enter the 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/Privileged EXEC Mode.

**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 log in with username "user1".

```
Switch# login

Username: user1
Password: xxxxxx

Switch#
```

---

## 2-6 login (Line)

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

---

**login [local]****no login**

## Parameters

<b>local</b>	(Optional) Specifies that the line login method will be local.
--------------	--

## Default

By default, there is no login method 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 method (by password) configured for the **SSH** line.

## Command Mode

Line Configuration Mode.

## 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 **password** command, the user will 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
- 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 are ignored. Enter the details at Level 1.
  - When the **username and password** option is selected, enter the username and password configured 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 configure the line console login method as "login".

```
Switch# configure terminal
Switch(config)# line console
Switch(config-line)# login
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/Privileged EXEC Mode.

### Usage Guideline

Use this command to close an active terminal session by logging off the Switch.

### Example

This example shows how to log out.

```
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 EXEC Mode.

### end

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

Any Configuration Mode.

### Usage Guideline

Use this command to 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 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 EXEC Mode, executing the exit command logs you out of the current session.

**exit**

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

Any Configuration Mode.

### 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 Privileged 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 environment

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

**show environment [fan | power | temperature]**

### Parameters

<b>fan</b>	(Optional) Specifies to display the Switch fan detailed status.
<b>power</b>	(Optional) Specifies to display the Switch power detailed status.
<b>temperature</b>	(Optional) Specifies to display the Switch temperature detailed status.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

If no parameter is 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:
Temperature Descr/ID          Current/Threshold Range
-----
Central Temperature/1        33C/11~79C
Status code: * temperature is out of threshold range

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

Detail Power Status:
Power Module                Power Status
-----
Power 1                     In-operation

Switch#
```

## Display Parameters

<b>Power status</b>	<ul style="list-style-type: none"> <li>• <b>In-operation</b> - The power rectifier is in normal operation.</li> <li>• <b>Failed</b> - The power rectifier not working normally.</li> <li>• <b>Empty</b> - The power rectifier is not installed.</li> </ul>
---------------------	--

## 2-11 show unit

This command is used to display information about system units.

**show unit**

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display information about the system modules.

## Example

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

```
Switch#show unit
```

Model Descr		Model Name	
24P 10/100/1000M PoE + 4P 10G SFP+		DGS-1250-28XMP	
Serial-Number		Status	Up Time
DGS1250102030		ok	0DT0H38M59S
Memory	Total	Used	Free
DRAM	243268 K	125248 K	118020 K
FLASH	45220 K	24920 K	20300 K

```
Switch#
```

## 2-12 show cpu utilization

This command is used to display the CPU utilization information.

```
show cpu utilization
```

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the CPU utilization information of the Switch 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 - 12 %           One minute - 12 %           Five minutes - 12 %
```

```
Switch#
```

## 2-13 show version

This command is used to display the version information of the Switch.

```
show version
```

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the version information of the Switch.

### Example

This example shows how to display the version information of the Switch.

```
Switch#show version

System MAC Address: F0-7D-68-12-50-01

Module Name DGS-1250-28XMP
H/W A1
Runtime 2.03.001

Switch#
```

## 2-14 snmp-server enable traps environment

This command is used to enable the power, temperature and fan trap states. Use the **no** form of this command to disable the state.

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

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

### Parameters

<b>fan</b>	(Optional) Specifies to enable or disable the Switch's fan trap state for warning fan events (fan failed or fan recover).
<b>power</b>	(Optional) Specifies to enable or disable the Switch's power trap state for warning power events (power failure or power recovery).
<b>temperature</b>	(Optional) Specifies to enable or disable the Switch's temperature trap state for warning temperature events (temperature exceeds the thresholds or temperature recover).

## Default

By default, all environment device traps are disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enable or disable the environment trap states for fan, power and temperature events. If no parameter is specified, all of the environment traps are enabled or disabled.

## Example

This example shows how to enable the environment trap status..

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

## 2-15 environment temperature threshold

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

**environment temperature threshold thermal [high VALUE] [low VALUE]**

**no environment temperature threshold thermal [high] [low]**

## Parameters

<b>high</b>	(Optional) Specifies the high threshold of the temperature in Celsius. The range is from -100 to 200.
<b>low</b>	(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.

## Usage Guideline

Use this command 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.

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

---

## 2-16 show memory utilization

This command is used to display the memory utilization information.

**show memory utilization**

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the memory utilization information of the Switch including DRAM and flash.

## Example

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

```
Switch#show memory utilization
```

Memory	Total	Used	Free
DRAM	243268 K	125316 K	117952 K
FLASH	45220 K	24968 K	20252 K

```
Switch#
```

---

## 2-17 show privilege

This command is used to display the current privilege level.

**show privilege**

### Parameters

None.

### Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the current privilege level.

## Example

This example shows how to display the current privilege level.

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

## 3. 802.1X Commands

### 3-1 clear dot1x counters

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

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

#### Parameters

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

#### Default

None.

#### Command Mode

Privileged EXEC Mode.

#### Usage Guideline

Use this command 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 port 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 this command to revert to the default setting.

```
dot1x control-direction {both | in}
```

```
no dot1x control-direction
```

#### Parameters

<b>both</b>	Specifies to enable bidirectional control for the port.
<b>in</b>	Specifies to enable in direction control for the port.



## Default

By default, this option is bidirectional mode.

## Command Mode

Interface Configuration Mode.

## 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**, the access to the port for the controlled direction needs to be authenticated. If the port control is set to **force-unauthorized**, 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**, the port can receive and transmit EAPOL packets only. All user traffic is blocked before authentication. If the control direction is set to **in**, in addition to receiving and transmitting EAPOL packets, the port can transmit user traffic but not receive user traffic before authentication. The **in** control direction is only valid when the **multi-host** mode is configured using the **authentication host-mode** command.

## Example

This example shows how to configure the controlled direction of the traffic on port 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.

## Usage Guideline

Use this command 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.

```
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** form of this command to revert to the default setting.

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

**no dot1x port-control**

### Parameters

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

### Default

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

### Command Mode

Interface Configuration Mode.

## Usage Guideline

This command is only available for physical port interface configuration.

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.

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

## Example

This example shows how to deny all access on port 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 this command to disable the forwarding of the dot1x PDU.

```
dot1x forward-pdu
no dot1x forward-pdu
```

#### Parameters

None.

#### Default

By default, this option is disabled.

#### Command Mode

Interface Configuration Mode.

#### 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

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

#### Default

None.

## Command Mode

Privileged EXEC Mode.

## Usage Guideline

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

In 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 port 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 this command to revert to the default setting.

**dot1x max-req** *TIMES*

**no dot1x max-req**

## Parameters

---

<i>TIMES</i>	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.

## 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 port 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.

#### 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 port 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 port 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

<b>interface</b> <i>INTERFACE-ID</i>	Specifies the port to re-authenticate. Valid interfaces are physical ports.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

---

<b>mac-address</b> <i>MAC-ADDRESS</i>	Specifies the MAC address to re-authenticate.
---------------------------------------	---

---

### Default

None.

### Command Mode

Privileged EXEC Mode.

### Usage Guideline

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

In the multi-host mode, specify an interface ID to re-authenticate a specific port.

In the multi-auth mode, specify a MAC address to re-authenticate a specific MAC address.

### Example

This example shows how to re-authenticate port 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 the Switch. Use the **no** form of this command to disable IEEE 802.1X authentication.

**dot1x system-auth-control**

**no dot1x system-auth-control**

### Parameters

None.

### Default

By default, this option is disabled.

### Command Mode

Global Configuration Mode.

### 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 the 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 this command to revert to the default settings.

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

### Parameters

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

### 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 port 1 to be 15, 15, and 10 seconds, respectively.

```
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

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies to display the dot1x configuration on the specified interface or range of interfaces.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the global configuration or interface configuration. If no parameter is specified, the global configuration 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 port 1.

```
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.

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

#### Parameters

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies to display the dot1x diagnostics on the specified interface or range of interfaces.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

#### Default

None.

#### Command Mode

User/Privileged EXEC Mode.

#### Usage Guideline

Use this command to display 802.1X diagnostics. If no parameter is specified, information of all interfaces will be displayed.

#### Example

This example shows how to display the dot1X diagnostics on port 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.

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

#### Parameters

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies to display the dot1x diagnostics on the specified interface or range of interfaces.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

#### Default

None.

#### Command Mode

User/Privileged EXEC Mode.

#### Usage Guideline

Use this command to display 802.1X statistics. If no parameter is specified, information of all interfaces will be displayed.

#### Example

This example shows how to display dot1X statistics on port 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 IEEE 802.1X session statistics.

---

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

## Parameters

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies to display the dot1x diagnostics on the specified interface or range of interfaces.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

---

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display 802.1X statistics. If no parameter is specified, information of all interfaces will be displayed.

## Example

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

```
Switch# show dot1x session-statistics interface eth1/0/1

Eth1/0/1 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 the sending of SNMP notifications for 802.1X authentication. Use the **no** form of this command to disable the sending of SNMP notifications.

```
snmp-server enable traps dot1x
```

```
no snmp-server enable traps dot1x
```

## Parameters

None.

## Default

this feature is disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enable or disable the sending of SNMP notifications for 802.1X authentication.

## Example

This example shows how to enable the sending of traps for 802.1X authentication.

```
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 starting sequence number and the increment number of the access list entries in an access list. Use the **no** form of this command to revert to the default setting.

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

**no access-list resequence**

#### Parameters

<i>NAME</i>	Specifies the name of the access list to be configured. It can be a maximum of 32 characters.
<i>NUMBER</i>	Specifies the number of the access list to be configured.
<i>STARTING-SEQUENCE-NUMBER</i>	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.
<i>INCREMENT</i>	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.

#### 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, 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 an 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# show access-list ip R&D

Extended IP access list R&D(ID: 3552)
 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# configure terminal
Switch(config)#ip access-list extended R&D
Switch(config-ip-ext-acl)# 5 permit tcp any 10.30.0.0 0.0.255.255
Switch(config-ip-ext-acl)# end
Switch# show access-list ip R&D

Extended IP access list R&D(ID: 3552)
 5 permit tcp any 10.30.0.0 0.0.255.255
 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# configure terminal
Switch(config)# access-list resequence R&D 1 2
Switch(config)# exit
Switch# show access-list ip R&D

Extended IP access list R&D(ID: 3552)
 1 permit tcp any 10.30.0.0 0.0.255.255
 3 permit tcp any 10.20.0.0 0.0.255.255
 5 permit tcp any host 10.100.1.2
 7 permit icmp any any

Switch#
```

## 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. Use the **no** form of this command to disable the ACL hardware counter function.

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

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

### Parameters

<b>access-group</b> ACCESS-LIST-NAME	Specifies the name of the access list to be configured.
<b>access-group</b> ACCESS-LIST-NUMBER	Specifies the number of the access list to be configured.

### Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to 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.

## Example

This example shows how to enable the ACL hardware counter.

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

## 4-3 clear acl-hardware-counter

This command is used to clear the ACL hardware counter.

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

## Parameters

<b>access-group</b>	Specifies access groups to be cleared.
<i>ACCESS-LIST-NAME</i>	(Optional) Specifies the name of the access list to be cleared.
<i>ACCESS-LIST-NUMBER</i>	(Optional) Specifies the number of the access list to be cleared.

## Default

None.

## Command Mode

Privileged EXEC Mode.

## Usage Guideline

If no parameter is specified, all access-group hardware counters will be cleared.

## Example

This example shows how to clear the ACL hardware counter.

```
Switch# clear acl-hardware-counter access-group abc
Switch#
```

## 4-4 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

<i>NAME</i>	Specifies the name of the IP access-list to be applied. The name can be up to 32 characters.
<i>NUMBER</i>	Specifies the number of the IP access list to be applied.
<b>in</b>	(Optional) Specifies that the IP access list will be applied to check packets in the ingress direction. If the direction is not specified, <b>in</b> is used.

## Default

None.

## Command Mode

Interface Configuration Mode.

## 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, 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, 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 port 2.

```
Switch# configure terminal
Switch(config)# interface eth1/0/2
Switch(config-if)# ip access-group Strict-Control
The remaining applicable IP related access entries are 704, remaining range entries are 16.
Switch(config-if)#
```

## 4-5 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** form of this command to remove an IP access list.

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

## Parameters

<b>extended</b>	(Optional) Specifies that the IP access list is the extended IP access list, and more fields can be chosen for the filter. If the parameter is not specified, the IP access list is the standard IP access list.
<i>NAME</i>	Specifies the name of the IP access list to be configured. The maximum length is 32 characters. The first character must be a letter.
<i>NUMBER</i>	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.

## 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
Switch(config-ip-ext-acl)# permit tcp any 10.20.0.0 0.0.255.255
Switch(config-ip-ext-acl)# exit
Switch(config)# ip access-list pim-srcfilter
Switch(config-ip-acl)# permit host 172.16.65.193 any
Switch(config-ip-acl)#
```

## 4-6 ipv6 access-group

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

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

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

## Parameters

<i>NAME</i>	Specifies the name of the IPv6 access-list to be applied. The name can be up to 32 characters.
<i>NUMBER</i>	Specifies the number of the IPv6 access list to be applied.
<b>in</b>	(Optional) Specifies that the IPv6 access list will be applied to check packets in the ingress direction. If the direction is not specified, <b>in</b> is used.

## Default

None.

## Command Mode

Interface Configuration Mode.

## 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, 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, an error message will be displayed.

## Example

This example shows how to specify the IPv6 access list “ip6-control” as an IP access group on port 3.

```
Switch# configure terminal
Switch(config)# interface eth1/0/3
Switch(config-if)# ipv6 access-group ip6-control in
The remaining applicable IPv6 related access entries are 320, remaining range entries are 16.
Switch(config-if)#
```

## 4-7 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

<b>extended</b>	(Optional) Specifies that the IPv6 access list is the extended IPv6 access list, and more fields can be chosen for the filter. If the parameter is not specified, the IPv6 access list is the standard IPv6 access list.
<i>NAME</i>	Specifies the name of the IPv6 access list to be configured. The maximum length is 32 characters.
<i>NUMBER</i>	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.

### 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 extended IPv6 access list, named “ip6-control”.

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

## 4-8 list-remark

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

**list-remark** *TEXT*

**no list-remark**

### Parameters

<i>TEXT</i>	Specifies the remark information. The information can be up to 256 characters long.
-------------	---

### Default

None.

### Command Mode

Access-list Configuration Mode.

### Usage Guideline

This command is available in the MAC, IP, and IPv6 Configure Mode.

### Example

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

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

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

Switch#
```

## 4-9 mac access-group

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

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

## Parameters

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

## Default

None.

## Command Mode

Interface Configuration Mode.

## 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, an error message will be displayed.

## Example

This example shows how to apply the MAC access list daily-profile to port 4.

```
Switch# configure terminal
Switch(config)#interface eth1/0/4
Switch(config-if)#mac access-group daily-profile in
The remaining applicable MAC access entries are 204, remaining range entries are 32.
Switch(config-if)#
```

## 4-10 mac access-list

This command is used to create or modify an MAC access list and this command will enter the MAC Access-list Configuration Mode. Use the **no** form of this command to delete a MAC access list.

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

## Parameters

<i>NAME</i>	Specifies the name of the MAC access list to be configured. The maximum length is 32 characters.
<i>NUMBER</i>	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.

## 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)#
```

## 4-11 permit | deny (ip access-list)

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

### Extended 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

<i>SEQUENCE-NUMBER</i>	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.
------------------------	--

<b>any</b>	Specifies any source IP address or any destination IP address.
<b>host SRC-IP-ADDR</b>	Specifies a specific source host IP address.
<b>SRC-IP-ADDR SRC-IP-WILDCARD</b>	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.
<b>host DST-IP-ADDR</b>	Specifies a specific destination host IP address.
<b>DST-IP-ADDR DST-IP-WILDCARD</b>	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.
<b>precedence PRECEDENCE</b>	(Optional) Specifies that packets can be filtered by precedence level, as specified by a number from 0 to 7.
<b>dscp DSCP</b>	(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.
<b>tos TOS</b>	(Optional) Specifies that packets can be filtered by type of service level, as specified by a number from 0 to 15.
<b>lt PORT</b>	(Optional) Specifies to match if less than the specified port number.
<b>gt PORT</b>	(Optional) Specifies to match if greater than the specified port number.
<b>eq PORT</b>	(Optional) Specifies to match if equal to the specified port number.
<b>neq PORT</b>	(Optional) Specifies to match if not equal to the specified port number.
<b>range MIN-PORT MAX-PORT</b>	(Optional) Specifies to match if fall within the range of ports.
<b>TCP-FLAG</b>	(Optional) Specifies the TCP flag fields and the specified TCP header bits called <b>ack</b> (acknowledge), <b>fin</b> (finish), <b>psh</b> (push), <b>rst</b> (reset), <b>syn</b> (synchronize), or <b>urg</b> (urgent).
<b>fragments</b>	(Optional) Specifies the packet fragment's filtering.
<b>time-range PROFILE-NAME</b>	(Optional) Specifies the name of the time period profile associated with the access list delineating its activation period.
<b>tcp, udp, icmp, igmp, ipinip, gre, esp, eigrp, ospf, pcp, pim, vrrp</b>	Specifies Layer 4 protocols.
<b>PROTOCOL-ID</b>	(Optional) Specifies the protocol ID. The valid value is from 0 to 255.
<b>ICMP-TYPE</b>	(Optional) Specifies the ICMP message type. The valid number for the message type is from 0 to 255.
<b>ICMP-CODE</b>	(Optional) Specifies the ICMP message code. The valid number for the message code is from 0 to 255.
<b>ICMP-MESSAGE</b>	(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.

## Usage Guideline

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

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

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

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

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

## Example

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

```
Switch# configure terminal
Switch(config)#ip access-list extended Strict-Control
Switch(config-ip-ext-acl)#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-acl`. 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)#
```

---

## 4-12 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-ADDR/PREFIX-LENGTH} [{eq | lt | gt | neq} PORT | range MIN-PORT MAX-PORT] {any | host DST-IPV6-ADDR | DST-IPV6-ADDR/PREFIX-LENGTH} [{eq | lt | gt | neq} PORT | range MIN-PORT MAX-PORT] [TCP-FLAG] [dscp VALUE | traffic-class VALUE] [flow-label FLOW-LABEL] [time-range PROFILE-NAME]

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

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

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

#### Standard IPv6 Access List:

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

no SEQUENCE-NUMBER

#### Parameters

<b>SEQUENCE-NUMBER</b>	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.
<b>any</b>	Specifies any source IPv6 address or any destination IPv6 address.
<b>host SRC-IPV6-ADDR</b>	Specifies a specific source host IPv6 address.
<b>SRC-IPV6-ADDR/PREFIX-LENGTH</b>	Specifies a source IPv6 network.
<b>host DST-IPV6-ADDR</b>	Specifies a specific destination host IPv6 address.
<b>DST-IPV6-ADDR/PREFIX-LENGTH</b>	Specifies a destination IPv6 network.
<b>tcp, udp, icmp, esp, pcp, sctp</b>	Specifies the Layer 4 protocol type.
<b>dscp VALUE</b>	(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.
<b>traffic-class VALUE</b>	(Optional) Specifies the matching traffic class value in the IPv6 header. The valid value is from 0 to 255.
<b>lt PORT</b>	(Optional) Specifies to match if less than the specified port number.
<b>gt PORT</b>	(Optional) Specifies to match if greater than the specified port number.
<b>eq PORT</b>	(Optional) Specifies to match if equal to the specified port number.
<b>neq PORT</b>	(Optional) Specifies to match if not equal to the specified port number.
<b>range MIN-PORT MAX-PORT</b>	(Optional) Specifies to match if fall within the range of ports.
<b>PROTOCOL-ID</b>	(Optional) Specifies the protocol ID. The valid value is from 0 to 255.



<i>ICMP-TYPE</i>	(Optional) Specifies the ICMP message type. The valid number of the message type is from 0 to 255.
<i>ICMP-CODE</i>	(Optional) Specifies the ICMP message code. The valid number of the code type is from 0 to 255.
<i>ICMP-MESSAGE</i>	(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.
<i>TCP-FLAG</i>	(Optional) Specifies the TCP flag fields and the specified TCP header bits called <b>ack</b> (acknowledge), <b>fin</b> (finish), <b>psh</b> (push), <b>rst</b> (reset), <b>syn</b> (synchronize), or <b>urg</b> (urgent).
<b>flow-label</b> <i>FLOW-LABEL</i>	(Optional) Specifies the flow label value, within the range of 0 to 1048575.
<b>fragments</b>	(Optional) Specifies the packet fragment's filtering.
<b>time-range</b> <i>PROFILE-NAME</i>	(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.

## 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)#
```

## 4-13 permit | deny (mac access-list)

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

```
[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.
<b>any</b>	Specifies any source MAC address or any destination MAC address.
<b>host SRC-MAC-ADDR</b>	Specifies a specific source host MAC address.
<b>SRC-MAC-ADDR SRC-MAC-WILDCARD</b>	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.
<b>host DST-MAC-ADDR</b>	Specifies a specific destination host MAC address.
<b>DST-MAC-ADDR DST-MAC-WILDCARD</b>	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.
<b>ethernet-type TYPE MASK</b>	(Optional) Specifies that the Ethernet type which is a hexadecimal number from 0 to FFFF or the name of an Ethernet type which can be one of the following: aarp, appletalk, decnet-iv, etype-6000, etype-8042, lat, lavc-sca, mop-console, mop-dump, vines-echo, vines-ip, xns-idp., arp.
<b>cos VALUE</b>	(Optional) Specifies the priority value of 0 to 7.
<b>vlan VLAN-ID</b>	(Optional) Specifies the VLAN-ID.
<b>vlan-range MIN-VID MAX-VID</b>	(Optional) Specifies the VLAN range. Enter the minimum and maximum VLAN ID in the range here.
<b>time-range PROFILE-NAME</b>	(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.

## 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.

MAC access-list rules will only check non-IP packets.

## 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)#
```

---

## 4-14 show access-group

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

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

### Parameters

---

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interface to be displayed.
--------------------------------------	---

---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

If no parameter is specified, all interfaces that have access list configured will be displayed.

## Example

This example shows how to display all interfaces that have access lists configured.

```
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#
```

## 4-15 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] | arp [NAME]]
```

### Parameters

<b>ip</b>	(Optional) Specifies to display a listing of all IP access lists.
<b>mac</b>	(Optional) Specifies to display a listing of all MAC access lists.
<b>ipv6</b>	(Optional) Specifies to display a listing of all IPv6 access lists.
<b>arp</b>	(Optional) Specifies to display the ARP access list.
<i>NAME</i>	(Optional) Specifies to the name of the access list to be displayed.
<i>NUMBER</i>	(Optional) Specifies to the ID of the access list to be displayed.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to access list information. If no parameter 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
-----
Strict-Control(ID: 3999)                       ip ext-acl
daily-profile(ID: 7999)                       mac ext-acl
ip6-control(ID: 14999)                       ipv6 ext-acl

Total Entries: 3

Switch#
```

This example shows how to display the IP access list called "Strict-Control".

```
Switch# show access-list ip Strict-Control
```

```
Extended IP access list Strict-Control(ID: 3999)
 10 permit any 10.20.0.0 0.0.255.255
 20 permit any host 10.100.1.2

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
```

```
Extended IP access simple-ip-acl(ID:3994)
 10 permit tcp any 10.20.0.0 0.0.255.255 (Ing: 6410 packets Egr: 5201 packets)
 20 permit tcp any host 10.100.1.2 (Ing: 3232 packets Egr: 0 packets)
 30 permit icmp any any (Ing: 8758 packets Egr: 4214 packets)

Counter enable on following port(s):
Ingress port(s): eth1/0/5-1/0/8

Switch#
```

## 5. Access Management Commands

### 5-1 access-class

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

**access-class** *IP-ACL*

**no access-class** *IP-ACL*

#### Parameters

<i>IP-ACL</i>	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.

#### Usage Guideline

Use this command to specify 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 to create a standard IP access list and specify 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 do

This command is used to execute commands originally in the EXEC Mode in Any Configuration Mode.

**do** *COMMAND*

#### Parameters

None.

#### Default

None.

## Command Mode

Any Configuration Mode.

## Usage Guideline

Use this command to execute commands originally in the EXEC Mode, such as **show**, **clear**, or **debug**, while configuring the Switch. After the command is executed, the system will return to the configuration mode you were using.



**NOTE:** The question mark (?) and the Tab key are available for the do command.

## Example

This example shows how to use the question mark (?) with this command.

```
Switch# configure terminal
Switch(config)#do show running-config ?
  all           All configurations including commands corresponding to default
                parameters
  effective     The configurations which affect the behavior of the device
  interface     Select an interface
  Vlan          VLAN configuration
  |            Output modifiers
  <cr>

Switch(config)#do show running-config
```

This example shows how to execute the **show ip interface** command in the Global Configuration Mode.

```
Switch#configure terminal
Switch(config)#do show ip interface

Interface vlan1 is enabled, Link status is down
  IP Address is 10.90.90.90/8 (Manual)
  ARP timeout is 240 minutes.

Total Entries: 1

Switch(config)#
```

## 5-3 enable password

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

**enable password** [0 | 7 | 15] *PASSWORD*

**no enable password**

### Parameters

<b>0</b>	(Optional) Specifies the password in clear, plain text. The password length is between 1 and 32 characters and can contain embedded spaces. It is case-
----------	---

	sensitive. If the password syntax cannot be specified, the syntax remains plain text.
<b>7</b>	(Optional) Specifies the encrypted password based on SHA-1. The password length is fixed at 35 bytes. It is case-sensitive. The password is encrypted. If the password syntax is not specified, the syntax is plain text.
<b>15</b>	(Optional) Specifies the password in the encrypted form based on MD5. The password length is fixed at 31 bytes. It is case-sensitive. The password is encrypted. If the password syntax is not specified, the syntax is plain text.
<i>PASSWORD</i>	Specifies the password for the user.

## Default

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

## Command Mode

Global Configuration Mode.

## 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 of “MyEnablePassword”.

```
Switch# configure terminal
Switch(config)#enable password MyEnablePassword
Switch(config)#
```

## 5-4 ip http server

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

```
ip http server
no ip http server
```

## Parameters

None.

## Default

By default, this option is enabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enable or disable 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 this command to disable the HTTPS server function.

```
ip http secure-server [ssl-service-policy POLICY-NAME]
no ip http secure-server
```

### Parameters

<b>ssl-service-policy</b> <i>POLICY-NAME</i>	(Optional) Specifies the SSL service policy name. Use this <b>ssl-service-policy</b> parameter only if you have already declared an SSL service policy using the <b>ssl-service-policy</b> command.
--	---

### Default

By default, this option is disabled.

### Command Mode

Global Configuration Mode.

### Usage Guideline

Use this command to enable the HTTPS server function and use the specified SSL service policy for HTTPS. If no parameter is specified, a built-in local certificate will be used 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 | https} access-class

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

```
ip {http | https} access-class IP-ACL
no ip {http | https} access-class IP-ACL
```

## Parameters

<i>IP-ACL</i>	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.

## Usage Guideline

Use this command to specify an access list to restrict the access to the HTTP or HTTPs server. If the specified access list does not exist, the command does not take effect and no access list is checked for the user's access to HTTP or HTTPs.

## Example

This example shows how to create a standard IP access list and specify 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 this command to revert to the default setting.

**ip http service-port** *TCP-PORT*

**no ip http service-port**

## Parameters

<i>TCP-PORT</i>	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.

## Usage Guideline

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

```
ip http timeout-policy idle INT
no ip http timeout-policy idle
```

### Parameters

---

<i>INT</i>	Specifies the idle timeout value. This value is between 60 and 36000.
------------	---

---

### Default

By default, this value is 180 seconds.

### Command Mode

Global Configuration Mode.

### Usage Guideline

Use this command 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 this command to disable the Telnet server function.

```
ip telnet server
no ip telnet server
```

### Parameters

None.

### Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enable or disable 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 this command to revert to the default setting.

**ip telnet service-port** *TCP-PORT*

**no ip telnet service-port**

## Parameters

---

<i>TCP-PORT</i>	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 port number is 23.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to configure 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 the Line Configuration Mode.

---

**line {console | telnet | ssh}**

## Parameters

<b>console</b>	Specifies the local console terminal line.
<b>telnet</b>	Specifies the Telnet terminal line.
<b>ssh</b>	Specifies the SSH terminal line.

---

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command 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 this command to disable the encryption.

**service password-encryption [7 | 15]**

**no service password-encryption**

## Parameters

<b>7</b>	(Optional) Specifies the password in the encryption form based on SHA-1.
<b>15</b>	(Optional) Specifies the password in the encrypted form based on MD5.

---

## Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## 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 **service password-encryption** command, 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 display information about the terminal configuration parameter settings for the current terminal line.

**show terminal**

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

## 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: 115200 bps

Switch#
```

---

## 5-14 show ip telnet server

This command is used to display information about the Telnet server status.

```
show ip telnet server
```

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### 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 display information about the HTTP server status.

```
show ip http server
```

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### 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 : Enabled  
Switch#
```

---

## 5-16 show ip http secure-server

This command is used to display information about the SSL status.

**show ip http secure-server**

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### 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 : Disabled  
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

User/Privileged EXEC Mode.

---



## Usage Guideline

Use this command to display information about the active lines on the Switch.

## Example

This example shows how to display all session information.

```
Switch#show users
ID   Type      User-Name      Login-Time      IP address
-----
0    * console  admin          25M58S
Total Entries: 1
Switch#
```

## 5-18 terminal length

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

**terminal length** *NUMBER*

**no terminal length**

**terminal length default** *NUMBER*

**no terminal length default**

## Parameters

<i>NUMBER</i>	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

User/Privileged EXEC Mode (for the **terminal length** command).

Global Configuration Mode (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, 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.

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 this command to revert to the default setting.

**terminal speed** *BPS*

**no terminal speed**

### Parameters

---

<i>BPS</i>	Specifies the console rate in bits per second (bps).
------------	--

---

### Default

By default, this value is 115200.

### Command Mode

Global Configuration Mode.

### 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 this command to revert to the default setting.

**session-timeout** *MINUTES*

**no session-timeout**

### Parameters

---

<i>MINUTES</i>	Specifies the timeout length in minutes. 0 represents never timeout.
----------------	--

---

## Default

By default, this value is 3 minutes.

## Command Mode

Line Configuration Mode.

## 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

This 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 does not affect any current sessions. Use the **no** form of this command to revert to the default setting.

**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

User/Privileged EXEC Mode (for the **terminal width** command).

Global Configuration Mode (for the **terminal width default** command).

## Usage Guideline

Use the **terminal width** command to change 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.

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 setting takes effect.

## Example

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

```
Switch#terminal width 120
Switch#
```

## 5-22 username

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

```
username NAME [nopassword | password [0 | 7 | 15] PASSWORD]
no username [NAME]
```

### Parameters

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

### Default

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

### Command Mode

Global Configuration Mode.

### Usage Guideline

This command creates user accounts. When the user logs in, the user will be in the Privileged EXEC Mode.

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

When the user account is empty, the user will be directly in the Privileged EXEC Mode.

## Example

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

```
Switch# configure terminal
Switch(config)# username admin password 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 this command to remove the password.

```
password [0 | 7 | 15] PASSWORD
no password
```

### Parameters

<b>0</b>	(Optional) Specifies the password in clear, plain text. The password length is between 1 and 32 characters and can contain embedded spaces. It is case-sensitive. If the password syntax cannot be specified, the syntax remains plain text.
<b>7</b>	(Optional) Specifies the encrypted password based on SHA-1. The password length is fixed at 35 bytes. It is case-sensitive. The password is encrypted. If the password syntax is not specified, the syntax is plain text.
<b>15</b>	(Optional) Specifies the password in the encrypted form based on MD5. The password length is fixed at 31 bytes. It is case-sensitive. The password is encrypted. If the password syntax is not specified, the syntax is plain text.
<i>PASSWORD</i>	Specifies the password for the user.

### Default

None.

### Command Mode

Line Configuration Mode.

### 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)#
```

## 5-24 clear line

This command is used to disconnect a connection session.

**clear line** *LINE-ID*

### Parameters

---

<i>LINE-ID</i>	Specifies the line ID of the connection session that will be disconnected.
----------------	--

---

### Default

None.

### Command Mode

Privileged EXEC Mode.

### Usage Guideline

Use this command to disconnect an active session on the Switch. The line ID is assigned by line when the connection session was created. Use the **show users** command to view active sessions.

This command can only disconnect SSH and Telnet sessions.

### Example

This example shows how to disconnect the line session 1.

```
Switch# clear line 1
Switch#
```

## 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 this 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

<i>GATEWAY-IP</i>	Specifies the IP address of the gateway.
<i>GATEWAY-MAC</i>	Specifies the MAC address of the gateway. The MAC address setting will replace the last configuration for the same gateway IP address.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies the interface that will be activated or removed from active interface list (in the <b>no</b> 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 series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

#### Default

By default, no entries exist.

#### Command Mode

Global Configuration Mode.

#### Usage Guideline

This command is only available for physical port and port-channel interface configuration.

Use this command 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'.

#### 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 on port 10.

```
Switch# configure terminal
Switch(config)# ip arp spoofing-prevention 10.254.254.251 00-00-00-11-11-11 interface
eth1/0/10
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

User/Privileged EXEC Mode.

### 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 eth1/0/10
```

```
Total Entries: 1
```

```
Switch#
```

### Display Parameters

<b>IP</b>	The IP address of the gateway.
<b>MAC</b>	The MAC address of the gateway.
<b>Interfaces</b>	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.

#### 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 authentication enable

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

```
aaa authentication enable default METHOD1 [METHOD2...]
no aaa authentication enable default
```

#### Parameters

---

<i>METHOD1</i> [ <i>METHOD2...</i> ]	<p>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.</p> <p><b>enable</b> - Specifies to use the local enable password for authentication.</p> <p><b>group radius</b> - Specifies to use the servers defined by the RADIUS server host command.</p> <p><b>group tacacs+</b> - Specifies to use the servers defined by the TACACS+ server host command.</p> <p><b>group GROUP-NAME</b> - Specifies to use the server groups defined by the AAA group server command.</p> <p><b>none</b> - Normally, the method is listed as the last method. The user will pass the authentication if it is not denied by previous method authentication.</p>
--------------------------------------	---

---

#### Default

No AAA authentication method is configured.

#### Command Mode

Global Configuration Mode.

#### 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** command. The authentication with the RADIUS server will be based on the privilege level and take either "enable" 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)#
```

### 8-2 aaa authentication dot1x

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

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

```
no aaa authentication dot1x default
```

## Parameters

<i>METHOD1</i> [ <i>METHOD2...</i> ]	<p>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.</p> <ul style="list-style-type: none"> <li>• <b>local</b> - Specifies to use the local database for authentication.</li> <li>• <b>group radius</b> - Specifies to use the servers defined by the RADIUS server host command.</li> <li>• <b>group GROUP-NAME</b> - Specifies to use the server groups defined by the AAA group server.</li> <li>• <b>none</b> - Normally, the method is listed as the last method. The user will pass the authentication if it is not denied by previous method authentication.</li> </ul>
--------------------------------------	---

## Default

No AAA accounting method is configured.

## Command Mode

Global Configuration Mode.

## 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)#
```

## 8-3 aaa authentication login

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

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

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

## Parameters

<b>default</b>	Specifies to configure the default method list for login authentication.
<i>LIST-NAME</i>	Specifies the name of the method list other than the default method list. This name can be up to 32 characters long.
<i>METHOD1</i> [ <i>METHOD2...</i> ]	<p>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.</p> <p><b>local</b> - Specifies to use the local database for authentication.</p>

**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.

## Usage Guideline

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

If authentication uses the default method list but the default method list does not exist, 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)#
```

---

## 8-4 aaa authentication mac-auth

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

---

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

```
no aaa authentication mac-auth default
```

## Parameters

---

<i>METHOD1</i> [ <i>METHOD2...</i> ]	<p>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.</p> <p><b>local</b> - Specifies to use the local database for authentication.</p> <p><b>group radius</b> - Specifies to use the servers defined by the RADIUS server host command.</p> <p><b>group</b> <i>GROUP-NAME</i> - Specifies to use the server groups defined by the AAA group server.</p> <p><b>none</b> - Normally, the method is listed as the last method. The user will pass authentication if it is not denied by previous method authentication.</p>
--------------------------------------	---

---

## 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)#
```

---

## 8-5 aaa group server radius

This command is used to enter the RADIUS Group Server Configuration Mode to associate server hosts with the group. Use the **no** form of this command to remove a RADIUS server group.

```
aaa group server radius GROUP-NAME
```

```
no aaa group server radius GROUP-NAME
```

## Parameters

---

<i>GROUP-NAME</i>	<p>Specifies the name of the server group. This name can be up to 32 characters long. The syntax is a general string and does not allow spaces.</p>
-------------------	---

---

## Default

There is no AAA group server.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to define a RADIUS server group. The defined server group can be specified as the method list for authentication via the **aaa authentication** 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)#
```

---

## 8-6 aaa group server tacacs+

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

```
aaa group server tacacs+ GROUP-NAME
no aaa group server tacacs+ GROUP-NAME
```

## Parameters

---

<i>GROUP-NAME</i>	Specifies the name of the server group. This name can be up to 32 characters long. The syntax is a general string and does not allow spaces.
-------------------	--

---

## Default

There is no AAA group server.

## Command Mode

Global Configuration Mode.

## 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** 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)#
```

## 8-7 aaa new-model

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

### Usage Guideline

Use this command to enable AAA before the authentication via the AAA method lists takes 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)#
```

## 8-8 clear aaa counters servers

This command is used to clear the authentication server statistic counters.

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

### Parameters

<b>all</b>	Specifies to clear server counter information related to all server hosts.
<b>radius IP-ADDRESS</b>	Specifies to clear server counter information related to a RADIUS IPv4 host.

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

## Default

None.

## Command Mode

Privileged EXEC Mode.

## 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#
```

## 8-9 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 this 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

<b>default</b>	Specifies to authenticate based on the default method list.
<i>METHOD-LIST</i>	Specifies the name of the method list to use.

## Default

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

## Command Mode

Global Configuration Mode.



## 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)#
```

## 8-10 login authentication

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

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

**no login authentication**

### Parameters

<b>default</b>	Specifies to authenticate based on the default method list.
<i>METHOD-LIST</i>	Specifies the name of the method list to use.

### Default

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

### Command Mode

Line Configuration Mode.

## 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)#
```

## 8-11 radius-server deadtime

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

**radius-server deadtime** *MINUTES*

**no radius-server deadtime**

### Parameters

<i>MINUTES</i>	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.

### Usage Guideline

Use this command 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)#
```

## 8-12 radius-server host

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

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

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

### Parameters

<i>IP-ADDRESS</i>	Specifies the IP address of the RADIUS server.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the RADIUS server.
<b>auth-port</b> <i>PORT</i>	(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.
<b>timeout</b> <i>SECONDS</i>	(Optional) 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.

<b>retransmit</b> <i>COUNT</i>	(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.
<b>Key 0</b> <i>KEY-STRING</i>	Specifies the unencrypted (cleartext) shared key. This key can be from 1 to 254 characters long.
<b>Key 7</b> <i>KEY-STRING</i>	Specifies the encrypted shared key. This key can be from 24 to 344 characters long.

## Default

By default, no server is configured.

## Command Mode

Global Configuration Mode.

## 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 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)#
```

## 8-13 server (RADIUS)

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

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

## Parameters

<i>IP-ADDRESS</i>	Specifies the IPv4 address of the authentication server.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the authentication server.

## Default

By default, no server is configured.

## Command Mode

RADIUS Group Server Configuration Mode.

## Usage Guideline

Use this 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 via the **aaa authentication** 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)#
```

## 8-14 server (TACACS+)

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

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

## Parameters

<i>IP-ADDRESS</i>	Specifies the IPv4 address of the authentication server.
<i>IPV6-ADDRESS</i>	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.

## Usage Guideline

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

## Example

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

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

---

## 8-15 show aaa

This command is used to display the AAA global state.

```
show aaa
```

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### 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#
```

---

## 8-16 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-NUMBER] [timeout SECONDS] key [0 | 7] KEY-STRING
no tacacs-server host {IP-ADDRESS | IPV6-ADDRESS}
```

## Parameters

<i>IP-ADDRESS</i>	Specifies the IPv4 address of the TACACS+ server.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the TACACS+ server.
<b>port</b> <i>PORT-NUMBER</i>	(Optional) Specifies the UDP destination port number for sending request packets. The default port number is 49. The range is 1 to 65535.
<b>timeout</b> <i>SECONDS</i>	(Optional) Specifies the time-out value. This value must be between 1 and 255 seconds. The default value is 5 seconds.
<b>0</b>	(Optional) Specifies the password in the clear text form. This is the default option.
<b>7</b>	(Optional) Specifies the password in the encrypted form.
<b>key</b> <i>KEY-STRING</i>	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.

## 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)#
```

## 8-17 show radius statistics

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

**show radius statistics**

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

## 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: 172.19.10.100: Auth-Port 1500
State is Up

Auth.
Round Trip Time:      0
Access Requests:     0
Access Accepts:      0
Access Rejects:      0
Access Challenges:   0
Retransmissions:     0
Malformed Responses: 0
Bad Authenticators:  0
Pending Requests:   0
Timeouts:           0
Unknown Types:       0
Packets Dropped:     0

RADIUS Server: 172.19.11.20: Auth-Port 1600
State is Up

Auth.
Round Trip Time:      0
Access Requests:     0
Access Accepts:      0
Access Rejects:      0

CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

## Display Parameters

<b>Auth.</b>	Statistics for authentication packets.
<b>Round Trip Time</b>	The time interval (in hundredths of a second) between the most recent Response and the Request that matched it from this RADIUS server.
<b>Access Requests</b>	The number of RADIUS Access-Request packets sent to this server. This does not include retransmissions.
<b>Access Accepts</b>	The number of RADIUS Access-Accept packets (valid or invalid) received from this server.
<b>Access Rejects</b>	The number of RADIUS Access-Reject packets (valid or invalid) received from this server.
<b>Access Challenges</b>	The number of RADIUS Access-Challenge packets (valid or invalid) received from this server.
<b>Retransmissions</b>	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.
<b>Malformed Responses</b>	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.

---

---

<b>Bad Authenticators</b>	The number of RADIUS Response packets containing invalid authenticators or Signature attributes received from this server.
<b>Pending Requests</b>	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.
<b>Timeouts</b>	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.
<b>Unknown Types</b>	The number of RADIUS packets of unknown type which were received from this server.
<b>Packets Dropped</b>	The number of RADIUS packets of which were received from this server and dropped for some other reason.

---

---

## 8-18 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

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display statistics counters related to servers.

### Example

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

```
Switch#show tacacs statistics

TACACS+ Server: 10.90.90.5/49, State is Up
Socket Opens: 0
Socket Closes: 0
Total Packets Sent: 0
Total Packets Recv: 0
Reference Count: 0

Switch#
```



## 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** form of this command to remove a static entry in the ARP cache.

```
arp IP-ADDRESS HARDWARE-ADDRESS
no arp IP-ADDRESS HARDWARE-ADDRESS
```

#### Parameters

<i>IP-ADDRESS</i>	Specifies the network layer IP address.
<i>HARDWARE-ADDRESS</i>	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.

#### 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** form of this command to revert to the default setting.

```
arp timeout MINUTES
no arp timeout
```

#### Parameters

<i>MINUTES</i>	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 240 minutes.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

Use this command to set the ARP aging time for the ARP table.

## Example

This example shows how to set the ARP timeout to 60 minutes to allow entries to time out.

```
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

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

### Default

None.

## Command Mode

Privileged EXEC Mode.

## Usage Guideline

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

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

**no ip address** {*IP-ADDRESS SUBNET-MASK* | **dhcp**}

## Parameters

<i>IP-ADDRESS</i>	Specifies the IP address.
<i>SUBNET-MASK</i>	Specifies the subnet mask for the associated IP address.
<b>dhcp</b>	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.

## Usage Guideline

The IPv4 address of an interface can be either manually assigned by the user or dynamically assigned by the DHCP server. Use the **no ip address** command to delete the configured IP address entry.



**NOTE:** The Switch supports up to four IPv4 and IPv6 interfaces.

## Example

This example shows how to configure 10.108.1.27 as the IP address for VLAN 1.

```
Switch# configure terminal
Switch(config)#interface vlan1
Switch(config-if)#ip address 10.108.1.27 255.0.0.0
Switch(config-if)#
```

## 9-5 show arp

This command is used to display the ARP cache.

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

## Parameters

<i>ARP-TYPE</i>	(Optional) Specifies the ARP type. <ul style="list-style-type: none"> <li><b>dynamic</b> - Specifies to display only dynamic ARP entries.</li> <li><b>static</b> - Specifies to display only static ARP entries.</li> </ul>
<i>IP-ADDRESS [MASK]</i>	(Optional) Specifies to display a specific entry or entries that belong to a specific network.
<i>INTERFACE-ID</i>	(Optional) Specifies to display ARP entries that are associated with a specific interface.

---



---

**HARDWARE-ADDRESS** (Optional) Specifies to display ARP entries whose hardware address equal to this address.

---



---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command 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#
```

## 9-6 show arp timeout

This command is used to display the aging time of ARP cache.

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

### Parameters

---



---

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

---



---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command 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#
```

## 9-7 show ip interface

This command is used to display the IP interface information.

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

### Parameters

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

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the IP interface information. 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 vlan 1

Interface vlan1 is enabled, Link status is down
  IP address is 10.90.90.90/8 (Manual)
  ARP timeout is 240 minutes.

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 INTERFACE-ID}
```

#### Parameters

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

#### Default

None.

#### Command Mode

Privileged EXEC Mode.

#### Usage Guideline

Use this command to clear dynamic neighbor cache entries.

#### Example

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

```
Switch#clear ipv6 neighbors interface vlan1
Switch#
```

### 10-2 ipv6 address

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

```
ipv6 address {IPv6-ADDRESS/PREFIX-LENGTH | IPv6-ADDRESS link-local}
no ipv6 address {IPv6-ADDRESS/PREFIX-LENGTH | IPv6-ADDRESS link-local}
```

#### Parameters

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

#### Default

None.

## Command Mode

Interface Configuration Mode.

## 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.

Each interface can have one IPv6 address assigned. 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
```

---

## 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 this command to delete an IPv6 address formed by the EUI-64 interface ID.

**ipv6 address** *IPv6-PREFIX/PREFIX-LENGTH* **eui-64**

**no ipv6 address** *IPv6-PREFIX/PREFIX-LENGTH* **eui-64**

## Parameters

<i>IPv6-PREFIX</i>	Specifies the IPv6 prefix part for the configured IPv6 address.
<i>PREFIX-LENGTH</i>	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.

## 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 this command to disable the using of DHCPv6 to get an IPv6 address.

**ipv6 address dhcp [rapid-commit]**

**no ipv6 address dhcp**

### Parameters

<b>rapid-commit</b>	(Optional) 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

By default, this option is disabled.

### Command Mode

Interface Configuration Mode.

### Usage Guideline

Use this command to configure the interface to obtain IPv6 network configuration settings from a DHCPv6 server.

The standard four-message exchange between the DR and the RR includes four messages: SOLICIT, ADVERTISE, REQUEST, and REPLY. When the **rapid-commit** parameter is specified, the RR will notify the DR in the SOLICIT message that it can skip receiving the ADVERTISE message and sending REQUEST message, and proceed directly with receiving the REPLY message from DR to complete a two-message exchange instead of the standard four-message exchange. The REPLY message contains the network configuration settings.

The **rapid-commit** parameter must be enabled on both the DR and the RR to function properly.

When the **no** command is used, the existing IPv6 network configuration settings which are obtained from the DHCPv6 server will be removed.

## 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 this command to disable IPv6 processing on interfaces that have no IPv6 address explicitly configured.

**ipv6 enable**

**no ipv6 enable**

### Parameters

None.

### Default

By default, this option is disabled.

### Command Mode

Interface Configuration Mode.

### 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

---

<i>VALUE</i>	Specifies the IPv6 hop limit value. To use the default value on this interface, configure this value as 0. The range is from 0 to 255.
--------------	--

---

### Default

By default, this value is 64.

### Command Mode

Interface Configuration Mode.

## 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 to 255.

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

---

## 10-7 ipv6 nd managed-config-flag

This command is used to enable the management configure flag in the advertised RA message. Use the **no** command to disable this flag.

```
ipv6 nd managed-config-flag
no ipv6 nd managed-config-flag
```

## Parameters

None.

## Default

By default, this feature is disabled.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

When the neighboring host receives the RA with an enabled flag, the host should use a stateful configuration protocol to obtain IPv6 addresses.

## Example

This example shows how to enable the IPv6 management configure flag in RA advertised on VLAN 1.

```
Switch# configure terminal
Switch(config)# interface vlan1
Switch(config-if)# ipv6 nd managed-config-flag
Switch(config-if)#
```

---

## 10-8 ipv6 nd other-config-flag

This command is used to enable the other configure flag in the advertised RA message. Use the **no** command to disable this flag.

```
ipv6 nd other-config-flag
no ipv6 nd other-config-flag
```

---

## Parameters

None.

## Default

By default, this feature is disabled.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

When this feature is enabled, the router will instruct the connected hosts to use a stateful configuration protocol to obtain auto-configuration information other than IPv6 address.

## Example

This example shows how to enable the IPv6 other configure flag in RA advertised on VLAN 1.

```
Switch# configure terminal
Switch(config)# interface vlan1
Switch(config-if)# ipv6 nd other-config-flag
Switch(config-if)#
```

## 10-9 ipv6 nd prefix

This command is used to configure the IPv6 prefix to be advertised in RA messages. Use the **no** command to remove the prefix.

**ipv6 nd prefix** *IPv6-PREFIX**PREFIX-LENGTH* [*VALID-LIFETIME* *PREFERRED-LIFETIME*] [**off-link**] [**no-autoconfig**]

**no ipv6 nd prefix** *IPv6-PREFIX**PREFIX-LENGTH*

## Parameters

<i>IPv6-PREFIX</i>	Enter the IPv6 prefix to be created or advertised in the RA on the interface here.
<i>PREFIX-LENGTH</i>	Enter the IPv6 prefix length to be created or advertised in the RA on the interface here.
<i>VALID-LIFETIME</i>	(Optional) Enter the valid lifetime value here. The range is from 0 to 4294967295 seconds.
<i>PREFERRED-LIFETIME</i>	(Optional) Enter the preferred lifetime value here. The range is from 0 to 4294967295 seconds.
<b>off-link</b>	(Optional) Specifies to disable the on-link flag.
<b>no-autoconfig</b>	(Optional) Specifies to disable the auto-config flag.

## Default

The default valid lifetime value is 2592000 seconds (30 days).

The default preferred lifetime value is 604800 seconds (7 days).

By default, the off-link flag and auto-config flag is on.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

For a prefix, the valid lifetime should be greater than the preferred lifetime. They are meaningful when the prefix has the A bit ON. The received host will do a stateless address configuration based on the prefix. If the lifetime of the prefix has exceeded the preferred lifetime, then the IPv6 address configured based on this prefix will change to the deprecated state. If the lifetime of a prefix has exceeded the valid lifetime, then the IPv6 address configured based on this prefix will be removed.

If the IPv6 address is manually configured on the interface, the corresponding prefix will automatically be advertised. The advertised prefix can be modified but cannot be removed using this command. If the IPv6 address is removed later, the advertising of the corresponding prefix will also be stopped.

## Example

This example shows how to configure an IPv6 prefix 3ffe:501:ffff:100::/64 with a valid lifetime of 30000 seconds and a preferred lifetime of 20000 seconds.

```
Switch# configure terminal
Switch(config)# interface vlan1
Switch(config-if)# ipv6 nd prefix 3ffe:501:ffff:100::/64 30000 20000
Switch(config-if)#
```

## 10-10 ipv6 nd ra interval

This command is used to configure the IPv6 RA interval for an interface. Use the **no** form of this command to revert to the default setting.

**ipv6 nd ra interval** *MAX-SECS* [*MIN-SECS*]

**no ipv6 nd ra interval**

## Parameters

<i>MAX-SECS</i>	Specifies the maximum interval between retransmission of RA messages in seconds. The valid range is from 4 to 1800 seconds.
<i>MIN-SECS</i>	(Optional) Specifies the minimum interval between retransmission of RA messages in seconds. This value must be smaller than 0.75 times the maximum value. The valid range is from 3 to 1350 seconds.

## Default

By default, the maximum interval value is 200 seconds.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

The following rules apply to the minimum RA interval value if the minimum value is not configured:

- If the maximum RA interval value is equal to or greater than 9 seconds, then the minimum value will be 33% of the maximum value.
- If the maximum RA interval value lesser than 9 seconds, then the minimum value will be the same as the maximum value.

## Example

This example shows how to configure IPv6 RA interval value.

```
Switch# configure terminal
Switch(config)# interface vlan1
Switch(config-if)# ipv6 nd ra interval 1500 1000
Switch(config-if)#
```

---

## 10-11 ipv6 nd ra lifetime

This command is used to configure the IPv6 RA lifetime value for an interface. Use the **no** form of this command to revert to the default setting.

```
ipv6 nd ra lifetime SECONDS
no ipv6 nd ra lifetime
```

### Parameters

---

<i>SECONDS</i>	Specifies the lifetime in seconds of the router as the default router. The valid range is 0-9000.
----------------	---

---

### Default

By default, this value is 1800 seconds.

### Command Mode

Interface Configuration Mode.

### Usage Guideline

The lifetime value in RA informs the received host of the lifetime for taking the router as the default router.

## Example

This example shows how to configure the lifetime value advertised in the RA to 9000 seconds.

```
Switch# configure terminal
Switch(config)# interface vlan1
Switch(config-if)# ipv6 nd ra lifetime 9000
Switch(config-if)#
```

---

## 10-12 ipv6 nd suppress-ra

This command is used to disable the sending of RA messages on the interface. Use the **no** command to enable the sending of RA messages.

```
ipv6 nd suppress-ra
no ipv6 nd suppress-ra
```

### Parameters

None.

## Default

By default, this feature is enabled on a VLAN interface and disabled on a tunnel interface.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

Use this command to disable the sending of RA messages on the interface. Use the **no** command to re-enable the sending of RA messages on an ISATAP tunnel interface.

## Example

This example shows how to suppress the sending of RA on VLAN 1.

```
Switch# configure terminal
Switch(config)# interface vlan1
Switch(config-if)# ipv6 nd suppress-ra
Switch(config-if)#
```

---

## 10-13 ipv6 nd reachable-time

This command is used to configure the reachable time used in the ND protocol. Use the **no** form of this command to revert to the default setting.

**ipv6 nd reachable-time** *MILLI-SECONDS*

**no ipv6 nd reachable-time**

## Parameters

---

<i>MILLI-SECONDS</i>	Specifies the IPv6 router advertisement reachable time range in milliseconds. The range is from 0 to 3600000 milliseconds in multiples of 1000 milliseconds.
----------------------	--

---

## Default

The default value advertised in RA is 1200000 milliseconds.

The default value used by the router is 1200000 milliseconds (1200 seconds).

## Command Mode

Interface Configuration Mode.

## Usage Guideline

The configured time is used by the router on the interface and is also advertised in RA message. If the specified time is 0, the router will use 30 seconds on the interface and advertise 0 (unspecified) in RA message. The reachable time is used by the IPv6 node in determining the reachability of the neighboring nodes.

## Example

This example shows how to configure the reachable time on VLAN 1 to 3600 seconds.

```
Switch# configure terminal
Switch(config)# interface vlan1
Switch(config-if)# ipv6 nd reachable-time 3600000
Switch(config-if)#
```

## 10-14 ipv6 nd ns-interval

This command is used to configure the interval between retransmissions of NS messages. Use the **no** form of this command to revert to the default setting.

**ipv6 nd ns-interval** *MILLI-SECONDS*

**no ipv6 nd ns-interval**

### Parameters

<i>MILLI-SECONDS</i>	Specifies the amount of time between retransmissions of NS message here. The range is from 0 to 3600000 milliseconds in multiples of 1000 milliseconds.
----------------------	---

### Default

The default value advertised in the RA is 0.

The default value used by the router is 1000 milliseconds (1 second).

### Command Mode

Interface Configuration Mode.

### Usage Guideline

The configured time is used by the router on the interface and is also advertised in RA message. If the specified time is 0, the router will use 1 second on the interface and advertise 0 (unspecified) in the RA message.

## Example

This example shows how to configure the IPv6 NS message retransmission interval to 6 seconds.

```
Switch# configure terminal
Switch(config)# interface vlan1
Switch(config-if)# ipv6 nd ns-interval 6000
Switch(config-if)#
```

## 10-15 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

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

## Default

None.

## Command Mode

Global Configuration Mode.

## 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)#
```

## 10-16 show ipv6 interface

This command is used to display IPv6 interface information.

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

## Parameters

<i>INTERFACE-ID</i>	(Optional) Specifies to display information for the specified IPv6 interface.
<b>brief</b>	(Optional) Specifies to display a summary of the IPv6 interface information.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## 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::200:ABFF:FECD:1234
  Global unicast address:
    200::2/64 (Manual)
  RA messages are sent between 66 to 200 seconds
  RA advertised reachable time is 1200000 milliseconds
  RA advertised retransmit interval is 0 milliseconds
  RA advertised life time is 1800 seconds
  RA advertised O flag is OFF, M flag is OFF
  RA advertised prefixes
    200::/64
      valid lifetime is 2592000, preferred lifetime is 604800

Total Entries: 1

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#
```

## 10-17 show ipv6 neighbors

This command is used to display IPv6 neighbor information.

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

### Parameters

<i>INTERFACE-ID</i>	(Optional) Specifies the interface to display IPv6 neighbor cache entry.
<i>IPV6-ADDRESS</i>	(Optional) Specifies the IPv6 address to display its IPv6 neighbor cache entry.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## 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

<b>Type</b>	<ul style="list-style-type: none"> <li>• <b>D</b> - Dynamic learning entry.</li> <li>• <b>S</b> - Static neighbor entry.</li> </ul>
<b>State</b>	<ul style="list-style-type: none"> <li>• <b>INCMP (Incomplete)</b> - Address resolution is being performed on the entry, but the corresponding neighbor advertisement message has not yet been received.</li> <li>• <b>REACH (Reachable)</b> - Corresponding neighbor advertisement message was received and the reachable time (in milliseconds) has not elapsed yet. It indicates that the neighbor was functioning properly.</li> <li>• <b>STALE</b> - More than the reachable time (in milliseconds) have elapsed since the last confirmation was received.</li> <li>• <b>PROBE</b> - Sending the neighbor solicitation message to confirm the reachability.</li> <li>• <b>DELAY</b> - The neighbor is no longer known to be reachable and traffic has recently been sent to the neighbor. Instead of probing the neighbor immediately, delay the sending of probes for a short while in order to give upper-layer protocols a chance to provide reachability confirmation.</li> </ul>

# 11. Cable Diagnostics Commands

## 11-1 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

<b>interface</b> <i>INTERFACE-ID</i>	Specifies the interface ID.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

This command is only available for physical port interface configuration. Cable Diagnostics can help users to detect whether the copper Ethernet port has connectivity problems. Use this 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.
- **Crosstalk** - The cable in the error pair has a crosstalk problem at the specified position.
- **Mismatch** - An impedance mismatch in each differential pair.
- **PairBusy** - The remote partner interfered the test. Start the test again.
- **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#
```

## 11-2 show cable-diagnostics

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

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

### Parameters

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interface ID.
--------------------------------------	--

,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

This command is only available for physical port interface configuration. Use this command 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	Pair 1 Open at 0M Pair 2 OK at 7M Pair 3 OK at 7M Pair 4 Open at 0M	-
eth1/0/2	1000BASE-T	Link Down	-	-
eth1/0/3	1000BASE-T	Link Down	-	-
eth1/0/4	1000BASE-T	Link Down	-	-
eth1/0/5	1000BASE-T	Link Down	-	-
eth1/0/6	1000BASE-T	Link Down	-	-
eth1/0/7	1000BASE-T	Link Down	-	-
eth1/0/8	1000BASE-T	Link Down	-	-
eth1/0/9	1000BASE-T	Link Down	-	-
eth1/0/10	1000BASE-T	Link Down	-	-
eth1/0/11	1000BASE-T	Link Down	-	-
eth1/0/12	1000BASE-T	Link Down	-	-
eth1/0/13	1000BASE-T	Link Down	-	-
eth1/0/14	1000BASE-T	Link Down	-	-
eth1/0/15	1000BASE-T	Link Down	-	-
eth1/0/16	1000BASE-T	Link Down	-	-
eth1/0/17	1000BASE-T	Link Down	-	-
eth1/0/18	1000BASE-T	Link Down	-	-

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## 11-3 clear cable-diagnostics

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

---

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

## Parameters

<b>all</b>	Specifies to clear cable diagnostics results for all interfaces.
<b>interface <i>INTERFACE-ID</i></b>	Specifies the interface ID.
<b>,</b>	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
<b>-</b>	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

This command is only available for physical port interface configuration. Use this command 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#
```

## 12. Command Logging Commands

### 12-1 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.

#### 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)#
```

---

# 13. Debug Commands

## 13-1 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.

### Usage Guideline

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

### Example

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

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

## 13-2 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: //LOCATION/DESTINATION-URL*

### Parameters

<i>SOURCE-URL</i>	Specifies the source URL for the source file to be copied. It must be one of the following keywords. <ul style="list-style-type: none"> <li><b>error-log</b> - Specifies to copy the error log information.</li> <li><b>tech-support</b> - Specifies to copy the technical support information.</li> </ul>
<i>LOCATION</i>	Specifies the IPv4 or IPv6 address of the TFTP server.

### Default

None.



## Command Mode

Privileged EXEC Mode.

## Usage Guideline

Use this command to copy debug information to the destination filename.

## Example

This example shows how to copy tech-support information to a TFTP server (10.90.90.99).

```
Switch# debug copy tech-support tftp: //10.90.90.99/abc.txt

Address of remote host [10.90.90.99]?
Destination filename [abc.txt]?
Connecting to server..... Done.
Upload tech-support..... 100 %

Success.

Switch#
```

---

## 13-3 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.

### 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#
```

---

## 13-4 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.

**Usage Guideline**

Use this command to display the content of the error log.

**Example**

This example shows how to display the content of the error log.

```
Switch#debug show error-log
Exception signal 11 caught: Segmentation fault
Address: 0
Task: 0x023CCA78 "CLI"
Stack Usage (used max/size): 9320/196608 bytes
Registers:
    pc=00000000
    $0=00000000    $1(at)=00000001    $2(v0)=00000000    $3(v1)=00000074
$4(a0)=00000000    $5(a1)=014FFB15    $6(a2)=00000000    $7(a3)=00000000
$8(t0)=00000064    $9(t1)=00000064    $10(t2)=0018F730    $11(t3)=FFFFFFFE
$12(t4)=02406EB8    $13(t5)=73947BC8    $14(t6)=20000000    $15(t7)=00000074
$16(s0)=68173794    $17(s1)=739503B8    $18(s2)=738404F0    $19(s3)=6817379C
$20(s4)=00000001    $21(s5)=6FB45D3C    $22(s6)=00000004    $23(s7)=68173928
$24(t8)=00CF81C4    $25(t9)=00D60E10    $26(k0)=68174524    $27(k1)=00000000
$28(gp)=016F7B70    $29(sp)=681736E0    $30(fp)=016FCCB4    $31(ra)=00D15A30
Back Trace (for reference only):
->00D15A28
->023AF920
->00D60E20 strcpy+0X10/0X24
Stack:
681736E0    739503B8 738404F0 68173798 00000001    s...s...h.7.....
681736F0    016F7B70 016FCCB4 68173928 00195818    .o{p.o..h.9(..X.
68173700    778C2020 00000000 000030D4 023AF928    w. ....0...:(
68173710    00000001 00000000 00000000 00000000    .....
68173720    016FCCB4 00000000 00000000 2F000004    .o...../...
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

**13-5 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.

**Usage Guideline**

Use this command to display technical support information. The technical support information is used to collect the Switch's information needed by the engineers to troubleshoot or analyze a problem.

**Example**

This example shows how to display technical support information of all the modules.

```
Switch#debug show tech-support
```

```
#-----  
#           DGS-1250-28XMP Gigabit Ethernet Smart Managed Switch  
#           Technical Support Information  
#  
#           Firmware: Build 2.03.001  
#   Copyright (C) 2021 D-Link Corporation. All rights reserved.  
#-----
```

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

```
[SYS 2000-1-1 00:12:25]
```

```
Boot Time           : 1 Jan 2000 00:00:00  
RTC Time            : 2000/01/01 00:12:25  
Bootloader Version  : 3.3.0.31-12  
Linux Version       : 3.18.24-18 #3 Mon Mar 25 22:31:47 CST 2019  
Runtime Version     : 2.03.001  
Hardware Version    : A1  
Serial number       : DGS1250102030  
MAC Address         : F0-7D-68-12-50-01  
MAC Address Number  : 28
```

```
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

# 14. DHCP Auto-Configuration Commands

## 14-1 autoconfig enable

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

```
autoconfig enable
no autoconfig enable
```

### Parameters

None.

### Default

By default, this option is disabled.

### Command Mode

Global Configuration Mode.

### Usage Guideline

When auto-configuration is enabled and the Switch is rebooted, the Switch becomes a DHCP client automatically. The auto-configuration process is as following:

- The Switch will get “configure file path” name and the TFTP server IP address from the DHCP server if the DHCP server has the TFTP server IP address and configuration file name and be configured to deliver this information in the data field of the DHCP reply packet.
- The Switch will then download the configuration file from the TFTP server to configure the system, if the TFTP server is running and have the requested configuration file in its base directory when the request is received from the Switch.

If the Switch is unable to complete the auto-configuration process, the previously saved local configuration file present in switch memory will be loaded.

### Example

This example shows how to enable auto-configuration.

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

---

## 14-2 show autoconfig

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

```
show autoconfig
```

### Parameters

None.

### Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command 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#
```

# 15. DHCP Client Commands

## 15-1 ip dhcp client class-id

This command is used to specify the vendor class identifier used as the value of Option 60 for the DHCP discover message. Use the **no** form of this command to revert to the default setting.

```
ip dhcp client class-id {STRING | hex HEX-STRING}
no ip dhcp client class-id
```

### Parameters

<i>STRING</i>	Specifies the vendor class identifier in the string form. The maximum length of the string is 32.
<b>hex</b> <i>HEX-STRING</i>	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.

### Usage Guideline

Use this command to specify a vendor class identifier (Option 60) to be sent with the DHCP discover message. This specification only applies to the subsequent sending of the DHCP discover messages. The setting only takes effect when the DHCP client is enabled on the interface to acquire the IP address from the DHCP server. The vendor class identifier specifies the type of device that is requesting an IP address.

### Example

This example shows how to enable the DHCP client, enable the sending of the Vendor Class Identifier, and specifies its value as VOIP-Device for VLAN 100.

```
Switch# configure terminal
Switch(config)# interface vlan 100
Switch(config-if)# ip address dhcp
Switch(config-if)# ip dhcp client class-id VOIP-Device
Switch(config-if)#
```

## 15-2 ip dhcp client client-id

This command is used to specify the VLAN interface whose hexadecimal MAC address will be used as the client ID sent with the discover message. Use the **no** form of this command to revert to the default setting.

```
ip dhcp client client-id INTERFACE-ID
no ip dhcp client client-id
```

### Parameters

<i>INTERFACE-ID</i>	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.

## Usage Guideline

Use this command to configure the hexadecimal MAC address of the specified interface as the client ID sent with the discover message. The specification only applies to the subsequent sending of the DHCP discover messages. The setting only takes effect when the DHCP client is enabled on the interface to acquire the IP address from the DHCP server. One interface can be specified as the client identifier.

## Example

This example shows how to configure the MAC address of VLAN 100 as the client ID, sent in the discover message for VLAN 100.

```
Switch# configure terminal
Switch(config)# interface vlan 100
Switch(config-if)# ip dhcp client client-id vlan 100
Switch(config-if)#
```

## 15-3 ip dhcp client 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

<i>DAYS</i>	Specifies the day duration of the lease. The range is from 0 to 10000 days.
<i>HOURS</i>	(Optional) Specifies the hour duration of the lease. The range is from 0 to 23 hours.
<i>MINUTES</i>	(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.

## 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)#
```

---



## 16. DHCP Relay Commands

### 16-1 class (DHCP relay)

This command is used to enter the DHCP pool configuration mode and associate a range of IP addresses with the DHCP class. Use the **no** form of this command to remove the association.

**class** *NAME*

**no class** *NAME*

#### Parameters

<i>NAME</i>	Specifies the DHCP class name with a maximum of 32 characters.
-------------	--

#### Default

None.

#### Command Mode

DHCP Pool Configuration Mode.

#### 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 configure a DHCP class, "Service-A", defined with DHCP Option 60 matching pattern 0x112233 and 0x102030, classified to the relay pool, "pool1", and is associated with relay target "10.2.1.2".

```
Switch# configure terminal
Switch(config)# ip dhcp class Service-A
Switch(config-dhcp-class)# option 60 hex 112233
Switch(config-dhcp-class)# option 60 hex 102030
Switch(config-dhcp-class)# exit
Switch(config)# ip dhcp pool pool1
Switch(config-dhcp-pool)# relay source 172.19.18.0 255.255.255.0
Switch(config-dhcp-pool)# class Service-A
Switch(config-dhcp-pool-class)# relay target 10.2.1.2
Switch(config-dhcp-pool-class)#
```

### 16-2 ip dhcp class (DHCP relay)

This command is used to define a DHCP class and enter the DHCP Class Configuration Mode. Use the **no** form of this command to remove a DHCP class.

**ip dhcp class** *NAME*

**no ip dhcp class** *NAME*

## Parameters

<i>NAME</i>	Specifies the DHCP class name with a maximum of 32 characters.
-------------	--

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enter the DHCP Class Configuration Mode. In the mode, the user can use the **option hex** command to define the option matching pattern for the DHCP class. When a class has no option hex associated, the class will be matched by any packet.

## Example

This example shows how to configure a DHCP class "Service-A" and defined with DHCP Option 60 matching pattern 0x112233.

```
Switch# configure terminal
Switch(config)# ip dhcp class Service-A
Switch(config-dhcp-class)# option 60 hex 112233
Switch(config-dhcp-class)#
```

## 16-3 ip dhcp pool (DHCP Relay)

This command is used to configure a DHCP relay pool on a DHCP relay agent and enter the DHCP pool configuration mode. Use the **no** form of this command to delete a DHCP relay pool.

**ip dhcp pool** *NAME*

**no ip dhcp pool** *NAME*

## Parameters

<i>NAME</i>	Specifies the address pool name with a maximum of 32 characters.
-------------	--

## Default

None.

## Command Mode

Global Configuration Mode.

## 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 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.

When receiving a DHCP request packet, if the subnet that the packet comes from matches the relay source of a relay pool, the packet will be relayed based on the matched relay pool. To relay based on the relay pool, if the

request packet is a relayed packet, the Gateway IP Address (GIADDR) of the packet is the source of the request. If the GIADDR is zero, the subnet of the received interface is the source of the packet.

In a DHCP relay pool, the user can further use the **class** command and the **relay target** command to define the relay target address for the request packets that match the option pattern.

## Example

This example shows how to create a DHCP relay pool, called pool1. In the relay pool, the subnet 172.19.18.0/255.255.255.0 is specified as the source subnet. 10.2.1.1 is specified as the relay destination address.

```
Switch# configure terminal
Switch(config)# ip dhcp pool pool1
switch(config-dhcp-pool)# relay source 172.19.18.0 255.255.255.0
switch(config-dhcp-pool)# relay destination 10.2.1.1
switch(config-dhcp-pool)#
```

---

## 16-4 ip dhcp relay information check

This command is used to enable the DHCP relay agent to validate and remove the relay agent information option in the received DHCP reply packet. Use the **no** form of this command to globally disable the check for Option 82.

**ip dhcp relay information check**

**no ip dhcp relay information check**

### Parameters

None.

### Default

By default, this option is disabled.

### Command Mode

Global Configuration Mode.

### Usage Guideline

This command takes effect when the **service dhcp** command is enabled.

The **ip dhcp relay information check** command and the **ip dhcp relay information check-reply** command together determine whether the check function of Option 82 is effective for an interface. If the **ip dhcp relay information check-reply** command is not configured for an interface, the global setting takes effect. If the **ip dhcp relay information check-reply** command is configured for an interface, the interface setting takes effect.

When the check for Option 82 of the reply packet is enabled, the device will check the validity of the Option 82 field in DHCP reply packets it receives from the DHCP server. If the Option 82 field in the received packet is not present or the option is not the original option inserted by the agent (by checking the remote ID sub-option, the relay agent drops the packet. Otherwise, the relay agent removes the Option 82 field and forwards the packet.

If the check is disabled, the packet will be directly forwarded.

## Example

This example shows how to enable the global DHCP relay agent check.

```
Switch#configure terminal
Switch(config)# ip dhcp relay information check
switch(config)#
```

## 16-5 ip dhcp relay information 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 this command to remove the configuration for the interface.

**ip dhcp relay information check-reply [none]**

**no ip dhcp relay information check-reply [none]**

### Parameters

<b>none</b>	(Optional) Specifies to disable check for Option 82 of the reply packet.
-------------	--

### Default

None.

### Command Mode

Interface Configuration Mode.

### Usage Guideline

This command takes effect when the **service dhcp** command is enabled.

The **ip dhcp relay information check** command and the **ip dhcp relay information check-reply** command together determine whether the check function of Option 82 is effective for an interface. If the **ip dhcp relay information check-reply** command is not configured for an interface, the global setting takes effect. If the **ip dhcp relay information check-reply** command is configured for an interface, the interface setting takes effect.

When the check for Option 82 of the reply packet is enabled, the device will check the validity of the Option 82 field in DHCP reply packets it receives from the DHCP server. If the Option 82 field in the received packet is not present or the option is not the original option inserted by the agent (by checking the remote ID sub-option, the relay agent drops the packet. Otherwise, the relay agent removes the Option 82 field and forwards the packet.

If the check is disabled, the packet will be directly forwarded.

### Example

This example shows how to disable the global DHCP relay agent check but enable the DHCP relay agent check for the VLAN 100. The effect state of the check function for VLAN 100 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
```

## 16-6 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** form of this command to disable this insert function.

**ip dhcp relay information option**

**no ip dhcp relay information option**

### Parameters

None.

## Default

By default, Option 82 is not inserted.

## Command Mode

Global Configuration Mode.

## Usage Guideline

This command takes effect when the **service dhcp** command is enabled.

When DHCP Option 82 is enabled, the DHCP packet received from the client will be inserted with an Option 82 field before being relayed to the server. The DHCP Option 82 contains two sub-options respectively the circuit ID sub-option and remote ID sub-option.

Administrators can use the **ip dhcp relay information option format remote-id** command to specify a user-defined string for the remote ID sub-option.

## Example

This example shows how to enable the insertion of Option 82 during the relay of DHCP request packets.

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

## 16-7 ip dhcp relay information option-insert

This command is used to configure the insertion of Option 82 for an interface during the relay of DHCP request packets. Use the **no** form of this command to remove the configuration of the insert function for the interface.

**ip dhcp relay information option-insert [none]**

**no ip dhcp relay information option-insert [none]**

## Parameters

<b>none</b>	(Optional) Specifies to disable insertion of Option 82 in the relayed packet. Default
-------------	--

## Default

None.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

This command takes effect when the **service dhcp** command is enabled.

## Example

This example shows how to enable the insertion of Option 82 during the relay of DHCP request packets and disables the insertion of Option 82 for interface VLAN 100. The insertion of Option 82 is disabled for VLAN 100 but enabled for the remaining interfaces.

```
Switch# configure terminal
Switch(config)# ip dhcp relay information option
Switch(config)# interface vlan 100
Switch(config-if)# ip dhcp relay information option-insert none
switch(config-if)#
```

## 16-8 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 this command to revert to the default setting.

```
ip dhcp relay information policy {drop | keep | replace}
no ip dhcp relay information policy
```

### Parameters

<b>drop</b>	Specifies to discard the packet that already has the relay option.
<b>keep</b>	Specifies that the DHCP requests packet that already has the relay option is left unchanged and directly relayed to the DHCP server.
<b>replace</b>	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.

### Usage Guideline

This command takes effect when the **service dhcp** command is enabled.

Use this command to configure the global policy for the insertion of Option 82 on packets that already have Option 82.

## Example

This example shows how to configure the relay agent option re-forwarding policy to keep.

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

## 16-9 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 this command to remove the configuration for the interface.

**ip dhcp relay information policy-action {drop | keep | replace}**

**no ip dhcp relay information policy-action**

## Parameters

<b>drop</b>	Specifies to discard the packet that already has the relay option.
<b>keep</b>	Specifies that the DHCP request packet that already has the relay option is left unchanged and directly relayed to the DHCP server.
<b>replace</b>	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.

## Usage Guideline

This command takes effect when the **service dhcp** command is enabled.

Use this command to configure the global policy for the insertion of Option 82 on packets that already have Option 82.

## Example

This example shows how to configure the relay agent option re-forwarding policy to keep and set the policy to drop for VLAN 100. The effective relay agent option re-forwarding policy for VLAN 100 is drop and for the remaining interfaces are set as keep.

```
Switch# configure terminal
Switch(config)# ip dhcp relay information policy keep
Switch(config)# interface vlan 100
Switch(config-if)# ip dhcp relay information policy-action drop
Switch(config-if)#
```

## 16-10 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 this command to configure the default remote ID sub-option.

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

**no ip dhcp relay information option format remote-id**

## Parameters

<b>default</b>	Specifies to use the Switch's system MAC address as the remote ID. The remote ID is formed in the following format:
	<pre>  -----    a.      b.      c.      d.      e.       -----    2       8       0       6       MAC Address  -----    1 byte  1 byte  1 byte  1 byte  6 bytes </pre>

<b>string SENTENCE</b>	<p>Specifies to use a user-defined string as the remote ID. Space characters are allowed in the string. The remote ID option is formed in the following format:</p> <pre> -----   a.        b.        c.        d.        e.        -----   2         n+2       1         n         User Defined   -----   1 byte    1 byte    1 byte    1 byte    Max. 32 bytes   ----- </pre>
<b>vendor2</b>	<p>Specifies to use the vendor 2. If configures, the remote ID option uses the original format:</p> <pre> -----   a.        b.        c.        -----   2         n         System Name   -----   1 byte    1 byte    n byte       ----- </pre> <p><b>a. Sub-option type:</b> The number 2 indicates that this is the remote ID.  <b>b. Length:</b> The length of the value.  <b>c. Value:</b> The character string. The system name of the Switch.</p>
<b>vendor3</b>	Specifies to use vendor 3.

## Default

The Switch's system MAC address is used as the remote ID string.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to select different vendor's remote ID format or configures a user-defined string of ASCII characters to be the remote ID.

## Example

This example shows how to use vendor2 as the remote ID.

```
Switch# Switch# configure terminal
Switch(config)# ip dhcp relay information option
Switch(config)# ip dhcp relay information option format remote-id vendor2
Switch(config)#
```

This example shows how to configure a user-defined string "switch1" as the remote ID.

```
Switch# configure terminal
Switch(config)# ip dhcp relay information option
Switch(config)# ip dhcp relay information option format remote-id string switch1
Switch(config)#
```



## 16-11 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 the Interface Configuration Mode. Use the **no** form of this command to remove the remote ID sub-option of vendor format string.

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

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

### Parameters

<b>vendor3</b>	Specifies the vendor 3 user-defined string with the maximum 32 characters.
<i>STRING</i>	Specifies the user-defined string.

### Default

None.

### Command Mode

Interface Configuration Mode.

### Usage Guideline

This command is only available for physical port and port-channel interface configuration.

Use this command to configure each interface's vendor defined string for option 82 information remote-id sub-option.

### Example

This example shows how to define vendor3 remote-id format string as "switch1" on port 3.

```
Switch# configure terminal
Switch(config)# interface eth1/0/3
Switch(config-if)# ip dhcp relay information option format-type remote-id vendor3 string
switch1
Switch(config-if)#
```

## 16-12 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 this command to configure the default circuit ID sub-option.

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

**no ip dhcp relay information option format circuit-id**

### Parameters

<b>default</b>	Specifies to use the default circuit ID sub-option. If configured, the circuit ID will use the original format:
	<pre>  -----    a.      b.      c.      d.      e.      f.      g.       -----    1       0x6     0       4       VLAN    Module  Port  ID     ID     </pre>

```

-----|
| 1 byte | 1 byte | 1 byte | 1 byte | 2 bytes | 1 byte | 1 byte |
-----|

```

- a. *Sub-option type*: The number 1 indicates that this is the circuit ID.
- b. *Length*: The length of the value. This should be 6.
- c. *Circuit ID's sub-option*: This should be 0.
- d. *Sub-option's length*: This should be 4.
- e. The VLAN ID (S-VID).
- f. *Module ID*: For stand-alone switch this is 0.
- g. *Port ID*: Port number for each box.

**string SENTENCE**

Specifies to use a user-defined string as the circuit ID. Space characters are allowed in the string.

```

-----|
| a.      | b.      | c.      | d.      | e.      |
-----|
| 2       | n+2    | 1       | n       | User Defined |
-----|
| 1 byte | 1 byte | 1 byte | 1 byte | Max. 32 bytes |
-----|

```

**vendor1**

If configured, the circuit ID will use the following format to communicate with the server:

```

-----|
| a.      | b.      | c.      | d.      | e.      | f.      |
-----|
| 1       | 0x10   | 0       | 6       | VLAN    | Slot ID |
-----|
| 1 byte | 1 byte | 1 byte | 1 byte | 2 bytes | 2 bytes |
-----|

-----|
| g.      | h.      | i.      | j.      |
-----|
| Port ID | 1       | 6       | MAC     |
-----|
| 2 bytes | 1 byte | 1 byte | 6 bytes |
-----|

```

- a. *Sub-option type*: 1 means circuit ID.
- b. *Length*.
- c. *Circuit ID's sub-option's first tag*: This should be 0.
- d. *First tag's length*: This should be 6
- e. *VLAN ID*.
- f. *Slot ID*: For a stand-alone switch, this is 1.
- g. *Port ID*: The port number of each box.
- h. *Circuit ID's sub-option's second tag*: This should be 1.
- i. *Second tag's length*: This should be 6.
- j. *MAC address*: The Switch's system MAC address.

**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.

## Usage Guideline

Use this command to select different vendor's circuit ID format or configures a user-defined string of ASCII characters to be the circuit ID.

## Example

This example shows how to use vendor1 as the circuit ID.

```
Switch# configure terminal
Switch(config)# ip dhcp relay information option
Switch(config)# ip dhcp relay information option format circuit-id vendor1
Switch(config)#
```

This example shows how to configure a user-defined string "abcd" as the circuit ID.

```
Switch# configure terminal
Switch(config)# ip dhcp relay information option
Switch(config)# ip dhcp relay information option format circuit-id string abcd
Switch(config)#
```

## 16-13 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

<b>vendor3</b>	Specifies to the vendor3 user-defined string with the maximum 32 characters.
<b><i>STRING</i></b>	Specifies the vendor-defined string.

## Default

None.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

This command is only available for physical port and port-channel interface configuration.

Use this command to configure each interface's vendor defined string for Option 82 information circuit ID sub-option.

## Example

This example shows how to define vendor3 circuit-id of "abc" on port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# ip dhcp relay information option format-type circuit-id vendor3 string abc
Switch(config-if)#
```

---

## 16-14 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** form of this command to disable the trusting on all interfaces.

```
ip dhcp relay information trust-all
no ip dhcp relay information trust-all
```

## Parameters

None.

## Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

When IP DHCP relay information trust is enabled on an interface, the arriving packets with a GIADDR of 0 (this relay agent is the first relay of this DHCP request packet) but with relay agent information option present will be accepted. If it is not trusted, these packets will be dropped.

When this command is enabled, IP DHCP relay information is trusted for all interfaces. When this command is disabled, the trust state is determined by the **ip dhcp relay information trusted** command in the Interface Configuration Mode.

Use the **show ip dhcp relay information trusted-sources** command to see the settings.

## Example

This example shows how to enable the DHCP relay agent to trust IP DHCP relay information for all interfaces.

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

---

## 16-15 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** form of this command to disable the trusting of relay information for the interface.

```
ip dhcp relay information trusted
no ip dhcp relay information trusted
```

## Parameters

None.

## Default

By default, information is not trusted.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

When IP DHCP relay information trust is enabled on an interface, the arriving packets with a GIADDR of 0 (this relay agent is the first relay of this DHCP request packet) but with relay agent information option present will be accepted. If it is not trusted, these packets will be dropped.

When the **ip dhcp relay information trust-all** command is enabled, IP DHCP relay information is trusted for all interfaces. When the **ip dhcp relay information trust-all** command is disabled, the trust state is determined by this command.

Use the **show ip dhcp relay information trusted-sources** command to see the settings.

## Example

This example shows how to disable the DHCP relay agent to trust all interface settings and enable trust for VLAN 100.

```
Switch# configure terminal
Switch(config)# no ip dhcp relay information trust-all
Switch(config)# interface vlan 100
Switch(config-if)# ip dhcp relay information trusted
Switch(config-if)#
```

## 16-16 ip dhcp local-relay vlan

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

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

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

## Parameters

<i>VLAN-ID</i>	Specifies the VLAN used.
,	(Optional) Specifies a series of VLANs or separates a range of VLANs from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.

## Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

The local relay relays the DHCP message to all local VLAN member ports based on the relay option setting. The local relay does not change the destination IP, destination MAC, and the gateway field of the packet.

## Example

This example shows how to enable the local relay function on VLAN 100.

```
Switch# configure terminal
Switch(config)# ip dhcp local-relay vlan 100
Switch(config)#
```

## 16-17 option hex (DHCP relay)

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

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

## Parameters

<i>CODE</i>	Specifies the DHCP option number.
<i>PATTERN</i>	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 <i>PATTERN</i> should be the same as the bit length of the option.
<i>MASK</i>	(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 <i>PATTERN</i> will be checked. The bit set to FF will be checked. The input format should be the same as <i>PATTERN</i> .

## Default

None.

## Command Mode

DHCP Class Configuration Mode.

## 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.

Use the **option hex** command to specify the DHCP option code number with its matching pattern for a DHCP class. Multiple option patterns can be specified for a DHCP class. If the packet matches any of the specified pattern of a DHCP class, the packet will be classified to the DHCP class and forwarded based on the specified target.

The following are some common used option codes:

- **Option 60** - Vendor class identifier.
- **Option 61** - Client identifier.
- **Option 77** - User class.
- **Option 124** - Vendor-identifying vendor class.
- **Option 125** - Vendor-identifying vendor-specific information.

## Example

This example shows how to configure a DHCP class “Service-A” and 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)#
```

## 16-18 relay destination

This command is used to specify the DHCP relay destination IP address associated with a relay pool. Use the **no** form of this command to delete a DHCP relay destination from the DHCP relay pool.

**relay destination** *IP-ADDRESS*

**no relay destination** *IP-ADDRESS*

## Parameters

<i>IP-ADDRESS</i>	Specifies the relay destination DHCP server IP address.
-------------------	---

## Default

None.

## Command Mode

DHCP Pool Configuration Mode.

## Usage Guideline

The relay destination of the DHCP server can be specified in the DHCP relay pool. To do this, use the **ip dhcp pool** command to enter the DHCP Pool Configuration Mode and then use the **relay source** command to specify the source subnet of the client requests. Use the **relay destination** command to specify the relay destination server address. Multiple relay sources and multiple relay destinations can be specified in a pool. If a packet matches any of the relay sources, the packet will be forwarded to all of the relay destinations.

When receiving a DHCP request packet, if the subnet of the received packet matches the relay source of a relay pool, the packet will be relayed based on this relay pool. To relay a packet based on the relay pool, if the request packet is a relayed packet, the GIADDR of the packet is the source of the request. If the request packet is not a relayed packet, the subnet of the received interface is the source of the packet.

In a DHCP relay pool, administrators can further use the **class** command and the **relay target** command to associate a list of relay target addresses with a DHCP class.

## Example

This example shows how to create a DHCP relay pool, called pool1. In the relay pool, the subnet 172.19.10.0/255.255.255.0 is specified as the source subnet. 10.2.1.1 is specified as the relay destination address.

```
Switch# configure terminal
Switch(config)# ip dhcp pool pool1
Switch(config-dhcp-pool)# relay source 172.19.10.0 255.255.255.0
Switch(config-dhcp-pool)# relay destination 10.2.1.1
Switch(config-dhcp-pool)#
```

## 16-19 relay source

This command is used to specify the source subnet of client packets. Use the **no** form of this command to remove the source subnet

**relay source** *IP-ADDRESS SUBNET-MASK*

**no relay source** *IP-ADDRESS SUBNET-MASK*

### Parameters

<i>IP-ADDRESS</i>	Specifies the source subnet of client packets.
<i>SUBNET-MASK</i>	Specifies the network mask of the source subnet.

### Default

None.

### Command Mode

DHCP Pool Configuration Mode.

### Usage Guideline

The relay destination of the DHCP server can be specified in the DHCP relay pool. To do this, use the **ip dhcp pool** command to enter the DHCP Pool Configuration Mode and then use the **relay source** command to specify the source subnet of the client requests. Use the **relay destination** command to specify the relay destination server address. Multiple relay sources and multiple relay destinations can be specified in a pool. If a packet matches any of the relay sources, the packet will be forwarded to all of the relay destinations.

When receiving a DHCP request packet, if the subnet of the received packet matches the relay source of a relay pool, the packet will be relayed based on this relay pool. To relay a packet based on the relay pool, if the request packet is a relayed packet, the GIADDR of the packet is the source of the request. If the request packet is not a relayed packet, the subnet of the received interface is the source of the packet.

In a DHCP relay pool, administrators can further use the **class** command and the **relay target** command to associate a list of relay target addresses with a DHCP class. The DHCP packet will not be relayed when the interface that receives the packet has no IP address configured.

### Example

This example shows how to create a DHCP relay pool, called pool2. In the relay pool, the subnet 172.19.18.0/255.255.255.0 is specified as the source subnet and 10.2.1.10 is specified as the relay destination address.

```
Switch# configure terminal
Switch(config)# ip dhcp pool pool2
Switch(config-dhcp-pool)# relay source 172.19.18.0 255.255.255.0
Switch(config-dhcp-pool)# relay destination 10.2.1.10
Switch(config-dhcp-pool)#
```

## 16-20 relay target

This command is used to specify a DHCP relay target for relaying packets that matches the value pattern of the option defined in the class. Use the **no** form of this command to delete a relay target.

**relay target** *IP-ADDRESS*

**no relay target** *IP-ADDRESS*



---

## Parameters

---

<i>IP-ADDRESS</i>	Specifies the relay target server IP address for the class.
-------------------	---

---

## Default

None.

## Command Mode

DHCP Pool Configuration Mode.

## 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 relayed. If the matched relay pool has no class defined, the request will be relayed to the relay destination of the matched relay pool. Multiple **relay target** commands can be specified for a class. If a packet matches the class, the packet will be forwarded to all of the relay targets.

If the **relay target** command is not configured for a class, the relay target follows the relay destination specified for the pool. The DHCP packet will not be relayed when the interface that receives the packet has no IP address configured.

## Example

This example shows how to configure a DHCP relay target for relaying packets that matches the value pattern of the option defined in the class.

```
Switch# configure terminal
Switch(config)# ip dhcp class Service-A
Switch(config-dhcp-class)# option 60 hex 112233
Switch(config-dhcp-class)# option 60 hex 102030
Switch(config-dhcp-class)#exit
Switch(config)# ip dhcp pool pool1
Switch(config-dhcp-pool)# relay source 172.19.18.0 255.255.255.0
Switch(config-dhcp-pool)# class Service-A
Switch(config-dhcp-pool-class)# relay target 10.2.1.2
Switch(config-dhcp-pool-class)#
```

---

## 16-21 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.

## Usage Guideline

Use this command to enable or disable the DHCP relay service on the switch.

## Example

This example shows how to disable the DHCP relay service.

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

---

## 16-22 show ip dhcp relay information trusted-sources

This command is used to display all interfaces configured as trusted sources for the DHCP relay information option.

**show ip dhcp relay information trusted-sources**

## Parameters

None.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the effective setting of the trust relay information option function.

## Example

This example shows how to display the effective setting of the trust relay information option function when the **ip dhcp relay information trust-all** command is disabled.

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

List of trusted sources of relay agent information option:
vlan100          vlan200          vlan300          vlan400
vlan500

Total Entries: 5

Switch#
```

---

This example shows how to display the effective setting of the trust relay information option function when the **ip dhcp relay information trust-all** command is enabled.

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

All interfaces are trusted source of relay agent information option

Switch#
```

---

## 16-23 show ip dhcp relay information option-insert

This command is used to display the relay option insert configuration.

```
show ip dhcp relay information option-insert
```

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display relay information options with insert configuration information.

### Example

This example shows how to display relay information Option 82 option and insert configuration information for all VLANs.

```
Switch# show ip dhcp relay information option-insert

Interface      Option-Insert
-----
vlan1          Enabled
vlan2          Disabled
vlan3          Not Configured

Total Entries: 3

Switch#
```

---

## 16-24 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

User/Privileged EXEC Mode.

## 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#
```

# 17. DHCP Snooping Commands

## 17-1 ip dhcp snooping

This command is used to globally enable DHCP snooping. Use the **no** form of this command to disable DHCP snooping.

```
ip dhcp snooping
no ip dhcp snooping
```

### Parameters

None.

### Default

By default, this option is disabled.

### Command Mode

Global Configuration Mode.

### 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)#
```

---

## 17-2 ip dhcp snooping information option allow-untrusted

This command is used to globally allow DHCP packets with the relay Option 82 on the untrusted interface. Use the **no** form of this command to not allow packets with the relay Option 82.

```
ip dhcp snooping information option allow-untrusted
no ip dhcp snooping information option allow-untrusted
```

### Parameters

None.

### Default

By default, this option is not allowed.

### Command Mode

Global Configuration Mode.

## 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 or deny 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)#
```

## 17-3 ip dhcp snooping database

This command is used to configure the storing of DHCP snooping binding entries to a remote site. Use the no form of this command to disable the storing or reset the parameters to the default setting.

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

**no ip dhcp snooping database [write-delay]**

## Parameters

<i>URL</i>	Specifies the URL in the following form: <ul style="list-style-type: none"> <li>• tftp://location/filename</li> </ul>
<b>write-delay</b> <i>SECONDS</i>	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.

## Usage Guideline

Use this command to store the DHCP binding entry to a remote server. Use the follow method to store DHCP binding entries:

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

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)#
```

## 17-4 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.

### Usage Guideline

Use this command to clear the DHCP binding database statistics.

### Example

This example shows how to clear the snooping database statistics.

```
Switch# clear ip dhcp snooping database statistics
Switch#
```

---

## 17-5 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

---

---

<i>MAC-ADDRESS</i>	(Optional) Specifies the MAC address to clear.
<i>IP-ADDRESS</i>	(Optional) Specifies the IP address to clear.
<b>vlan</b> <i>VLAN-ID</i>	(Optional) Specifies the VLAN ID to clear.
<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interface to clear.

---

---

### Default

None.

### Command Mode

Privileged EXEC Mode.

### 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#
```

## 17-6 renew ip dhcp snooping database

This command is used to renew the DHCP binding database.

**renew ip dhcp snooping database** *URL*

### Parameters

<i>URL</i>	Specifies the URL in the following form:
	● tftp://location/filename

### Default

None.

### Command Mode

Privileged EXEC Mode.

### Usage Guideline

Use this command 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#
```

## 17-7 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

<i>MAC-ADDRESS</i>	Specifies the MAC address of the entry.
<b>vlan</b> <i>VLAN-ID</i>	Specifies the VLAN of the entry.
<i>IP-ADDRESS</i>	Specifies the IP address of the entry.
<i>INTERFACE-ID</i>	Specifies the interfaces to be configured
<i>SECONDS</i>	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.

## Usage Guideline

This command is only available for physical port and port-channel interface configuration.

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 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 eth1/0/10 expiry 100
Switch#
```

---

## 17-8 ip dhcp snooping trust

This command is used to configure a port as a trusted interface for DHCP snooping. Use the **no** form of this command to revert to the default setting.

**ip dhcp snooping trust**

**no ip dhcp snooping trust**

## Parameters

None.

## Default

By default, this option is disabled.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

This command is only 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 DHCP OFFER, DHCP ACK, or DHCP NAK 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 forwards 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.

```
Switch# configure terminal
Switch(config)# interface eth1/0/3
Switch(config-if)# ip dhcp snooping trust
Switch(config-if)#
```

## 17-9 ip dhcp snooping limit entries

This command is used to configure the number of the DHCP snooping binding entries that an interface can learn. Use the **no** form of this command to reset the DHCP message entry limit.

```
ip dhcp snooping limit entries NUMBER
no ip dhcp snooping limit entries
```

### Parameters

<i>NUMBER</i>	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.

### Usage Guideline

This command is only 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 1 to 100.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# ip dhcp snooping limit entries 100
Switch(config-if)#
```

## 17-10 ip dhcp snooping limit rate

This command is used to configure the number of the DHCP messages that an interface can receive per second. Use the **no** form of this command to reset the DHCP message rate limiting.

**ip dhcp snooping limit rate** *VALUE*

**no ip dhcp snooping limit rate**

## Parameters

---

<i>VALUE</i>	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.

## 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.

```
Switch# configure terminal
Switch(config)# interface eth1/0/3
Switch(config-if)# ip dhcp snooping limit rate 100
Switch(config-if)#
```

---

## 17-11 ip dhcp snooping station-move deny

This command is used to disable the DHCP snooping station move state. Use the **no** form of this command to enable the DHCP snooping roaming state.

**ip dhcp snooping station-move deny**

**no ip dhcp snooping station-move deny**

## Parameters

None.

## Default

By default, this option is enabled.

## Command Mode

Global Configuration Mode.

## 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 belongs 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)#
```

---

## 17-12 ip dhcp snooping verify mac-address

This command is used to enable the verification that the source MAC address in a DHCP packet matches the client hardware address. Use the **no** form of this command to disable the verification of the MAC address.

**ip dhcp snooping verify mac-address**

**no ip dhcp snooping verify mac-address**

### Parameters

None.

### Default

By default, this option is enabled.

### Command Mode

Global Configuration Mode.

### 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)#
```

---

## 17-13 ip dhcp snooping vlan

This command is used to enable DHCP snooping on a VLAN or a group of VLANs. Use the **no** form of this 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

---

<i>VLAN-ID</i>	Specifies the VLAN to be used.
----------------	--------------------------------

---

---

---

,	(Optional) Specifies a series of VLANs or separates a range of VLANs from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.

---

---

## Default

By default, DHCP snooping is enabled on all VLANs.

## Command Mode

Global Configuration Mode.

## 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 disable DHCP snooping on a range of VLANs.

```
Switch#configure terminal
Switch(config)# no ip dhcp snooping vlan 10,15-18
Switch(config)#
```

---

## 17-14 show ip dhcp snooping

This command is used to display the DHCP snooping configuration.

```
show ip dhcp snooping
```

## Parameters

None.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## 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 disabled
DHCP Snooping is enabled on VLANs:
  1-4094
Verification of MAC address is enabled
Station move is permitted.
Information option is not allowed on un-trusted interface

Interface      Trusted   Rate Limit  Entry Limit
-----
eth1/0/1       no       10          no_limit
eth1/0/2       no       no_limit    no_limit
eth1/0/3       no       no_limit    no_limit
eth1/0/4       no       no_limit    no_limit
eth1/0/5       no       no_limit    no_limit
eth1/0/6       no       no_limit    no_limit
eth1/0/7       no       no_limit    no_limit
eth1/0/8       no       50          20
eth1/0/9       yes      no_limit    no_limit
eth1/0/10      no       no_limit    no_limit
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

## 17-15 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

<i>IP-ADDRESS</i>	(Optional) Specifies to display the binding entry based on the IP address.
<i>MAC-ADDRESS</i>	(Optional) Specifies to display the binding entry based on the MAC address.
<b>vlan</b> <i>VLAN-ID</i>	(Optional) Specifies to display the binding entry based on the VLAN.
<b>interface</b>	(Optional) Specifies to display the binding entry based on the port ID.
<i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

## 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	eth1/0/5
00-01-02-00-00-05	10.1.1.11	1495	dhcp-snooping	100	eth1/0/5

```
Total Entries: 2
```

```
Switch#
```

This example shows how to display DHCP snooping binding entries by IP 10.1.1.10.

```
Switch# show ip dhcp snooping binding 10.1.1.10
```

MAC Address	IP Address	Lease(seconds)	Type	VLAN	Interface
00-01-02-03-04-05	10.1.1.10	1500	dhcp-snooping	100	eth1/0/5

```
Total Entries: 1
```

```
Switch#
```

This example shows how to display DHCP snooping binding entries by IP 10.1.1.10 and MAC 00-01-02-00-00-05.

```
Switch# show ip dhcp snooping binding 10.1.1.10 00-01-02-03-04-05
```

MAC Address	IP Address	Lease(seconds)	Type	VLAN	Interface
00-01-02-03-04-05	10.1.1.10	1495	dhcp-snooping	100	eth1/0/5

```
Total Entries: 1
```

```
Switch#
```

This example shows how to display DHCP snooping binding entries by IP 10.1.1.10 and MAC 00-01-02-03-04-05 on VLAN 100.

```
Switch# show ip dhcp snooping binding 10.1.1.10 00-01-02-03-04-05 vlan 100
```

MAC Address	IP Address	Lease(seconds)	Type	VLAN	Interface
00-01-02-03-04-05	10.1.1.10	1495	dhcp-snooping	100	eth1/0/5

```
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	eth1/0/5
00-01-02-00-00-05	10.1.1.11	1495	dhcp-snooping	100	eth1/0/5

```
Total Entries: 2

Switch#
```

This example shows how to display DHCP snooping binding entries on port 5.

```
Switch# show ip dhcp snooping binding interface eth1/0/5
```

MAC Address	IP Address	Lease(seconds)	Type	VLAN	Interface
00-01-02-03-04-05	10.1.1.10	1500	dhcp-snooping	100	eth1/0/5
00-01-02-00-00-05	10.1.1.11	495	dhcp-snooping	100	eth1/0/5

```
Total Entries: 2

Switch#
```

## Display Parameters

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

## 17-16 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

User/Privileged EXEC Mode.



## 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

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

## 17-17 based-on hardware-address

This command is used to add an entry of the DHCP server screen profile. Use the **no** form of this command to delete the specified entry.

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

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

## Parameters

<i>CLIENT-HARDWARE-ADDRESS</i>	(Optional) Specifies the MAC address of the client.
--------------------------------	---

## Default

None.

## Command Mode

DHCP Server Screen Configure Mode.

## Usage Guideline

If a binding entry is defined with the client's MAC address, 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)#
```

---

## 17-18 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.

## 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#
```

---

## 17-19 dhcp-server-screen profile

This command is used to define a server screen profile and enter the DHCP Server Screen Configure Mode. Use the **no** form of this command to delete the specified server screen profile.

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

## Parameters

<i>PROFILE-NAME</i>	Specifies the profile name with a maximum of 32 characters.
---------------------	---

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enter the DHCP Server Screen Configure 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)#
```

## 17-20 ip dhcp snooping server-screen

This command is used to enable DHCP server screening. Use the **no** form of this command to disable it.

**ip dhcp snooping server-screen** [*SERVER-IP-ADDRESS* [**profile** *PROFILE-NAME*]]  
**no ip dhcp snooping server-screen** [*SERVER-IP-ADDRESS*]

## Parameters

<i>SERVER-IP-ADDRESS</i>	(Optional) Specifies the trust DHCP sever IP address.
<b>profile</b> <i>PROFILE-NAME</i>	(Optional) Specifies the profile with the client MAC address list for the DHCP sever.

## Default

None.

## Command Mode

Interface Configuration Mode.

## 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 on port 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 eth1/0/3
Switch(config-if)# ip dhcp snooping server-screen 10.1.1.2 profile campus-profile
Switch(config-if)#
```

## 17-21 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 this command to revert to the default setting.

**ip dhcp snooping server-screen log-buffer entries** *NUMBER*

**no ip dhcp snooping server-screen log-buffer entries**

### Parameters

---

<i>NUMBER</i>	Specifies the buffer entry number. The maximum number is 1024.
---------------	--

---

### Default

By default, this value is 32.

### Command Mode

Global Configuration Mode.

### 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)#
```

---

## 17-22 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

Privileged EXEC Mode.

### 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#
```

---

## 17-23 snmp-server enable traps dhcp-server-screen

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

```
snmp-server enable traps dhcp-server-screen
no snmp-server enable traps dhcp-server-screen
```

## Parameters

None.

## Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## 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. Use this command to enable or disable the sending of the SNMP notifications for such events.

## Example

This example shows how to enable the sending of traps for DHCP server screening.

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

# 18. DHCPv6 Client Commands

## 18-1 clear ipv6 dhcp client

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

```
clear ipv6 dhcp client INTERFACE-ID
```

### Parameters

---

<i>INTERFACE-ID</i>	Specifies the VLAN interface to restart the DHCPv6 client.
---------------------	--

---

### Default

None.

### Command Mode

Privileged EXEC Mode.

### Usage Guideline

This command is only available for VLAN interface configuration.

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

### Example

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

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

## 18-2 show ipv6 dhcp

This command is used to display the DHCPv6 related settings on the interface.

```
show ipv6 dhcp [interface [INTERFACE-ID]]
```

### Parameters

---

<i>INTERFACE-ID</i>	(Optional) Specifies the VLAN interface to display the DHCPv6 related settings.
---------------------	---

---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use the **show ipv6 dhcp** command to display the device's DHCPv6 DUID.

Use the **show ipv6 dhcp interface** command to display DHCPv6 related 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 lifetime 80, valid lifetime 100
```

```
Prefix name: yy
```

```
Rapid-Commit: disabled
```

```
Switch#
```

---



# 19. DHCPv6 Guard Commands

## 19-1 ipv6 dhcp guard policy

This command is used to create or modify a DHCPv6 guard policy, and enter the DHCPv6 Guard Policy Configuration Mode.. Use the **no** form of this command to remove the DHCPv6 guard policy.

```
ipv6 dhcp guard policy POLICY-NAME
no ipv6 dhcp guard policy POLICY-NAME
```

### Parameters

<i>POLICY-NAME</i>	Specifies the DHCPv6 guard policy name.
--------------------	---

### Default

None.

### Command Mode

Global Configuration Mode.

### Usage Guideline

Use this command to create or modify the DHCPv6 guard policy, and enter the DHCPv6 Guard Policy Configuration Mode.. DHCPv6 guard policies can be used to block DHCPv6 reply and advertisement messages that come from unauthorized servers. Client messages are not blocked.

After the DHCPv6 guard policy was created, use the **ipv6 dhcp guard attach-policy** command to apply the policy on a specific interface.

### Example

This example shows how to create a DHCPv6 guard policy.

```
Switch# configure terminal
Switch(config)# ipv6 dhcp guard policy policy1
Switch(config-dhcp-guard)#
```

## 19-2 device-role

This command is used to specify the role of the attached device. Use the **no** form of this command to revert to the default setting.

```
device-role {client | server}
no device-role
```

### Parameters

<b>client</b>	Specifies that the attached device is a DHCPv6 client. All DHCPv6 server messages are dropped on this port.
<b>server</b>	Specifies that the attached device is a DHCPv6 server. DHCPv6 server messages are allowed on this port.

## Default

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

## Command Mode

DHCPv6 Guard Policy Configuration Mode.

## Usage Guideline

Use this command to specify the role of the attached device. By default, the device role is client, and all DHCPv6 server messages that came from this port will be dropped. If the device role is set to server, DHCPv6 server messages are allowed on this port.

## Example

This example shows how to create a DHCPv6 guard policy and set the device role as the server.

```
Switch# configure terminal
Switch(config)# ipv6 dhcp guard policy dhcpguard1
Switch(config-dhcp-guard)# device-role server
Switch(config-dhcp-guard)#
```

---

## 19-3 match ipv6 access-list

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

**match ipv6 access-list** *IPV6-ACCESS-LIST-NAME*

**no match ipv6 access-list**

## Parameters

---

<i>IPV6-ACCESS-LIST-NAME</i>	Specifies the IPv6 access list to be matched.
------------------------------	---

---

## Default

By default, this option is disabled.

## Command Mode

DHCPv6 Guard Policy Configuration Mode.

## Usage Guideline

Use this command to filter DHCPv6 server message based on sender's IP address. If the **match ipv6 access-list** command is not configured, all server messages are bypassed. An access list is configured by the **ipv6 access-list** command.

## Example

This example shows how to create a DHCPv6 guard policy and matches the IPv6 addresses in the access list named list1.

```
Switch# configure terminal
Switch(config)# ipv6 dhcp guard policy dhcp_filter1
Switch(config-dhcp-guard)# match ipv6 access-list list1
Switch(config-dhcp-guard)#
```

## 19-4 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

<i>POLICY-NAME</i>	(Optional) Specifies the DHCPv6 guard policy name.
--------------------	--

### Default

By default, this option is disabled.

### Command Mode

Interface Configuration Mode.

### Usage Guideline

Use this command to apply a DHCPv6 policy to an interface. DHCPv6 guard policies can be used to block DHCPv6 server messages or filter server messages based on sender IP address. If the policy name is not specified, the default policy will set the device's role to client.

## Example

This example shows how to apply the DHCPv6 guard policy "pol1" to port 3.

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

## 19-5 show ipv6 dhcp guard policy

This command is used to display DHCPv6 guard information.

```
show ipv6 dhcp guard policy [POLICY-NAME]
```

### Parameters

<i>POLICY-NAME</i>	(Optional) Specifies the DHCPv6 guard policy name.
--------------------	--

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

If no parameter is specified, information of all policies is displayed.

## Example

This example shows how to displayed information of all policies.

```
Switch#show ipv6 dhcp guard policy

DHCP guard policy: 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

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

## 20. DHCPv6 Relay Commands

### 20-1 ipv6 dhcp relay destination

This command is used to enable the DHCP for IPv6 relay service on the interface and specify a destination address to which client messages are forwarded to. Use the **no** form of this command to remove a relay destination.

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

**no ipv6 dhcp relay destination** *IPV6-ADDRESS* [*INTERFACE-ID*]

#### Parameters

<i>IPV6-ADDRESS</i>	Specifies the DHCPv6 relay destination address.
<i>INTERFACE-ID</i>	(Optional) Specifies the output interface for the relay destination.

#### Default

By default, this option is disabled.

#### Command Mode

Interface Configuration Mode.

#### Usage Guideline

Use this command to configure or remove the relay destination address on an interface. 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)#
```

### 20-2 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** {*cid-with-user-define* | *default* | *expert-udf* | *user-define*}

**no ipv6 dhcp relay remote-id format**

## Parameters

<b>cid-with-user-define</b>	<p>Specifies to use a CID with user-defined string as the remote ID. The remote ID option is formed in the following format:</p> <pre>  -----    F01        F02        F03        F04        F05         ----- ----- ----- ----- -----    Sub Type   VLAN ID    Module ID   Port ID    User  Defined      ----- ----- ----- ----- -----    1 byte     2 bytes    1 byte     1 byte     Max. 256  bytes        -----  </pre> <p><b>F01.</b> Sub Type: The number 2 indicates that this is the remote ID.  <b>F02.</b> VLAN ID: The incoming VLAN ID of the DHCP client packet.  <b>F03.</b> Module ID: For a standalone switch, the module ID is always 0.  <b>F04.</b> Port ID: The incoming port number of the DHCP client packet. The port number starts from 1.  <b>F05.</b> User Defined: The user-defined string configured in the <b>ipv6 dhcp relay remote-id udf</b> command. By default, the field is empty.</p>
<b>default</b>	<p>Specifies to use the Switch's system MAC address as the remote ID. The remote ID is formed in the following format:</p> <pre>  -----    F01        F02        F03        F04        F05         ----- ----- ----- ----- -----    Sub Type   VLAN ID    Module ID   Port ID    MAC  Address     ----- ----- ----- ----- -----    1 byte     2 bytes    1 byte     1 byte     6 bytes     -----  </pre> <p><b>F01.</b> Sub Type: The number 1 indicates that this is the remote ID.  <b>F02.</b> VLAN ID: The incoming VLAN ID of the DHCP client packet.  <b>F03.</b> Module ID: For a standalone switch, the module ID is always 0.  <b>F04.</b> Port ID: The incoming port number of the DHCP client packet. The port number starts from 1.  <b>F05.</b> MAC Address: The system MAC address of the Switch.</p>
<b>expert-udf</b>	<p>Specifies to use a flexible user-defined string as the remote ID. The remote ID option is formed in the following format:</p> <pre>  -----    F01         -----    User Defined    -----    Max. 256 bytes    -----  </pre> <p><b>F01.</b> User Defined: The flexible user-defined string configured in the <b>ipv6 dhcp relay remote-id format-type</b>, <b>ipv6 dhcp relay remote-id profile</b>, and <b>format string</b> commands. By default, the field is empty.</p>
<b>user-define</b>	<p>Specifies to use a user-defined string as the remote ID. The remote ID option is formed in the following format:</p> <pre>  -----    F01        F02         ----- -----    Sub Type   User Defined    ----- -----  </pre>

1 byte	Max. 256 bytes
-----	-----

**F01.** Sub Type: The number 3 indicates that this is the remote ID.

**F02.** User Defined: The user-defined string configured in the **ipv6 dhcp relay remote-id udf** command.

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command 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)#
```

## 20-3 ipv6 dhcp relay remote-id option

This command is used to enable the insertion of the relay agent remote ID Option 37 during the relay of DHCP for IPv6 request packets. Use the **no** form of this command to disable the insert function.

```
ipv6 dhcp relay remote-id option
no ipv6 dhcp relay remote-id option
```

## Parameters

None.

## Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enable or disable the insertion of the DHCPv6 relay agent Remote ID option function.

## Example

This example shows how to enable the insertion of the DHCPv6 relay agent remote ID option.

```
Switch#configure terminal
Switch(config)# ipv6 dhcp relay remote-id option
Switch(config)#
```

## 20-4 ipv6 dhcp relay remote-id policy

This command is used to configure the Option 37 forwarding policy for the DHCPv6 relay agent. Use the **no** form of this command to revert to the default setting.

```
ipv6 dhcp relay remote-id policy {drop | keep}
no ipv6 dhcp relay remote-id policy
```

### Parameters

<b>drop</b>	Specifies to discard the packet that already has the relay agent Remote-ID Option 37.
<b>keep</b>	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.

### Usage Guideline

Use this command to configure the global policy for packets that already have Option 37. If the **drop** parameter is used, relay agent's Remote ID option that has already been presented in the received packet from client, the packet will be dropped. If the **keep** parameter is used, the Switch does not check if there is a relay agent Remote-ID option in the received packet.

## Example

This example shows how to configure the policy of the DHCPv6 relay agent Remote ID option to dropping the packet if it has a relay agent Remote-ID option.

```
Switch# configure terminal
Switch(config)# ipv6 dhcp relay remote-id policy drop
Switch(config)#
```

## 20-5 ipv6 dhcp relay remote-id profile

This command is used to create a new profile for DHCPv6 relay Option 37 and enter the DHCPv6 Profile Configuration mode. Use the **no** form of this command to remove the profile.

```
ipv6 dhcp relay remote-id profile NAME
no ipv6 dhcp relay remote-id profile NAME
```



## Parameters

<i>NAME</i>	Specifies the profile name. The maximum length is 32 characters. The profile can be created up to 6 entries.
-------------	--

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to create or remove a profile for DHCPv6 relay Option 37, or enter the DHCPv6 Profile Configuration Mode.

## Example

This example shows how to create a profile, profile1, for DHCPv6 relay Option 37.

```
Switch#configure terminal
Switch(config)#ipv6 dhcp relay remote-id profile profile1
Switch(config-dhcp-profile)#
```

## 20-6 format string

This command is used to add the entry of the flexible user-defined Option 18 or Option 37. Use the **no** form of this command to delete the entry of the flexible user-defined Option 18 or Option 37.

**format string** *STRING*

**no format string**

## Parameters

<i>STRING</i>	<p>Specifies the user-defined DHCP Option 82 format with a maximum of 255 characters.</p> <p>The rules that need to follow for this parameters are:</p> <ul style="list-style-type: none"> <li>This parameter can be hexadecimal value, ASCII string, or any combination of hexadecimal value and ASCII string. An ASCII string needs to be enclosed with quotation marks (" "), such as "Ethernet"; Any ASCII characters outside of the quotation marks will be interpreted as hexadecimal values.</li> <li>A formatted key string is a string that should be translated before being encapsulated in a packet. A formatted key string can be contained both ASCII strings and hexadecimal values. For example, "%" + "\$" + "1-32" + "keyword" + ":":</li> </ul> <p><b>%</b> - Indicates that the string that follows this character is a formatted key string.</p> <p><b>\$ or 0</b> - (Optional) Indicates a fill indicator. This option specifies how to fill the formatted key string to meet the length option. This option can be either "\$" or "0", and cannot be specified as both at the same time. \$ indicates to fill leading space (0x20). 0 indicates to fill leading 0. To fill leading 0 (<b>0</b>) is the default setting.</p> <p><b>1-32</b> - (Optional) Indicates a length option. This specifies how many characters or bytes the translated key string should occupy. If the actual</p>
---------------	--

length of the translated key string is less than the length specified by this option, a fill indicator will be used to fill. Otherwise, this length option and fill indicator will be ignored and the actual string will be used directly.

**keyword** - Indicates that the keyword will be translated based on the actual value of the system. The following keyword definitions specifies that a command will be refused if an unknown or unsupported keyword is detected:

**devtype**: The model name of device. Derived from the Module Name field in the show version command. Only an ASCII string is accepted.

**sysname**: Indicates the System name of the Switch. The maximum length is 128. Only an ASCII string is accepted.

**sysname**: Indicates the System name of the Switch. Only an ASCII string is accepted.

**ifdescr**: Derived from ifDescr (IF-MIB). Only an ASCII string is accepted.

**portmac**: Indicates the MAC address of a port. This can be either an ASCII string or a hexadecimal value. When in the format of ASCII string, the MAC address format can be customized via special command (e.g., ip dhcp relay information option mac-format case). When in the format of a hexadecimal value, the MAC address will be encapsulated by order in hexadecimal.

**sysmac**: Indicates the system MAC address. This can be either an ASCII string or a hexadecimal value. When in the format of an ASCII string, the MAC address format can be customized using special CLI commands (e.g., ip dhcp relay information option mac-format case). When in the format of a hexadecimal value, the MAC address will be encapsulated by order in hexadecimal.

**module**: Indicates the module ID number. This can be either an ASCII string or a hexadecimal value.

**port**: Indicates the local port number. This can be either an ASCII string or a hexadecimal value.

**svlan**: Indicates the outer VLAN ID. This can be either an ASCII string or a hexadecimal value.

**cvlan**: Indicates the inner VLAN ID. This can be either an ASCII string or a hexadecimal value.

**:** - Indicates the end of the formatted key sting. If a formatted key string is the last parameter of the command, its ending character (:) can be ignored. The space (0x20) between % and : will be ignored. Other spaces will be encapsulated.

- ASCII strings can be any combination of formatted key strings, 0-9, a-z, A-Z, !, @, #, \$, %, ^, &, \*, (, ), \_, +, |, -, =, \, [, ], {, }, ;, :, ', ", /, ., ,, <, >, ` and space characters. \ is escape character. The special character after \ is the character itself. For example, \% is % itself, not the start indicator of a formatted key string. Space not in the formatted key string will also be encapsulated.
- Hexadecimal values can be any combination of formatted key strings, 0-9, A-F, a-f, and space characters. The formatted key strings only support keywords which support hexadecimal value. Space not in the formatted key string will be ignored.

## Default

None.

## Command Mode

DHCPv6 Profile Configuration Mode.

## Usage Guideline

Use this command to configure the entry of the flexible user-defined Option 18 or Option 37.

## Example

This example shows how to configure the entry of the flexible user-defined Option 18.

```
Switch# configure terminal
Switch(config)# ipv6 dhcp relay remote-id profile profile1
Switch(config-dhcp-profile)#format string "%port:\:%sysname:%05svlan"
Switch(config-dhcp-profile)#
```

## 20-7 ipv6 dhcp relay information option mac-format case

This command is used to define the MAC address format of the DHCPv6 Option 18 or Option 37 flexible user-defined profile. Use the **no** form of this command to revert to the default settings.

**ipv6 dhcp relay information option mac-format case {lowercase | uppercase} delimiter {hyphen | colon | dot | none} number {1 | 2 | 5}**

**no ipv6 dhcp relay information option mac-format case**

### Parameters

<b>lowercase</b>	Specifies that when using the lowercase format, the Option 18 or Option 37 MAC address for the user-defined profile will be formatted as: aa-bb-cc-dd-ee-ff.
<b>uppercase</b>	Specifies that when using uppercase format, the Option 18 or Option 37 MAC address for the user-defined profile username will be formatted as: AA-BB-CC-DD-EE-FF.
<b>hyphen</b>	Specifies that when using "-" as delimiter, the format is: AA-BB-CC-DD-EE-FF.
<b>colon</b>	Specifies that when using ":" as delimiter, the format is: AA:BB:CC:DD:EE:FF.
<b>dot</b>	Specifies that when using "." as delimiter, the format is: AA.BB.CC.DD.EE.FF.
<b>none</b>	Specifies that when not using any delimiter, the format is: AABCCDDEEFF.
<b>number</b>	Specifies the delimiter number value. Choose one of the following delimiter options: <ul style="list-style-type: none"> <li>• <b>1</b> - Single delimiter, the format is: AABCC.DDEEFF.</li> <li>• <b>2</b> - Double delimiters, the format is: AAB.CCDD.EEFF.</li> <li>• <b>5</b> - Multiple delimiters, the format is: AA.BB.CC.DD.EE.FF.</li> </ul> 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 **none**.

### Command Mode

Global Configuration Mode.

### Usage Guideline

Use this command to configure the MAC address format of the DHCPv6 Option 18 or Option 37 flexible user-defined profile.

## Example

This example shows how to specify the MAC address format of the Option 18 or Option 37 flexible user-defined profile.

```
Switch# configure terminal
Switch(config)# ipv6 dhcp relay information option mac-format case uppercase delimiter hyphen
number 5
Switch(config)#
```

---

## 20-8 show ipv6 dhcp relay information option mac-format

This command is used to display the MAC address format of the Option 18 and Option 37 profile.

```
show ipv6 dhcp relay information option mac-format
```

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the MAC address format of the Option 18 and Option 37 profile.

## Example

This example shows how to display the MAC address format of the Option 18 and Option 37 profile.

```
Switch# show ipv6 dhcp relay information option mac-format

Case           : Uppercase
Delimiter      : Hyphen
Delimiter Number : 5
Example        : AA-BB-CC-DD-EE-FF

Switch#
```

---

## 20-9 ipv6 dhcp relay remote-id udf

This command is used to configure the User Define Field (UDF) for remote ID. Use the **no** form of this command to delete the UDF entry.

```
ipv6 dhcp relay remote-id udf {ascii STRING | hex HEX-STRING}
no ipv6 dhcp relay remote-id udf
```

## Parameters

<b>ascii</b> <i>STRING</i>	Specifies the ASCII string (a maximum of 128 characters) for the UDF of the Remote ID.
<b>hex</b> <i>HEX-STRING</i>	Specifies the hexadecimal string (a maximum of 256 digits) for the UDF of the Remote ID.

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command 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)#
```

## 20-10 ipv6 dhcp local-relay vlan

This command is used to enable DHCPv6 local relay on a VLAN or a group of VLANs. Use the **no** form of this command to disable the function.

**ipv6 dhcp local-relay vlan** *VLAN-ID* [, | -]

**no ipv6 dhcp local-relay vlan** *VLAN-ID* [, | -]

## Parameters

<i>VLAN-ID</i>	Specifies the VLAN or range of VLANs.
,	(Optional) Specifies a series of VLANs or separates a range of VLANs from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.

## Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to configure the DHCPv6 local relay function.

When DHCPv6 local relay is enabled, the Switch will add Option 37 and Option 18 to the request packets from the client.

If the Option 37 check state is enabled, the Switch will check the request packet from the client and drop the packet if it contains Option 37 as specified in the DHCPv6 relay function.

If the Option 37 check state is disabled, the local relay function will always add Option 37 to the request packet, regardless whether the state of Option 37 is enabled or disabled.

The DHCPv6 local relay function will directly forward the packet from the server to the client after which no more processing is done.

## Example

This example shows how to enable the DHCPv6 local relay function on VLAN 100.

```
Switch# configure terminal
Switch(config)#ipv6 dhcp local-relay vlan 100
Switch(config)#
```

---

## 20-11 show ipv6 dhcp

This command is used to display the DHCPv6 related settings on the interface.

```
show ipv6 dhcp [interface [INTERFACE-ID]]
```

## Parameters

---

<i>INTERFACE-ID</i>	(Optional) Specifies the VLAN interface to display the DHCPv6 related settings.
---------------------	---

---

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use the **show ipv6 dhcp** command to display the device's DHCPv6 DUID.

Use the **show ipv6 dhcp interface** command to display DHCPv6 related 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 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#
```

---

## 20-12 show ipv6 dhcp relay information option

This command is used to display the settings of the DHCPv6 relay information options.

**show ipv6 dhcp relay information option**

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### 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#
```

## 20-13 show ipv6 dhcp relay remote-id profile

This command is used to display Option 37 profiles.

```
show ipv6 dhcp relay remote-id profile
```

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display Option 37 profiles.

### Example

This example shows how to display Option 37 profiles.

```
Switch# show ipv6 dhcp relay remote-id profile

Option37 Profile name: profile1
Format string: "Ethernet %unit:/0/ %port:\:%sysname:%05svlan"

Total Entries:1

Switch#
```

## 20-14 show ipv6 dhcp relay information option format-type

This command is used to display the format type of the DHCPv6 relay information options.

```
show ipv6 dhcp relay information option format-type [interface INTERFACE-ID [, | -]]
```

### Parameters

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

None.



## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the format type of the DHCPv6 relay information options.

## Example

This example shows how to display the format type of the DHCPv6 relay information options.

```
Switch# show ipv6 dhcp relay information option format-type

eth1/0/1
Remote ID bind profile: 1

Total Entries: 1
Switch#
```

# 21. Digital Diagnostics Monitoring (DDM) Commands

## 21-1 show interfaces transceiver

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

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

### Parameters

<i>INTERFACE-ID</i>	(Optional) Specifies multiple interfaces for transceiver monitoring status display. If no interface ID is specified, transceiver monitoring statuses on all valid interfaces are displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>detail</b>	(Optional) Specifies to display more detailed information.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the current SFP/SFP+ module operating transceiver monitoring parameters values for specified ports.

### Example

This example shows how to display current operating parameters for all ports valid for transceiver monitoring.

```
Switch#show interfaces transceiver

++ : high alarm, + : high warning, - : low warning, -- : low alarm
mA: milliamperes, mW: milliwatts

Transceiver Monitoring traps: Alarm and warning

port      Temperature  Voltage    Bias Current  TX Power    RX Power
(Celsius)  (V)         (mA)       (mW/dbm)     (mW/dbm)
-----
eth1/0/25  28.974      3.310     7.979        0.576      0.000
                    -2.395     -

Total Entries: 1

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.

eth1/0/25
  Transceiver Monitoring is enabled
  Transceiver Monitoring shutdown action: None

          Current      High-Alarm   High-Warning Low-Warning   Low-Alarm
Temperature(C)  30.176       78.000      73.000      -8.000      -13.000
Voltage(V)      3.310        3.700       3.600       3.000       2.900
Bias Current(mA) 7.975        11.800      10.800      5.000       4.000
TX Power(mW)    0.572        0.832       0.661       0.316       0.251
                (dbm)   -2.423      -0.800      -1.800      -5.000      -6.000
RX Power(mW)    0.000        1.000       0.794       0.016       0.010
                (dbm)   -          0.000      -1.000      -18.013     -20.000

Switch#
```

## 21-2 snmp-server enable traps transceiver-monitoring

This command is used to enable the sending of all or individual optical transceiver monitoring SNMP notifications. Use the **no** form of this command to disable the sending of all or individual optical transceiver monitoring SNMP notifications.

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

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

### Parameters

<b>alarm</b>	(Optional) Specifies to enable or disable the sending of alarm level notifications.
<b>warning</b>	(Optional) Specifies to enable or disable the sending of warning level notifications.

### Default

By default, this feature is disabled.

### Command Mode

Global Configuration Mode.

### Usage Guideline

If no optional parameter is specified, it will enable or disable all transceiver-monitoring SNMP notifications.

## Example

This example shows how to enable the sending of warning level notifications.

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

## 21-3 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 this command to disable the shutdown action.

```
transceiver-monitoring action shutdown {alarm | warning}
no transceiver-monitoring action shutdown
```

### Parameters

<b>alarm</b>	Specifies to shut down a port when alarm events occur.
<b>warning</b>	Specifies to shut down a port when warning events occur.

### Default

By default, this option is disabled.

### Command Mode

Interface Configuration Mode.

### 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 port 25 when an alarm event is detected.

```
Switch#configure terminal
Switch(config)#interface eth1/0/25
Switch(config-if)#transceiver-monitoring action shutdown alarm
Switch(config-if)#
```

## 21-4 transceiver-monitoring bias-current

This command is used to configure the thresholds of the bias current for a specified port. Use the **no** form of this command to remove the configuration.

```
transceiver-monitoring bias-current INTERFACE-ID {high | low} {alarm | warning} VALUE
no transceiver-monitoring bias-current INTERFACE-ID {high | low} {alarm | warning}
```

## Parameters

<i>INTERFACE-ID</i>	Specifies the interface to modify.
<b>high</b>	Specifies the high threshold, when the operating parameter rises above this value. It indicates an abnormal status.
<b>low</b>	Specifies the low threshold, when the operating parameter falls below this value, It indicates an abnormal status.
<b>alarm</b>	Specifies the threshold for high alarm or low alarm conditions.
<b>warning</b>	Specifies the threshold for high warning or low warning conditions.
<i>VALUE</i>	Specifies the value of the threshold. This value is from 0 to 131 mA.

## Default

None.

## Command Mode

Global Configuration Mode.

## 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/SFP+ module.

If the SFP/SFP+ module being configured does not support the threshold change, the user-configured threshold is stored in the system and the displayed value will be the user-configured threshold. If no user-configured threshold exists, the displayed value will always reflect the factory preset value defined by vendors.

The **no** form of this command has the effect to clear the configured threshold stored in the system. It does not change the threshold stored in the SFP/SFP+ transceivers. Use the **no** form of the command to prevent threshold values on newly inserted SFP/SFP+ transceivers from being altered.

## Example

This example shows how to configure the bias current high warning threshold as 10.237 on port 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)#
```

## 21-5 transceiver-monitoring enable

This command is used to enable the optical transceiver monitoring function for an SFP/SFP+ port. Use the **no** form of this 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.

## Usage Guideline

This command is available for the physical port interface configuration.

A user can use this command to enable or disable optical transceiver monitoring functions for an SFP/SFP+ port. When the monitoring function is enabled, an alarm event occurs when the parameters being monitored go higher than the high alarm threshold or go lower than the low alarm threshold. A warning event occurs when the parameters being monitored go higher than the high warning threshold or go lower than the low warning threshold.

When an SFP/SFP+ with transceiver monitoring capability is plugged into a port but the transceiver monitoring function of the port is disabled, the system will not detect the SFP/SFP+ transceiver's abnormal status.

## Example

This example shows how to enable transceiver monitoring on port 25.

```
Switch#configure terminal
Switch(config)#interface eth1/0/25
Switch(config-if)#transceiver-monitoring enable
Switch(config-if)#
```

## 21-6 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

<i>INTERFACE ID</i>	Specifies the interface to modify.
<b>high</b>	Specifies that when the operating parameter rises above the highest threshold, it indicates an abnormal status
<b>low</b>	Specifies that when the operating parameter falls below the low threshold this value, it indicates an abnormal status.
<b>alarm</b>	Specifies to configure the high and low threshold value condition.
<b>warning</b>	Specifies to configure the high and low warning threshold conditions.
<b>mwatt</b> <i>VALUE</i>	Specifies the power threshold value in milliwatts. This value must be between 0 and 6.5535.
<b>dbm</b> <i>VALUE</i>	Specifies the power threshold value in dBm. This value must be between -40 and 8.1647.

## Default

None.

## Command Mode

Global Configuration Mode.

## 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/SFP+ module.

If the SFP/SFP+ module configured does not support the threshold change, the user-configured threshold is just stored in the system and the displayed value will be the user-configured threshold. If there is no user-configured threshold, the displayed value will always reflect the factory preset value defined by the vendor.

The **no** form of this command has the effect to clear the configured threshold stored in system. It does not change the threshold stored in the SFP/SFP+ transceivers. Use **no** form of the command to prevent threshold values in newly inserted SFP/SFP+ transceivers from being altered.

## Example

This example shows how to configure the RX power low warning threshold as 0.135 mW on port 25.

```
Switch#configure terminal
Switch(config)#transceiver-monitoring rx-power eth1/0/25 low warning mwatt 0.135
Switch(config)#
```

## 21-7 transceiver-monitoring temperature

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

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

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

## Parameters

<i>INTERFACE ID</i>	Specifies the interface to modify.
<b>high</b>	Specifies that when the operating parameter rises above this high threshold value, it indicates an abnormal status.
<b>low</b>	Specifies that when the operating parameter falls below this low threshold value, it indicates an abnormal status.
<b>alarm</b>	Specifies to configure the high and low threshold value condition.
<b>warning</b>	Specifies to configure the high and low warning threshold conditions.
<i>VALUE</i>	Specifies the threshold value. This value must be between -128 and 127.996 °C.

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Only SFP/SFP+ port interfaces with optical modules, with transceiver monitoring capability, are valid for this configuration.

This command configures the temperature thresholds on the specified port. This value will be stored both in the system and in the SFP/SFP+ transceivers and be converted to the 16-bit format and then written into the SFP/SFP+ module.

If the SFP/SFP+ module configured does not support the threshold change, the user-configured threshold is just stored in the system and the displayed value will be the user-configured threshold. If there is no user-configured threshold, the displayed value will always reflect the factory preset value defined by the vendor.

The **no** form of this command has the effect to clear the configured threshold stored in system. It does not change the threshold stored in the SFP/SFP+ transceivers. Use the **no** form of the command to prevent threshold values in newly inserted SFP/SFP+ transceivers from being altered.

## Example

This example shows how to configure the temperature high alarm threshold as 127.994 on port 25.

```
Switch#configure terminal
Switch(config)#transceiver-monitoring temperature eth1/0/25 high alarm 127.994

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

## 21-8 transceiver-monitoring tx-power

This command is used to configure the output power threshold for the specified port. Use the **no** form of this 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

<i>INTERFACE ID</i>	Specifies the interface to modify.
<b>high</b>	Specifies that when the operating parameter rises above this high threshold value, it indicates an abnormal status.
<b>low</b>	Specifies that when the operating parameter falls below this low threshold value, it indicates an abnormal status.
<b>alarm</b>	Specifies to configure the high and low threshold value condition.
<b>warning</b>	Specifies to configure the high and low warning threshold conditions.
<b>mwatt</b> <i>VALUE</i>	Specifies the power threshold value in milliwatts. This value must be between 0 and 6.5535.
<b>dbm</b> <i>VALUE</i>	Specifies the power threshold value in dBm. This value must be between -40 and 8.1647.

### Default

None.

### Command Mode

Global Configuration Mode.



## 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/SFP+ module.

If the SFP/SFP+ module configured does not support the threshold change, the user-configured threshold is just stored in the system and the displayed value will be the user-configured threshold. If there is no user-configured threshold, the displayed value will always reflect the factory preset value defined by the vendor.

The **no** form of this command has the effect to clear the configured threshold stored in system. It does not change the threshold stored in the SFP/SFP+ transceivers. Use the **no** form of the command to prevent threshold values in newly inserted SFP/SFP+ transceivers from being altered.

## Example

This example shows how to configure the TX power low warning threshold to 0.181 mW on port 25.

```
Switch#configure terminal
Switch(config)#transceiver-monitoring tx-power eth1/0/25 low warning mwatt 0.181
Switch(config)#
```

## 21-9 transceiver-monitoring voltage

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

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

## Default

None.

## Command Mode

Global Configuration Mode.

## 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/SFP+ module.

If the SFP/SFP+ module configured does not support the threshold change, the user-configured threshold is just stored in the system and the displayed value will be the user-configured threshold. If there is no user-configured threshold, the displayed value will always reflect the factory preset value defined by the vendor.

The **no** form of this command has the effect to clear the configured threshold stored in system. It does not change the threshold stored in the SFP/SFP+ transceivers. Use the **no** form of the command to prevent threshold values in newly inserted SFP/SFP+ transceivers from being altered.

## Example

This example shows how to configure the low alarm voltage threshold as 0.005 on port 25.

```
Switch#configure terminal
Switch(config)#transceiver-monitoring voltage eth1/0/25 low alarm 0.005
Switch(config)#
```

---

## 22. D-Link Discovery Protocol (DDP) Client Commands

### 22-1 ddp

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

**ddp**

**no ddp**

#### Parameters

None.

#### Default

By default, this option is enabled.

#### Command Mode

Global Configuration Mode.

Interface Configuration Mode.

#### 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.

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

### 22-2 ddp report-timer

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

**ddp report-timer {30 | 60 | 90 | 120 | Never}**

**no ddp report-timer**

## Parameters

<b>30</b>	Specifies the report interval to 30 seconds.
<b>60</b>	Specifies the report interval to 60 seconds.
<b>90</b>	Specifies the report interval to 90 seconds.
<b>120</b>	Specifies the report interval to 120 seconds.
<b>Never</b>	Specifies to stop sending report message.

## Default

By default, this option is 30 seconds.

## Command Mode

Global Configuration Mode.

## 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)#
```

## 22-3 show ddp

This command is used to display the switch DDP configurations.

```
show ddp [interfaces INTERFACE-ID [, | -]]
```

## Parameters

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
<b>,</b>	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
<b>-</b>	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the DDP information of the Switch.

## 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.

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

Interface      State
-----      -
eth1/0/1      Enabled

Switch#
```

## 23. Domain Name System (DNS) Commands

### 23-1 clear host

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

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

#### Parameters

<b>all</b>	Specifies to clear all host entries.
<i>HOST-NAME</i>	(Optional) Specifies to delete the specified dynamically learned host entry.

#### Default

None.

#### Command Mode

Privileged EXEC Mode.

#### 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#
```

### 23-2 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.

## 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)#
```

## 23-3 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 this 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

<i>HOST-NAME</i>	Specifies the host name of the equipment.
<i>IP-ADDRESS</i>	Specifies the IPv4 address of the equipment.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the equipment.

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

The host name specified in this command needs to be qualified.

## 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)#
```

## 23-4 ip name-server

This command is used to configure the IP address for 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

<i>IP-ADDRESS</i>	Specifies the IPv4 address for the domain name server.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address for the domain name server.
<i>IP-ADDRESS2</i>	Specifies a second IPv4 address for the domain name server.
<i>IPV6-ADDRESS2</i>	Specifies a second IPv6 address for the domain name server.

## Default

None.

## Command Mode

Global Configuration Mode.

## 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. Two IPv4/IPv6 name servers can be specified.

## 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)#
```

---

## 23-5 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 to the default setting.

```
ip name-server timeout SECONDS
```

```
no ip name-server timeout
```

## Parameters

<i>SECONDS</i>	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.



## 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)#
```

---

## 23-6 show hosts

This command is used to display the DNS configuration.

**show hosts**

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

## 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:  1
Number of Dynamic Entries: 0

Host Name:                www.abc.com
IP Address:                192.168.5.243
Age:                      forever

Switch#
```

---

## 23-7 show ip name-server

This command is used to display the DNS configuration.

## show ip name-server

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### 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
```

```
Static name server:
```

```
192.168.5.134
```

```
5001:5::2
```

```
Dynamic name server:
```

```
Switch#
```

## 24. DoS Prevention Commands

### 24-1 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

<i>DOS-ATTACK-TYPE</i>	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.

#### Usage Guideline

Use the **dos-prevention** *DOS-ATTACK-TYPE* command to enable 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.

Use the **no dos-prevention all** command 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.
- **Smurf** - Attacker sends a large amount of ICMP request packets to IP broadcast address, the source IP address of the attacking packets equals to the victim's IP address. If the router delivers traffic to the IP broadcast address, all hosts in that IP network will reply ICMP to the victim's IP address.
- **tcp-syn-rst** - A TCP packet with the TCP SYN and RST flags which are both illegal and potentially a security threat.
- **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)#
```

---

## 24-2 show dos-prevention

This command is used to display the DoS prevention status and related drop counters.

```
show dos-prevention [DOS-ATTACK-TYPE]
```

### Parameters

---

<i>DOS-ATTACK-TYPE</i>	(Optional) Specifies the DoS type to be displayed.
------------------------	--

---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### 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                    Disabled
Blat Attack                    Disabled
Smurf Attack                    Disabled
TCP Null                       Disabled
TCP Xmas                       Disabled
TCP SYN-FIN                    Disabled
TCP SYN SrcPort Less 1024     Disabled
Ping of Death Attack           Disabled
TCP Flag SYN_RST               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#
```

---

## 24-3 snmp-server enable traps dos-prevention

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

### Usage Guideline

When DoS prevention is enabled, every five minutes, the Switch will log the event if any attack packet is received in this interval. Use this command to enable or disable the sending of SNMP notifications for such events.

## Example

This example shows how to enable the sending of traps for DoS attacking.

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

---

## 25. Dynamic ARP Inspection Commands

### 25-1 arp access-list

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

**arp access-list** *NAME*

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

#### Parameters

---

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

---

#### Default

None.

#### Command Mode

Global Configuration Mode.

#### 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 10.20.0.0 255.255.0.0 mac any
Switch(config-arp-nacl)# permit ip 10.30.0.0 255.255.0.0 mac any
Switch(config-arp-nacl)#
```

### 25-2 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.

## 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#
```

## 25-3 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

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

### Default

None.

### Command Mode

Privileged EXEC Mode.

## Usage Guideline

Use this command 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#
```

## 25-4 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** form of this 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

<b>ARP-ACL-NAME</b>	Specifies the access control list name with a maximum of 32 characters.
<b>vlan</b> <i>VLAN-ID</i>	Specifies the VLAN associated with the ARP access list.
,	(Optional) Specifies a series of VLANs or separates a range of VLANs from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.
<b>static</b>	(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.

## 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 and the **static** parameter is not specified, the packet will be further matched against the DHCP snooping binding entries. If the packet is denied due to the implicit deny and the **static** parameter is specified, the packet will be dropped.

## 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)#
```

## 25-5 ip arp inspection limit

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

```
ip arp inspection limit {rate VALUE [burst interval SECONDS] | none}
no ip arp inspection limit
```

## Parameters

<b>rate</b> <i>VALUE</i>	Specifies the maximum number of the ARP packets that can be processed. The valid range is from 1 to 150 seconds.
<b>burst interval</b> <i>SECONDS</i>	(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.

---



---

<b>none</b>	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.

## 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 eth1/0/10
Switch(config-if)# ip arp inspection limit rate 30 burst interval 5
Switch(config-if)#
```

---

## 25-6 ip arp inspection log-buffer

This command is used to configure the ARP inspection log buffer parameter. Use the **no** form of this command to revert to the default setting.

**ip arp inspection log-buffer entries** *NUMBER*

**no ip arp inspection log-buffer entries**

## Parameters

---



---

<i>NUMBER</i>	Specifies the buffer entry number. The maximum number is 1024.
---------------	--

---



---

## Default

By default, this value is 32.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this 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, 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)#
```

---

## 25-7 ip arp inspection trust

This command is used to trust an interface for dynamic ARP inspection. Use the **no** form of this command to disable the trust state.

```
ip arp inspection trust
no ip arp inspection trust
```

### Parameters

None.

### Default

By default, this option is disabled.

### Command Mode

Interface Configuration Mode.

### 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 to be trusted for DAI.

```
Switch# configure terminal
Switch(config)# interface eth1/0/3
Switch(config-if)# ip arp inspection trust
Switch(config-if)#
```

---

## 25-8 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 this command to remove specific additional check.

```
ip arp inspection validate [src-mac] [dst-mac] [ip]
no ip arp inspection validate [src-mac] [dst-mac] [ip]
```

### Parameters

---

<b>src-mac</b>	(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.
----------------	---

---

<b>dst-mac</b>	(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.
<b>ip</b>	(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.

## 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 parameter is specified, all options are enabled or disabled.

## Example

This example shows how to enable source MAC validation.

```
Switch# configure terminal
Switch(config)# ip arp inspection validate src-mac
Switch(config)#
```

## 25-9 ip arp inspection vlan

This command is used to enable specific VLANs for dynamic ARP inspection. Use the **no** form of this command to disable dynamic ARP inspection for VLAN.

```
ip arp inspection vlan VLAN-ID [, | -]
no ip arp inspection vlan VLAN-ID [, | -]
```

## Parameters

<i>VLAN-ID</i>	Specifies the VLAN to enable or disable the ARP inspection function.
,	(Optional) Specifies a series of VLANs or separates a range of VLANs from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.

## Default

By default, ARP inspection is disabled on all VLANs.

## Command Mode

Global Configuration Mode.

## 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)#
```

## 25-10 ip arp inspection vlan logging

This command is used to control the type of packets that are logged. Use the **no** form of this command to revert to the default settings.

```
ip arp inspection vlan VLAN-ID [, | -] logging {acl-match {permit | all | none} | dhcp-bindings {permit | all | none}}
```

```
no ip arp inspection vlan VLAN-ID [, | -] logging {acl-match | dhcp-bindings}
```

## Parameters

<i>VLAN-ID</i>	Specifies the VLAN to enable or disable the logging control function.
,	(Optional) Specifies a series of VLANs or separates a range of VLANs from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.
<b>acl-match</b>	Specifies the logging criteria for packets that are dropped or permitted based on ACL matches.
<b>acl-match permit</b>	Specifies logging when permitted by the configured ACL.
<b>acl-match all</b>	Specifies logging when permitted or denied by the configured ACL.
<b>acl-match none</b>	Specifies that ACL-matched packets are not logged.
<b>dhcp-bindings</b>	Specifies the logging criteria for packets dropped or permitted based on matches against the DHCP bindings.
<b>dhcp-bindings permit</b>	Specifies logging when permitted by DHCP bindings.
<b>dhcp-bindings all</b>	Specifies logging when permitted or denied by DHCP bindings.
<b>dhcp-bindings none</b>	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.

## Usage Guideline

Use this command to enable or disable the logging control function.

## 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)#
```

## 25-11 permit | deny (arp access-list)

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

**{permit | deny} ip {any | host SENDER-IP | SENDER-IP SENDER-IP-MASK} mac {any | host SENDER-MAC | SENDER-MAC SENDER-MAC-MASK}**

**no {permit | deny} ip {any | host SENDER-IP | SENDER-IP SENDER-IP-MASK} mac {any | host SENDER-MAC | SENDER-MAC SENDER-MAC-MASK}**

## Parameters

<b>ip any</b>	Specifies to match any source IP address.
<b>ip host SENDER-IP</b>	Specifies to match a single source IP address.
<b>SENDER-IP SENDER-IP-MASK</b>	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.
<b>mac any</b>	Specifies to match any source MAC address.
<b>mac host SENDER-MAC</b>	Specifies to match a single source MAC address.
<b>SENDER-MAC SENDER-MAC-MASK</b>	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.

## 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)#
```

## 25-12 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

<b>interfaces</b>	(Optional) Specifies a port or range of ports.
<i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>statistics</b>	(Optional) Specifies the DAI statistics.
<b>vlan</b> <i>VLAN-ID</i>	(Optional) Specifies a VLAN or range of VLANs.
,	(Optional) Specifies a series of VLANs or separates a range of VLANs from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command 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

<b>VLAN</b>	The VLAN ID that is enabled for ARP inspection.
<b>Forwarded</b>	The number of ARP packets that are forwarded by ARP inspection.
<b>Dropped</b>	The number of ARP packets that are dropped by ARP inspection.
<b>DHCP Drops</b>	The number of ARP packets that are dropped by DHCP snooping binding database.



<b>ACL Drops</b>	The number of ARP packets that are dropped by ARP ACL rule.
<b>DHCP Permits</b>	The number of ARP packets that are permitted by DHCP snooping binding database.
<b>ACL Permits</b>	The number of ARP packets that are permitted by ARP ACL rule.
<b>Source MAC Failures</b>	The number of ARP packets that fail source MAC validation.
<b>Dest MAC Failures</b>	The number of ARP packets that fail destination MAC validation.
<b>IP Validation Failures</b>	The number of ARP packets that fail the IP address validation.

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
-----
2      Enabled  -                                       -
VLAN ACL Logging DHCP Logging
-----
2      None      None

Switch#
```

## Display Parameters

<b>VLAN</b>	The VLAN ID that is enabled for ARP inspection.
<b>Configuration</b>	The configuration state of ARP inspection. <ul style="list-style-type: none"> <li>• <b>Enable</b> - ARP inspection is enabled.</li> <li>• <b>Disable</b> - ARP inspection is disabled.</li> </ul>
<b>ACL Match</b>	The name of ARP ACL that is specified.
<b>Static ACL</b>	The configuration of the static ACL. <ul style="list-style-type: none"> <li>• <b>Yes</b> - Static ARP ACL is configured.</li> <li>• <b>No</b> - Static ARP ACL is not configured.</li> </ul>
<b>ACL logging</b>	The state of logging for packets dropped or permitted based on ACL matches. <ul style="list-style-type: none"> <li>• <b>None</b> - ACL-matched packets are not logged.</li> <li>• <b>Permit</b> - Logging when packets are permitted by the configured ACL.</li> <li>• <b>Deny</b> - Logging when packets are dropped by the configured ACL.</li> <li>• <b>All</b> - ACL-matched packets are always logged.</li> </ul>
<b>DHCP Logging</b>	The state of logging for packets dropped or permitted based on DHCP bindings. <ul style="list-style-type: none"> <li>• <b>None</b> - Prevent logging when packets are dropped or permitted by the DHCP bindings.</li> <li>• <b>Permit</b> - Logging when packets are permitted by the DHCP bindings.</li> <li>• <b>Deny</b> - Logging when packets are dropped by the DHCP bindings.</li> <li>• <b>All</b> - Logging when packets are dropped or permitted by the DHCP bindings.</li> </ul>

This example shows how to display the trust state of port 3.

```
Switch#show ip arp inspection interfaces eth1/0/3

Interface      Trust State Rate(pps) Burst Interval
-----
eth1/0/3       untrusted  15         1
Total Entries: 1

Switch#
```

This example shows how to display the trust state of interfaces on the Switch.

```
Switch#show ip arp inspection interfaces eth1/0/1-7

Interface      Trust State Rate(pps) Burst Interval
-----
eth1/0/1       untrusted  15         1
eth1/0/2       untrusted  15         1
eth1/0/3       untrusted  15         1
eth1/0/4       untrusted  15         1
eth1/0/5       untrusted  15         1
eth1/0/6       untrusted  15         1
eth1/0/7       untrusted  15         1
Total Entries: 7

Switch#
```

## Display Parameters

<b>Interface</b>	The name of interface that enable ARP inspection.
<b>Trust State</b>	The state of the interface. <ul style="list-style-type: none"> <li>• <b>trusted</b> - This interface is ARP inspection trusted port, all ARP packet will be legal and not be authorized.</li> <li>• <b>untrusted</b> - This interface is ARP inspection untrusted port, all ARP packet will be authorized.</li> </ul>
<b>Rate (pps)</b>	The upper limit on the number of incoming packets processed per second.
<b>Burst Interval</b>	The consecutive interval in seconds over which the interface is monitored for the high rate of the ARP packets.

## 25-13 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

User/Privileged EXEC Mode.

## 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: 32
```

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

<b>Interface</b>	The name of interface that logging occurred.
<b>VLAN</b>	The VLAN that logging occurred.
<b>Sender IP</b>	The logging ARP's sender IP address.
<b>Sender MAC</b>	The logging ARP's sender MAC address.
<b>Occurrence</b>	The counter of logging entries occurred and the last time of logging entry occurred.

## 26. Error Recovery Commands

### 26-1 errdisable recovery

This command is used to enable the error recovery for causes and to configure the recovery interval. Use the **no** form of this command to disable the auto-recovery option or to return interval to the default setting for causes.

**errdisable recovery cause** {all | psecure-violation | storm-control | arp-rate | dhcp-rate | loopback-detect} [interval *SECONDS*]

**no errdisable recovery cause** {all | psecure-violation | storm-control | arp-rate | dhcp-rate | loopback-detect} [interval]

#### Parameters

<b>all</b>	Specifies to enable the auto-recovery option for all causes.
<b>psecure-violation</b>	Specifies to enable the auto-recovery option for an error port caused by port security violation.
<b>storm-control</b>	Specifies to enable the auto-recovery option for an error port caused by storm control.
<b>arp-rate</b>	Specifies to enable the auto-recovery option for an error port caused by ARP rate limiting.
<b>dhcp-rate</b>	Specifies to enable the auto-recovery option for an error port caused by DHCP rate limiting.
<b>loopback-detect</b>	Specifies to enable the auto-recovery option for an error port caused by loop detection.
<b>interval</b> <i>SECONDS</i>	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.

#### Usage Guideline

A port can be put in an error disabled state by causes such as port security violations, storm control, and so on. When a port enters the error disabled state, the port is shutdown although the setting running the configuration remains in the no shutdown state.

There are two ways to recover an error disabled port. Administrators can use the **errdisable recovery cause** command to enable the auto-recovery of error ports disabled by each cause. Alternatively, administrators can manually recover the port by entering the **shutdown** command first and then the **no shutdown** command for the port.

#### Example

This example shows how to set the recovery timer to 200 seconds for port security violation.

```
Switch# configure terminal
Switch(config)# errdisable recovery cause psecure-violation interval 200
Switch(config)#
```

This example shows how to enable the auto-recovery option for port security violations.

```
Switch# configure terminal
Switch(config)# errdisable recovery cause psecure-violation
Switch(config)#
```

---

## 26-2 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

User/Privileged EXEC Mode.

### 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# show errdisable recovery

ErrDisable Cause           State           Interval
-----
Port Security              enabled         200 seconds
Storm Control              disabled        300 seconds
Dynamic ARP Inspection     disabled        300 seconds
DHCP Snooping              disabled        300 seconds
Loop Detection             disabled        300 seconds

Interfaces that will be recovered at the next timeout:

Switch#
```

---

## 26-3 snmp-server enable traps errdisable

This command is used to enable the sending of SNMP notifications for the error disabled state. Use the **no** form of this command to disable the sending of SNMP notifications.

**snmp-server enable traps errdisable [asserted] [cleared] [notification-rate TRAP-RATE]**

**no snmp-server enable traps errdisable [asserted] [cleared] [notification-rate]**

## Parameters

---

<b>asserted</b>	(Optional) Specifies to control the notifications when entering into the error disabled state.
<b>cleared</b>	(Optional) Specifies to control the notifications when exiting from the error disabled state.
<b>notification-rate</b> <i>TRAP-RATE</i>	(Optional) Specifies the number of traps per minute. The value is from 0 to 1000. If the number of packets exceeds the specified number, the exceeded packets will be dropped. 0 represents that there is no limitation for the sending of the SNMP traps for the error disabled state per minute.

---

## Default

By default, this feature is disabled.

By default, the notification rate is 0.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command with the **asserted** and **cleared** parameters to enable or disable the notifications for the state change of the error disabled state. If one of the parameters is specified, only the specified notification type is enabled or disabled. The state or value of the other notification type will not be affected.

The **snmp-server enable traps errdisable notification-rate** and **no snmp-server enable traps errdisable notification-rate** commands only affect the setting of notification-rate, but not the state of the sending notifications for the error disabled state.

## Example

This example shows how to enable the sending of 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)#
```

## 27. File System Commands

### 27-1 delete

This command is used to delete a file.

```
delete FILE-URL
```

#### Parameters

---

<i>FILE-URL</i>	Specifies the name of the file to be deleted.
-----------------	---

---

#### Default

None.

#### Command Mode

Privileged EXEC Mode.

#### 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 "Image2" from file system on the local flash.

```
Switch#delete Image2
Delete Image2? (y/n) [n]  y
File is deleted.

Switch#
```

### 27-2 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

---

<i>URL</i>	(Optional) Specifies the name of the file or directory to be displayed.
------------	---

---

#### Default

None.

#### Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

If no parameter is specified, the current directory is used. By default, the current directory 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 /c:
 1  -rw          1062 Sep 24 2019 01:28:50  512_SSL_certificate.crt
 2  -rw           887 Sep 24 2019 01:29:40  512_SSL-private.prv
 3  -rw       8486640 Sep 23 2019 02:16:36  Image1
 4  -rw       8485024 Sep 16 2019 02:47:21  Image2
 5  -rw       160223 Sep 20 2019 03:33:54  Config1
 6  -rw         1338 Sep 24 2019 01:30:06  512_SSL_CertificateAuthority.ca
 7  d--         1360 Jan 01 2000 00:00:08  system

46305280 bytes total (20725760 bytes free)

Switch#
```

---

## 27-3 show storage media-info

This command is used to display the storage media's information.

**show storage media-info**

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

## 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.

```
Switch#show storage media-info
```

Drive	Media Type	Size	FS-Type	Label
c:	Flash	44 MB	swfs	

```
Switch#
```

---

## 28. Filter Database (FDB) Commands

### 28-1 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

<b>all</b>	Specifies to clear all dynamic MAC addresses.
<b>address</b> <i>MAC-ADDR</i>	Specifies to delete the specified dynamic MAC address.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies the interface that the MAC address will be deleted from. The specified interface can be a physical port or a port-channel.
<b>vlan</b> <i>VLAN-ID</i>	Specifies the VLAN ID. The valid values are from 1 to 4094.

#### Default

None.

#### Command Mode

Privileged EXEC Mode.

#### Usage Guideline

Use this command to only clear 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#
```

### 28-2 mac-address-table aging-time

This command is used to configure the MAC address table aging time. Use the **no** form of this command to revert to the default setting.

```
mac-address-table aging-time SECONDS
```

```
no mac-address-table aging-time
```

#### Parameters

<i>SECONDS</i>	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.

## 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)#
```

## 28-3 mac-address-table learning

This command is used to enable MAC address learning on the physical port. Use the **no** form of this command to disable learning.

**mac-address-table learning interface** *INTERFACE-ID* [, | -]

**no mac-address-table learning interface** *INTERFACE-ID* [, | -]

## Parameters

<i>INTERFACE-ID</i>	Specifies the interfaces to be configured.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

## Default

By default, this option is enabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

This command is only available for physical port interface configuration.

Use this command 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)#
```

## 28-4 mac-address-table notification change

This command is used to enable or configure the MAC address notification function. Use the **no** form of this command to disable the function or revert the optional configuration to default.

**mac-address-table notification change** [*interval* *SECONDS* | *history-size* *VALUE* | *trap-type* {*with-vlanid* | *without-vlanid*}]

**no mac-address-table notification change** [*interval* | *history-size* | *trap-type*]

### Parameters

<b>interval</b> <i>SECONDS</i>	(Optional) Specifies the interval of sending the MAC address trap message. The range is 1 to 2147483647 and the default value is 1 second.
<b>history-size</b> <i>VALUE</i>	(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.
<b>trap-type</b>	(Optional) Specifies the trap information to include VLAN ID or not.
<b>with-vlanid</b>	Specifies the trap information to include VLAN ID.
<b>without-vlanid</b>	Specifies the trap information to exclude VLAN ID.

### Default

MAC address notification is disabled.

The default trap interval is 1 second.

The default number of entries in the history table is 1.

The default trap type is without-vlanid.

### Command Mode

Global Configuration Mode.

### 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)#
```

## 28-5 mac-address-table static

This command is used to add a static address to the MAC address table. Use the **no** form of this command to remove a static MAC address entry from the table.

**mac-address-table static** *MAC-ADDR* **vlan** *VLAN-ID* **{interface** *INTERFACE-ID* **[, | -] | drop}**

**no mac-address-table static** **{all |** *MAC-ADDR* **vlan** *VLAN-ID* **[interface** *INTERFACE-ID* **[, | -}]**

### Parameters

<i>MAC-ADDR</i>	Specifies the MAC address of the entry. The address is a unicast entry. Packets with a destination address that match this MAC address received by the specified VLAN are forwarded to the specified interface.
<b>vlan</b> <i>VLAN-ID</i>	Specifies the VLAN of the entry. The range is 1 to 4094.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies the forwarding ports.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>drop</b>	Specifies to drop the frames that are sent by or sent to the specified MAC address on the specified VLAN.
<b>all</b>	Specifies to remove all static MAC address entries.

### Default

None.

### Command Mode

Global Configuration Mode.

### Usage Guideline

Only one interface can be specified. When deleting a unicast MAC address entry, there is no need to specify the interface ID.

## 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 port 1.

```
Switch# configure terminal
Switch(config)# mac-address-table static C2:F3:22:0A:12:F4 vlan 4 interface eth1/0/1
Switch(config)#
```

## 28-6 multicast filtering-mode

This command is used to configure the handling method for multicast packets for a VLAN. Use the **no** form of this command to revert to the default setting.

```
multicast filtering-mode {forward-all | forward-unregistered | filter-unregistered}
no multicast filtering-mode
```

### Parameters

<b>forward-all</b>	Specifies to flood all multicast packets based on the VLAN domain.
<b>forward-unregistered</b>	Specifies to forward registered multicast packets based on the forwarding table and flood all unregistered multicast packets based on the VLAN domain.
<b>filter-unregistered</b>	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.

### 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)#
```

## 28-7 show mac-address-table

This command is used to display a specific MAC address entry or the MAC address entries for a specific interface or VLAN.

**show mac-address-table** [**dynamic** | **static**] [**address** *MAC-ADDR* | **interface** *INTERFACE-ID* | **vlan** *VLAN-ID*]

## Parameters

<b>dynamic</b>	(Optional) Specifies to display dynamic MAC address table entries only.
<b>static</b>	(Optional) Specifies to display static MAC address table entries only.
<b>address</b> <i>MAC-ADDR</i>	(Optional) Specifies the 48-bit MAC address.
<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interface to be displayed. Only physical port and port-channel interfaces are allowed to be specified.
<b>vlan</b> <i>VLAN-ID</i>	(Optional) Specifies the VLAN ID. The valid values are from 1 to 4094.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

If the **interface** parameter 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#
```

## 28-8 show mac-address-table aging-time

This command is used to display the aging time of the MAC address table.

**show mac-address-table aging-time**

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the aging time of the MAC address table.

### Example

This example shows how to display the aging time of the MAC address table.

```
Switch# show mac-address-table aging-time

Aging Time is 300 seconds

Switch#
```

## 28-9 show mac-address-table learning

This command is used to display the MAC-address learning state.

**show mac-address-table learning [interface *INTERFACE-ID* [, | -]]**

### Parameters

---

---

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

---

---



---



---

,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

---



---

**Default**

None.

**Command Mode**

User/Privileged EXEC Mode.

**Usage Guideline**

If no parameter is specified, all existing interfaces will be displayed.

**Example**

This example shows how to display the MAC address learning status on ports 1 to 10.

```
Switch# show mac-address-table learning interface eth1/0/1-10
```

```
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#
```

**28-10 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**


---



---

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
<b>history</b>	(Optional) Specifies to display the MAC address notification change history.

---



---

**Default**

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

If no parameter is specified, the global configuration will be displayed. Use the **interface** parameter to display information of all interfaces. Use the **interface** *INTERFACE-ID* parameter to display information of the specified interface.

## 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
Trap Type: Without VID

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#
```

---

## 28-11 show multicast filtering-mode

This command is used to display the filtering mode for handling multicast packets that are received on a VLAN.

**show multicast filtering-mode** [**interface** *VLAN-ID*]

### Parameters

---

<b>interface</b> <i>VLAN-ID</i>	(Optional) Specifies the VLAN to display.
---------------------------------	---

---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the filtering mode for handling multicast packets that are received on a VLAN.

## Example

This example shows how to display the multicast filtering mode configuration for all VLANs.

```
Switch# show multicast filtering-mode

Interface                               Layer 2 Multicast Filtering Mode
-----                               -
default                                 forward-unregistered

Total Entries: 1

Switch#
```

---

## 28-12 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 this 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.

### Usage Guideline

Use this command to enable or disable 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)#
```

---

## 28-13 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 this command to revert to the default setting.

```
snmp trap mac-notification change {added | removed}
no snmp trap mac-notification change{added | removed}
```

## Parameters

---

<b>added</b>	Specifies to enable the MAC change notification when a MAC address is added on the interface
<b>removed</b>	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.

## 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 port 2.

```
Switch# configure terminal
Switch(config)# interface eth1/0/2
Switch(config-if)# snmp trap mac-notification change added
Switch(config-if)#
```

---

## 29. Gratuitous ARP Trap Commands

### 29-1 snmp-server enable traps gratuitous-arp

This command is used to enable the sending of SNMP notifications for gratuitous ARP duplicate IP detected. Use the **no** form of this command to disable the function.

**snmp-server enable traps gratuitous-arp**

**no snmp-server enable traps gratuitous-arp**

#### Parameters

None.

#### Default

By default, this option is disabled.

#### Command Mode

Global Configuration Mode.

#### Usage Guideline

Use this command to enable or disable the sending of SNMP notifications for gratuitous ARP duplicate IP detected.

#### Example

This example shows how to enable the sending of SNMP notifications for gratuitous ARP duplicate IP detected.

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

## 30. Interface Commands

### 30-1 clear counters

This command is used to clear counters for port interfaces.

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

#### Parameters

<b>all</b>	Specifies to clear counters for all interfaces.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies the interfaces to be cleared.
<b>,</b>	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
<b>-</b>	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

#### Default

None.

#### Command Mode

Privileged EXEC Mode.

#### Usage Guideline

Use this command to clear counters for port interfaces.

#### Example

This example shows how to clear the counters on port 1.

```
Switch# clear counters interface eth1/0/1
Switch#
```

### 30-2 description

This command is used to add a description to an interface. Use the **no** form of this command to delete the description.

```
description STRING
no description
```

#### Parameters

<i>STRING</i>	Specifies a description for an interface with a maximum of 64 characters.
---------------	---

#### Default

None.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

Description can be added to any pre-defined interface type. 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 port 10.

```
Switch# configure terminal
Switch(config)# interface eth1/0/10
Switch(config-if)# description Physical Port 10
Switch(config-if)#
```

This example shows how to add the description "Data VLAN" to Layer 2 Virtual LAN interface.

```
Switch# configure terminal
Switch(config)#interface l2vlan 1
Switch(config-if)#description Data VLAN
Switch(config-if)#
```

---

## 30-3 interface

This command is used to enter the Interface Configuration Mode for a single interface. Use the **no** form of this command to remove an interface.

**interface** *INTERFACE-ID*

**no interface** *INTERFACE-ID*

## Parameters

---

<i>INTERFACE-ID</i>	Specifies the ID of the interface. The interface ID is formed by interface type and interface number. The interface types are as follows: <ul style="list-style-type: none"><li>• <b>Ethernet</b> - Ethernet switch port with all different media.</li><li>• <b>Vlan</b> - VLAN interface.</li><li>• <b>Port-channel</b> - Aggregated port channel interface.</li><li>• <b>range</b> - Enter the interface range configuration mode for multiple interfaces.</li><li>• <b>L2vlan</b> - IEEE 802.1Q Layer 2 Virtual LAN interface.</li></ul>
---------------------	---

---

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enter 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.

L2vlan interface is only used to add descriptions to existed L2 VLANs. The **interface l2vlan** command does not create any new interface, neither will the no forms of this command removed any existing interface.

## Example

This example shows how to enter the Interface Configuration Mode for port 5.

```
Switch# configure terminal
Switch(config)# interface eth1/0/5
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)#
```

## 30-4 interface range

This command is used to enter the Interface Range Configuration Mode for multiple interfaces.

**interface range** *INTERFACE-ID* [, | -]

### Parameters

<i>INTERFACE-ID</i>	Specifies the ID of the interface. The interface ID is formed by interface type and interface number. The interface types are as follows: <ul style="list-style-type: none"> <li>• <b>Ethernet</b> - Ethernet switch port with all different media.</li> <li>• <b>L2vlan</b> - IEEE 802.1Q Layer 2 Virtual LAN interface.</li> </ul>
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

None.

### Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enter the Interface Range Configuration Mode for the specified range of interfaces. All Commands configured in the Interface Range Configuration Mode apply to all interfaces specified in the range.

## Example

This example shows how to enter the Interface Range Configuration Mode for ports 1 to 5 and port 8.

```
Switch# configure terminal
Switch(config)# interface range eth1/0/1-5,1/0/8
Switch(config-if-range)#
```

## 30-5 show counters

This command is used to display interface information.

**show counters** [interface *INTERFACE-ID*]

## Parameters

---

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
--------------------------------------	--

---

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the statistic counters for an interface.

## Example

This example shows how to display the counters on port 1.

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

eth1/0/1 counters
rxHCTotalPkts           : 0
txHCTotalPkts           : 0
rxHCUnicastPkts        : 0
txHCUnicastPkts        : 0
rxHCMulticastPkts      : 0
txHCMulticastPkts      : 0
rxHCBroadcastPkts     : 0
txHCBroadcastPkts     : 0
rxHCOctets             : 0
txHCOctets             : 0
rxHCPkt64Octets        : 0
rxHCPkt65to127Octets  : 0
rxHCPkt128to255Octets : 0
rxHCPkt256to511Octets : 0
rxHCPkt512to1023Octets : 0
rxHCPkt1024to1518Octets : 0
```

```

rxHCPkt1519toMAXOctets      : 0
txHCPkt64Octets             : 0
txHCPkt65to127Octets       : 0
txHCPkt128to255Octets      : 0
txHCPkt256to511Octets     : 0
txHCPkt512to1023Octets    : 0
txHCPkt1024to1518Octets   : 0
txHCPkt1519toMAXOctets    : 0

rxCRCAAlignErrors          : 0
rxUndersizedPkts           : 0
rxOversizedPkts           : 0
rxFragmentPkts            : 0
rxJabbers                  : 0
rxSymbolErrors             : 0
rxMTUDropPkts             : 0

txCollisions               : 0
ifInErrors                 : 0
ifOutErrors                : 0
ifInDiscards               : 0
ifOutDiscards              : 0
txCoS0DropPkts            : 0
txCoS1DropPkts            : 0
txCoS2DropPkts            : 0
txCoS3DropPkts            : 0
txCoS4DropPkts            : 0
txCoS5DropPkts            : 0
txCoS6DropPkts            : 0
txCoS7DropPkts            : 0

dot3StatsSingleColFrames   : 0
dot3StatsMultiColFrames   : 0
dot3StatsDeferredTransmissions : 0
dot3StatsLateCollisions   : 0
dot3StatsExcessiveCollisions : 0
dot3StatsFrameTooLongs    : 0

linkChange                 : 0

```

Switch#

## Display Parameters

<b>rxHCTotalPkts</b>	Receive Packet Counter. Incremented for each packet received (includes bad packets, all Unicast, Broadcast, Multicast Packets, and MAC control packets).
<b>txHCTotalPkts</b>	Transmit Packet Counter. Incremented for each packet transmitted (including bad packets, all Unicast, Broadcast, Multicast packets and MAC control packets).
<b>rxHCUnicastPkts</b>	Receive Unicast Packet Counter. Incremented for each good unicast packet received.
<b>txHCUnicastPkts</b>	Transmit Unicast Packet Counter. Incremented for each good unicast packet transmitted.

<b>rxHCMulticastPkts</b>	Receive Multicast Packet Counter. Incremented for each good Multicast packet received. (Excluding MAC control packets).
<b>txHCMulticastPkts</b>	Transmit Multicast Packet Counter. Incremented for each good Multicast packet transmitted. (Excluding MAC control frames).
<b>rxHCBroadcastPkts</b>	Receive Broadcast Packet Counter. Incremented for each good Broadcast packet received.
<b>txHCBroadcastPkts</b>	Transmit Broadcast Packet Counter. Incremented for each good Broadcast packet transmitted.
<b>rxHCOctets</b>	Receive Byte Counter. Incremented by the byte count of packets received, including bad packets. (Excluding framing bits but including FCS bytes). Note: for truncated packet, the counter only counts up to max-rcv-frame-size size.
<b>txHCOctets</b>	Transmit Byte Counter. Incremented for the bytes of packets transmitted. (Excluding framing bits but including FCS bytes).
<b>rxHCPkt64Octets</b>	Receive 64 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame received which is 64 bytes in length inclusive (excluding framing bits but including FCS bytes).
<b>rxHCPkt65to127Octets</b>	Receive 65 to 127 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame received which is 65 to 127 bytes in length inclusive (excluding framing bits but including FCS bytes).
<b>rxHCPkt128to255Octets</b>	Receive 128 to 255 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame received which is 128 to 255 bytes in length inclusive (excluding framing bits but including FCS bytes).
<b>rxHCPkt256to511Octets</b>	Receive 256 to 511 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len /Type error) frame received which is 256 to 511 bytes in length inclusive (excluding framing bits but including FCS bytes).
<b>rxHCPkt512to1023Octets</b>	Receive 512 to 1023 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame received which is 512 to 1023 bytes in length inclusive (excluding framing bits but including FCS bytes).
<b>rxHCPkt1024to1518Octets</b>	Receive 1024 to 1518 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame received which is 1024 to 1518 bytes in length inclusive (excluding framing bits but including FCS bytes).
<b>rxHCPkt1519toMAXOctets</b>	Receive 1519 or more Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame received which is 1519 or more bytes in length inclusive (excluding framing bits but including FCS bytes).
<b>txHCPkt64Octets</b>	Transmit 64 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame transmitted which is 64 bytes in length inclusive (excluding framing bits but including FCS bytes).
<b>txHCPkt65to127Octets</b>	Transmit 65 to 127 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame transmitted which is 65 to 127 bytes in length inclusive (excluding framing bits but including FCS bytes).
<b>txHCPkt128to255Octets</b>	Transmit 128 to 255 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame transmitted which is 128 to 255 bytes in length inclusive (excluding framing bits but including FCS bytes).

<b>txHCPkt256to511Octets</b>	Transmit t 256 to 511 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame transmitted which is 256 to 511 bytes in length inclusive (excluding framing bits but including FCS bytes).
<b>txHCPkt512to1023Octets</b>	Transmit 512 to 1023 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame transmitted which is 512 to 1023 bytes in length inclusive (excluding framing bits but including FCS bytes).
<b>txHCPkt1024to1518Octets</b>	Transmit 1024 to 1518 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame transmitted which is 1024 to 1518 bytes in length inclusive (excluding framing bits but including FCS bytes).
<b>txHCPkt1519toMAXOctets</b>	Transmit 1519 or more Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame transmitted which is 1519 or more bytes in length inclusive (excluding framing bits but including FCS bytes).
<b>rxCRCAlignErrors</b>	Receive Alignment Error Frame Counter. Incremented for each packet received which is 64 to max-rcv-frame-size (or max-rcv-frame-size+4 for tagged frames) octets in length (excluding framing bits, but including FCS octets), but had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
<b>rxUndersizedPkts</b>	Receive Undersize Frame Counter. Incremented for each packet received which is less than 64 bytes in length (excluding framing bits, but including FCS octets) and is otherwise well formed (contains a valid FCS).
<b>rxOversizedPkts</b>	Receive Oversized Frame Counter. Incremented for each packet received which is longer than 1518 bytes in length (excluding framing bits, but including FCS octets) and is otherwise well formed (contain a valid FCS).
<b>rxFragmentPkts</b>	Receive Fragment Counter. Incremented for each packet received which is less than 64 bytes in length (excluding framing bits but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
<b>rxJabbers</b>	Receive Jabber Frame Counter. Incremented for each packet received which is longer than 1518 bytes in length (excluding framing bits, but including FCS octets), and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
<b>rxSymbolErrors</b>	Receive Code Error Frame Counter. Incremented for the count of times where there was an invalid data symbol when a valid carrier was present.
<b>rxMTUDropPkts</b>	Receive MTU Check Error Frame Counter. Incremented for each frame received which exceeds the max-rcv-frame-size in length and contain a valid or invalid FCS.  Note: Single VLAN tagged, truncation happens at max-rcv-frame-size +4; double VLAN tagged, truncation happens at max-rcv-frame-size +8.
<b>txCollisions</b>	Transmit Total Collision Counter. Incremented by the total number of collisions experienced during the transmission.
<b>iflnErrors</b>	Received Error Packet Counter. Incremented for received packets which contained errors preventing them from being deliverable to a higher-layer protocol. The counter is the sum of dot3StatsAlignmentErrors, dot3StatsFCSErrors, dot3StatsFrameTooLongs, and dot3StatsInternalMacTransmitErrors.

<b>ifOutErrors</b>	Transmit Error Packet Counter. Incremented for outbound packets which could not be transmitted because of errors. The counter is the sum of dot3StatsSQETestErrors, dot3StatsLateCollisions, dot3StatsExcessiveCollisions, dot3StatsInternalMacTransmitErrors and dot3StatsCarrierSenseErrors.
<b>ifInDiscards</b>	Receive Discards Packet Counter. Incremented for packets received which are dropped due to any condition. Such as MTU drop, Buffer Full Drop, ACL Drop, Multicast Drop, VLAN Ingress Drop, Invalid IPv6, STP Drop, Storm and FDB Discard, and etc.
<b>ifOutDiscards</b>	Transmit Discards Packet Counter. Incremented for packets transmitted which are dropped due to any condition. Such as excessive transit delay discards, HOL drop, STP drop, MTU drop, VLAN drop, and etc.
<b>txCoS0DropPkts</b>	Transmit COS 0 Drop Packet Counter. Incremented for each packet drop due to Head of Line blocking per egress port COS 0.
<b>txCoS1DropPkts</b>	Transmit COS 1 Drop Packet Counter. Incremented for each packet drop due to Head of Line blocking per egress port COS 1.
<b>txCoS2DropPkts</b>	Transmit COS 2 Drop Packet Counter. Incremented for each packet drop due to Head of Line blocking per egress port COS 2.
<b>txCoS3DropPkts</b>	Transmit COS 3 Drop Packet Counter. Incremented for each packet drop due to Head of Line blocking per egress port COS 3.
<b>txCoS4DropPkts</b>	Transmit COS 4 Drop Packet Counter. Incremented for each packet drop due to Head of Line blocking per egress port COS 4.
<b>txCoS5DropPkts</b>	Transmit COS 5 Drop Packet Counter. Incremented for each packet drop due to Head of Line blocking per egress port COS 5.
<b>txCoS6DropPkts</b>	Transmit COS 6 Drop Packet Counter. Incremented for each packet drop due to Head of Line blocking per egress port COS 6.
<b>txCoS7DropPkts</b>	Transmit COS 7 Drop Packet Counter. Incremented for each packet drop due to Head of Line blocking per egress port COS 7.
<b>dot3StatsSingleColFrames</b>	Transmit Single Collision Frame Counter. 10/100 mode only - incremented for each frame transmitted which experienced exactly one collision during transmission.
<b>dot3StatsMultiColFrames</b>	Transmit Multiple Collision Frame Counter. 10/100 mode only - incremented for each frame successfully transmitted for which transmission is inhibited by more than one collision.
<b>dot3StatsDeferredTransmissions</b>	Transmit Single Deferral Frame Counter. 10/100 mode only - incremented for each frame which was deferred on its first transmission attempt and did not experience any subsequent collisions during transmission.
<b>dot3StatsLateCollisions</b>	Transmit Late Collision Frame Counter. 10/100 mode only - incremented for each frame transmitted which experienced a late collision during a transmission attempt.
<b>dot3StatsExcessiveCollisions</b>	Transmit Excessive Collision Frame Counter. 10/100 mode only - incremented for each frame transmitted for which transmission fails due to excessive collisions.
<b>dot3StatsFrameTooLongs</b>	Receive Frame Too Long Counter. Incremented for each frame received which exceeds the max-rcv-frame-size.

## 30-6 show interfaces

This command is used to display the interface information.

---

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

## Parameters

<i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

If no parameter is specified, all existing physical ports will be displayed.

## Example

This example shows how to display the VLAN interface information for 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 interface information for port 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#
```

## 30-7 show interfaces counters

This command is used to display counters on specified interfaces.

```
show interfaces [INTERFACE-ID [, | -]] counters [errors]
```

### Parameters

<i>INTERFACE-ID</i>	(Optional) specifies the interfaces to be displayed. If no interface is specified, the counters on all interfaces will be displayed. Only physical ports are allowed to be specified.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>errors</b>	(Optional) Specifies to display the error counters.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.



## Usage Guideline

Use this command to display switch port statistics counters.

## Example

This example shows how to display switch port counters on ports 1 to 8.

```
Switch# show interfaces eth1/0/1-8 counters
```

Port	InOctets / InUcastPkts	InMcastPkts / InBcastPkts
eth1/0/1	1834520 9234	629 338
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 / OutUcastPkts	OutMcastPkts / OutBcastPkts
eth1/0/1	5387265 9381	0 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 eth1/0/1-8 counters errors
```

Port	Align-Err	Fcs-Err	Rcv-Err	Undersize	Xmit-Err	OutDiscard
eth1/0/1	0	0	0	0	0	0
eth1/0/2	0	0	0	0	0	0
eth1/0/3	0	0	0	0	0	0
eth1/0/4	0	0	0	0	0	0
eth1/0/5	0	0	0	0	0	0
eth1/0/6	0	0	0	0	0	0
eth1/0/7	0	0	0	0	0	0
eth1/0/8	0	0	0	0	0	0

Port	Single-Col	Multi-Col	Late-Col	Excess-Col	Carri-Sen	Runts
eth1/0/1	0	0	0	0	0	0
eth1/0/2	0	0	0	0	0	0
eth1/0/3	0	0	0	0	0	0
eth1/0/4	0	0	0	0	0	0
eth1/0/5	0	0	0	0	0	0
eth1/0/6	0	0	0	0	0	0
eth1/0/7	0	0	0	0	0	0
eth1/0/8	0	0	0	0	0	0

Port	Giants	Symbol-Err	SQETest-Err	DeferredTx	IntMacTx	IntMacRx
eth1/0/1	0	0	0	0	0	0
eth1/0/2	0	0	0	0	0	0
eth1/0/3	0	0	0	0	0	0
eth1/0/4	0	0	0	0	0	0
eth1/0/5	0	0	0	0	0	0
eth1/0/6	0	0	0	0	0	0
eth1/0/7	0	0	0	0	0	0
eth1/0/8	0	0	0	0	0	0

```
Total Entries:8
```

```
Switch#
```

## Display Parameters

<b>Align-Err</b>	Refer to the item “dot3StatsAlignmentErrors” in the <b>show counters</b> command.
<b>Fcs-Err</b>	Refer to the item “dot3StatsFCSErrors” in the <b>show counters</b> command.
<b>Rcv-Err</b>	Refer to the item “ifInErrors” in Display Parameters in the <b>show counters</b> command.
<b>UnderSize</b>	Refer to the item “rxUndersizedPkts” in Display Parameters in the <b>show counters</b> command.
<b>Xmit-Err</b>	Refer to the item “ifOutErrors” in Display Parameters in the <b>show counters</b> command.
<b>OutDiscard</b>	Refer to the item “ifOutDiscards” in Display Parameters in the <b>show counters</b> command.

<b>Single-Col</b>	Refer to the item “dot3StatsSingleColFrames” in Display Parameters in the <b>show counters</b> command.
<b>Multi-Col</b>	Refer to the item “dot3StatsMultiColFrames” in Display Parameters in the <b>show counters</b> command.
<b>Late-Col</b>	Refer to the item “dot3StatsLateCollisions” in Display Parameters in the <b>show counters</b> command.
<b>Excess-Col</b>	Refer to the item “dot3StatsExcessiveCollisions” in Display Parameters in the <b>show counters</b> command.
<b>Carri-Sen</b>	Refer to the item “dot3StatsCarrierSenseErrors” in the <b>show counters</b> command.
<b>Runts</b>	Incremented for each packet whose size is less than 64 bytes in length.
<b>Giants</b>	Incremented for each packet whose size is greater than 1518 bytes in length.
<b>Symbol-Err</b>	Refer to the item “rxSymbolErrors” in Display Parameters in the <b>show counters</b> command.
<b>SQETest-Err</b>	Refer to the item “dot3StatsSQETestErrors” in the <b>show counters</b> command.
<b>DeferredTx</b>	Refer to the item “txDelayExceededDiscards” in Display Parameters in the <b>show counters</b> command.
<b>IntMacTx</b>	Refer to the item “dot3StatsInternalMacTransmitErrors” in Display Parameters in the <b>show counters</b> command.
<b>IntMacRx</b>	Refer to the item “dot3StatsInternalMacReceiveErrors” in the <b>show counters</b> command.

## 30-8 show interfaces status

This command is used to display the port connection status of the Switch.

```
show interfaces [INTERFACE-ID [, | -]] status
```

### Parameters

<i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the port connection status of the Switch. If no parameter is specified, the connection status of all switch ports will be displayed.

## Example

This example shows how to display the port connection status of the Switch.

```
Switch# show interfaces eth1/0/1-8 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

```
Total Entries: 8
```

```
Switch#
```

## 30-9 show interfaces utilization

This command is used to display the port utilization of the Switch.

```
show interfaces [INTERFACE-ID [, | -]] utilization
```

### Parameters

<i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed. If no interface is specified, the utilization of all physical port interfaces will be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>utilization</b>	Specifies to display the utilization information.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the port utilization of the Switch.

## Example

This example shows how to display the port utilization of the Switch.

```
Switch# show interfaces eth1/0/1-8 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#
```

## 30-10 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

<i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed. If no interface is specified, the auto-negotiation information on all physical port interfaces will be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>auto-negotiation</b>	Specifies to display detailed auto-negotiation information.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display 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: Enabled

Remote Signaling: -
Configure Status: Complete
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: 10M_Half, 10M_Full, 100M_Half, 100M_Full
RemoteFaultAdvertised: -
RemoteFaultReceived: -

eth1/0/2
Auto Negotiation: Enabled

Remote Signaling: -
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: -
RemoteFaultReceived: -

Switch#
```

## 30-11 show interfaces description

This command is used to display the description and link status of interfaces.

**show interfaces** [*INTERFACE-ID* [, | -]] **description**

### Parameters

<i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed. If no interface is specified, the information of all interfaces will be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>description</b>	Specifies to display the description and link status of interfaces.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the description and link status of interfaces.

## Example

This example shows how to display the description and link status of interfaces.

```
Switch# show interfaces description
```

Interface	Status	Administrative	Description
eth1/0/1	up	enabled	
eth1/0/2	down	enabled	
eth1/0/3	up	enabled	
eth1/0/4	down	enabled	
eth1/0/5	down	enabled	
eth1/0/6	down	enabled	
eth1/0/7	down	enabled	
eth1/0/8	down	enabled	
eth1/0/9	down	enabled	
eth1/0/10	down	enabled	Physical Port 10
eth1/0/11	down	enabled	
eth1/0/12	down	enabled	
eth1/0/13	down	enabled	
eth1/0/14	down	enabled	
eth1/0/15	down	enabled	
eth1/0/16	down	enabled	
eth1/0/17	down	enabled	
eth1/0/18	down	enabled	
eth1/0/19	down	enabled	
eth1/0/20	down	enabled	
eth1/0/21	down	enabled	

```
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

## 30-12 shutdown

This command is used to disable an interface. Use the **no** form of this command to enable an interface.

**shutdown**

**no shutdown**

### Parameters

None.

### Default

By default, this option is **no shutdown**.

### Command Mode

Interface Configuration Mode.

## Usage Guideline

This command is available for physical port and VLAN interface 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 disable the port state on port 1.

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

---



# 31. Internet Group Management Protocol (IGMP) Snooping Commands

## 31-1 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

<b>all</b>	Specifies to clear IP IGMP snooping statistics for all VLANs and all ports.
<b>vlan</b> <i>VLAN-ID</i>	Specifies a VLAN to clear the IP IGMP snooping statistics.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies a port to clear the IP IGMP snooping statistics.

### Default

None.

### Command Mode

Privileged EXEC Mode.

### Usage Guideline

Use this command 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#
```

## 31-2 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 VLANs.

The IGMP snooping global state is disabled by default.

## Command Mode

VLAN Configuration Mode.

Global Configuration Mode.

## Usage Guideline

For a VLAN to operate with IGMP snooping, both the global state and the VLAN 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 VLAN 1.

```
Switch# configure terminal
Switch(config)# vlan 1
Switch(config-vlan)# no ip igmp snooping
Switch(config-vlan)#
```

---

## 31-3 ip igmp snooping fast-leave

This command is used to configure IGMP snooping fast-leave on a VLAN. Use the **no** form to disable the fast-leave option on the specified VLAN.

**ip igmp snooping fast-leave**

**no ip igmp snooping fast-leave**

### Parameters

None.

### Default

By default, this option is disabled.

### Command Mode

VLAN Configuration Mode.

### Usage Guideline

This command is only available for VLAN configuration.

Use this command to allow 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)#
```

## 31-4 ip igmp snooping last-member-query-interval

This command is used to configure the interval at which the IGMP snooping querier sends IGMP group-specific or group-source-specific (channel) query messages. Use the **no** form of this command to revert to the default setting.

**ip igmp snooping last-member-query-interval** *SECONDS*

**no ip igmp snooping last-member-query-interval**

### Parameters

<i>SECONDS</i>	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

VLAN Configuration Mode.

### Usage Guideline

This command is only available for VLAN configuration.

On receiving an IGMP leave message, the IGMP snooping querier will assume that there are no local members on the VLAN 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)#
```

## 31-5 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

<b>interface</b>	Specifies a static multicast router port.
<b>forbidden interface</b>	Specifies a port that cannot be multicast router port.
<i>INTERFACE-ID</i>	Specifies an interface or an interface list. Only physical port and port-channel interfaces are allowed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

## Default

No IGMP snooping multicast router port is configured.

## Command Mode

VLAN Configuration Mode.

## Usage Guideline

To specify a multicast router port, the valid interface can be a physical port or a port-channel. 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 eth1/0/4
Switch(config-vlan)#
```

## 31-6 ip igmp snooping querier

This command is used to enable the capability of the entity as an IGMP querier. Use the **no** form of this command to disable the querier function.

```
ip igmp snooping querier
no ip igmp snooping querier
```

## Parameters

None.

## Default

By default, this option is disabled.

## Command Mode

VLAN Configuration Mode.

## Usage Guideline

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)#
```

---

## 31-7 ip igmp snooping query-interval

This command is used to configure the interval at which the IGMP snooping querier sends IGMP general query messages periodically. Use the **no** form of this command to revert to the default setting.

**ip igmp snooping query-interval** *SECONDS*

**no ip igmp snooping query-interval**

### Parameters

---

<i>SECONDS</i>	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

VLAN Configuration Mode.

## Usage Guideline

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)#
```

---

## 31-8 ip igmp snooping query-max-response-time

This command is used to configure the maximum response time advertised in IGMP snooping queries. Use the **no** form of this command to revert to the default setting.

**ip igmp snooping query-max-response-time** *SECONDS*

**no ip igmp snooping query-max-response-time**

## Parameters

<i>SECONDS</i>	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

VLAN Configuration Mode.

## Usage Guideline

Use this command to configure 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)#
```

## 31-9 ip igmp snooping query-version

This command is used to configure the general query packet version sent by the IGMP snooping querier. Use the **no** form of this command to revert to the default setting.

**ip igmp snooping query-version** *NUMBER*

**no ip igmp snooping query-version**

## Parameters

<i>NUMBER</i>	Specifies the version of the IGMP general query sent by the IGMP snooping querier. The value is from 1 to 3.
---------------	--

## Default

By default, this value is 3.

## Command Mode

VLAN Configuration Mode.

## Usage Guideline

The query version number setting will affect the querier electing. When configured to version 1, IGMP snooping will always act as the querier, and will not initiate new querier electing no matter what IGMP query packet is received. When configured to version 2 or version 3, IGMP snooping will initiate a new querier electing if any IGMPv2 or

IGMPv3 query packet is received. When receiving an IGMPv1 query packet, IGMP snooping will not initiate a new querier electing.

## Example

This example shows how to configure the query version to be 2 on VLAN 1000.

```
Switch# configure terminal
Switch(config)# vlan 1000
Switch(config-vlan)# ip igmp snooping query-version 2
Switch(config-vlan)#
```

---

## 31-10 ip igmp snooping robustness-variable

This command is used to set the robustness variable used in IGMP snooping. Use the **no** form of this command to revert to the default setting.

**ip igmp snooping robustness-variable** *VALUE*

**no ip igmp snooping robustness-variable**

### Parameters

---

<i>VALUE</i>	Specifies the robustness variable. The range is from 1 to 7.
--------------	--

---

### Default

By default, this value is 2.

### Command Mode

VLAN Configuration Mode.

### Usage Guideline

The robustness variable provides fine-tuning to allow for expected packet loss on a VLAN. 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 VLAN 1000.

```
Switch# configure terminal
Switch(config)# vlan 1000
Switch(config-vlan)# ip igmp snooping robustness-variable 3
Switch(config-vlan)#
```

## 31-11 ip igmp snooping static-group

This command is used to configure an IGMP snooping static group. Use the **no** form of this command is used to delete a static group.

```
ip igmp snooping static-group GROUP-ADDRESS interface INTERFACE-ID [, | -]
no ip igmp snooping static-group GROUP-ADDRESS [interface INTERFACE-ID [, | -]]
```

### Parameters

<i>GROUP-ADDRESS</i>	Specifies an IP multicast group address.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies the interfaces to be displayed. Only physical port and port-channel interfaces are allowed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

By default, no static-group is configured.

### Command Mode

VLAN Configuration Mode.

### Usage Guideline

Use this command 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 eth1/0/5
Switch(config-vlan)#
```

## 31-12 ip igmp snooping minimum-version

This command is used to configure the minimum version of IGMP hosts that is allowed on a VLAN. Use the **no** form of this command to remove the restriction from the VLAN.



**ip igmp snooping minimum-version** *NUMBER*

**no ip igmp snooping minimum-version**

## Parameters

---

<i>NUMBER</i>	Specifies the minimum version of IGMP hosts. <ul style="list-style-type: none"><li>• <b>2</b> - Specifies to filter out IGMPv1 messages.</li><li>• <b>3</b> - Specifies to filter out IGMPv1 and IGMPv2 messages.</li></ul>
---------------	---

---

## Default

By default, there is no limit on the minimum version.

## Command Mode

VLAN Configuration Mode.

## Usage Guideline

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)#
```

---

## 31-13 show ip igmp snooping

This command is used to display IGMP snooping information on the Switch.

**show ip igmp snooping** [*vlan VLAN-ID*]

## Parameters

---

<b>vlan</b> <i>VLAN-ID</i>	(Optional) Specifies the VLAN to be displayed.
----------------------------	--

---

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## 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

VLAN #2 configuration
  IGMP snooping state           : Disabled
  Minimum version               : v1
  Fast leave                    : Disabled (port-based)
  Querier state                 : Disabled
  Query version                 : v3
  Query interval                : 125 seconds
  Max response time             : 10 seconds
  Robustness value              : 2
  Last member query interval    : 1 seconds

Total Entries: 1

Switch#
```

## 31-14 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

<b>vlan</b> <i>VLAN-ID</i>	(Optional) Specifies the VLAN to be displayed. If no VLAN is specified, IGMP snooping group information of all VLANs will be displayed.
<b>IP-ADDRESS</b>	(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

User/Privileged EXEC Mode.

## 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#
```

## Display Parameters

<b>FM</b>	The value of the Filter Mode (FM) can be either IN (Include) or EX (Exclude). <ul style="list-style-type: none"> <li><b>EX</b> - The filter mode is Exclude.</li> <li><b>IN</b> - The filter mode is Include.</li> </ul>
<b>Exp (sec)</b>	Specifies the Expire Time (Exp) in seconds before the entry expires.

## 31-15 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

<b>vlan VLAN-ID</b>	(Optional) Specifies the VLAN to be displayed. If no VLAN is specified, IGMP snooping information on all VLANs will be displayed.
---------------------	---

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display dynamically learned or manually configured multicast router interfaces.

If no parameter is specified, IGMP snooping information on all VLANs will be displayed.

## Example

This example shows how to display IGMP snooping router port information.

```
Switch#show ip igmp snooping mrouter

VLAN   Ports
-----
4094   1/0/1 (static)

Total Entries: 1

Switch#
```

## 31-16 show ip igmp snooping static-group

This command is used to display statically configured IGMP snooping groups on the Switch.

```
show ip igmp snooping static-group [GROUP-ADDRESS | vlan VLAN-ID]
```

### Parameters

<i>GROUP-ADDRESS</i>	(Optional) Specifies the group IP address to be displayed.
vlan <i>VLAN-ID</i>	(Optional) Specifies the VLAN ID to be displayed.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display statically configured IGMP snooping groups on the Switch. If no parameter is specified, all information will be displayed.

## 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#
```

## 31-17 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

<b>interface</b>	Specifies to display statistics counters by interface.
<i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
<b>vlan</b>	Specifies to display statistics counters by VLAN.
<i>VLAN-ID</i>	(Optional) Specifies the VLAN ID to be displayed.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display IGMP snooping 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#
```

## 32. IP-MAC-Port Binding (IMPB) Commands

### 32-1 clear ip ip-mac-port-binding violation

This command is used to clear IMPB blocked entries.

```
clear ip ip-mac-port-binding violation {all | interface INTERFACE-ID | MAC-ADDRESS}
```

#### Parameters

<b>all</b>	Specifies to clear all of the violation entries.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies to clear the violation entries created by the specified interface.
<i>MAC-ADDRESS</i>	Specifies to clear the violation entries of the specified MAC address.

#### Default

None.

#### Command Mode

Privileged EXEC Mode.

#### Usage Guideline

Use this command to delete the IMPB violation entry from the filtering database.

#### Example

This example shows how to clear the entry blocked on port 4.

```
Switch# clear ip ip-mac-port-binding violation interface eth1/0/4
Switch#
```

### 32-2 ip ip-mac-port-binding

This command is used to enable the IMPB access control for port interfaces. Use the **no** form of this command to disable the IMPB access control function.

```
ip ip-mac-port-binding [MODE]
```

```
no ip ip-mac-port-binding
```

#### Parameters

<i>MODE</i>	(Optional) Specifies the IMPB access control mode. <ul style="list-style-type: none"> <li>• <b>strict-mode</b> - Specifies to perform strict mode access control.</li> <li>• <b>loose-mode</b> - Specifies to perform loose mode access control.</li> </ul> If not specified, the <b>strict-mode</b> is used.
-------------	---

#### Default

By default, this option is disabled.

## Command Mode

Interface Configuration Mode.

## 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 port 10.

```
Switch# configure terminal
Switch(config)# interface eth1/0/10
Switch(config-if)# ip ip-mac-port-binding strict
Switch(config-if)#
```

## 32-3 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

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>violation</b>	(Optional) Specifies to display the blocked entry.

### Default

None.

## Command Mode

User/Privileged EXEC Mode.

## 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
-----
eth1/0/3      1    01-00-0C-CC-CC-CC
eth1/0/3      1    01-80-C2-00-00-00
eth1/0/4      1    01-00-0C-CC-CC-CD
eth1/0/4      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
-----
eth1/0/1      Strict
eth1/0/2      Strict
eth1/0/3      Loose
eth1/0/4      Loose

Total Entries: 4

Switch#
```

## 32-4 snmp-server enable traps ip-mac-port-binding

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

### 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 the sending of traps for IMPB.

```
Switch# configure terminal
Switch(config)# snmp-server enable traps ip-mac-port-binding
Switch(config)#
```

---

## 33. IP Multicast (IPMC) Commands

### 33-1 show ip mroute forwarding-cache

This command is used to display the contents in the IP multicast routing forwarding cache database.

```
show ip mroute forwarding-cache [group-addr GROUP-ADDRESS [source-addr SOURCE-ADDRESS]]
```

#### Parameters

<b>group-addr</b> <i>GROUP-ADDRESS</i>	(Optional) Specifies the IP address of the group.
<b>source-addr</b> <i>SOURCE-ADDRESS</i>	(Optional) Specifies the IP address of the multicast source.

#### Default

None.

#### Command Mode

User/Privileged EXEC Mode.

#### Usage Guideline

The IP multicast forwarding cache is a summary of the IP multicast route table, IGMP snooping group member table, and the multicast router ports.

#### Example

This example shows how to display the IP multicast routing forwarding cache.

```
Switch# show ip mroute forwarding-cache
(10.1.1.1, 239.0.0.0) VLAN0060
  Outgoing interface list: 1/0/1, T2

(*,225.0.0.0) VLAN0070
  Outgoing interface list: 1/0/1-1/0/2

(10.1.1.1, 239.0.0.1) VLAN0060
  Outgoing interface list: 1/0/1, 2/0/2

Total entries: 3

Switch#
```

#### Display Parameters

<b>239.0.0.0</b>	The group address.
<b>10.1.1.1</b>	The source address.
<b>*</b>	The wildcard source address.
<b>VLAN0060</b>	The interface that multicast data arrived on.

---

---

**Outgoing interface**

A list of outgoing interfaces for multicast data. It contains Layer 2 switching and Layer 3 routing interfaces.

---

---

## 34. IP Multicast Version 6 (IPMCv6) Commands

### 34-1 show ipv6 mroute forwarding-cache

This command is used to display the contents in the IPv6 multicast routing forwarding cache database.

```
show ipv6 mroute forwarding-cache [group-addr GROUP-ADDRESS [source-addr SOURCE-ADDRESS]]
```

#### Parameters

<b>group-addr</b> <i>GROUP-ADDRESS</i>	(Optional) Specifies the IPv6 address of the group.
<b>source-addr</b> <i>SOURCE-ADDRESS</i>	(Optional) Specifies the IPv6 address of the multicast source.

#### Default

None.

#### Command Mode

User/Privileged EXEC Mode.

#### Usage Guideline

The IPv6 multicast forwarding cache is a summary of the IPv6 multicast route table, MLD snooping group member table, and the multicast router ports.

#### Example

This example shows how to display the IPv6 multicast routing forwarding cache.

```
Switch# show ipv6 mroute forwarding-cache

(2000:60:1:1::10, FF0E::1:1:1) VLAN0060
  Outgoing interface list: 1/0/1, port-channel2

(2000:60:1:1::10, FF0E::1:1:2) VLAN0060
  Outgoing interface list: 1/0/1, 2/0/2

Total entries: 2

Switch#
```

#### Display Parameters

<b>FF0E::1:1:1</b>	The group address.
<b>2000:60:1:1::10</b>	The source address.
<b>VLAN0060</b>	The interface that multicast data arrived on.
<b>Outgoing interface</b>	A list of outgoing interfaces for multicast data. It contains Layer 2 switching and Layer 3 routing interfaces.

## 35. IP Source Guard Commands

### 35-1 ip verify source vlan dhcp-snooping

This command is used to enable IP source guard for a port. Use the **no** form of this command to disable IP source guard.

```
ip verify source vlan dhcp-snooping [ip-mac]
no ip verify source vlan dhcp-snooping [ip-mac]
```

#### Parameters

<b>ip-mac</b>	(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.

#### Usage Guideline

This command is only available for physical port interface configuration.

Use this command to enable the IP source guard on the configured port.

When a port is enabled for IP source guard, the IP packet that arrives at the port will be validated via the port ACL. Port ACL is a hardware mechanism and its entry can come from either a manual configured entry or the DHCP snooping binding database. The packet that fails to pass the validation will be dropped.

There are two types of validations.

- If the **ip-mac** parameter is not specified, the validation is based on the source IP address and VLAN check only.
- If the **ip-mac** parameter is specified, the validation is based on the source MAC address, VLAN and IP address.

#### Example

This example shows how to enable IP Source Guard on port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# ip verify source vlan dhcp-snooping
Switch(config-if)#
```

### 35-2 ip source binding

This command is used to create a static entry used for IP source guard. Use the **no** form of this command to delete a static binding entry.

```
ip source binding MAC-ADDRESS vlan VLAN-ID IP-ADDRESS interface INTERFACE-ID [, | -]
no ip source binding MAC-ADDRESS vlan VLAN-ID IP-ADDRESS interface INTERFACE-ID [, | -]
```

## Parameters

<i>MAC-ADDRESS</i>	Specifies the MAC address of the IP-to-MAC address binding entry.
<b>vlan</b> <i>VLAN-ID</i>	Specifies the VLAN that the valid host belongs to.
<i>IP-ADDRESS</i>	Specifies the IP address of the IP-to-MAC address binding entry.
<b>Interface</b> <i>INTERFACE-ID</i>	Specifies the interfaces that the valid host is connected. Only physical port and port-channel interfaces are allowed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to add or delete a static binding entry used for IP source guard checking. The parameters specified for the command must exactly match the entry to be deleted.

If the MAC address and the VLAN for the configured entry already exist, the existing binding entry is updated.

## Example

This example shows how to configure an IP Source Guard entry with the IP address 10.1.1.1 and MAC address 00-01-02-03-04-05 at VLAN 2 on port 10.

```
Switch# configure terminal
Switch(config)# ip source binding 00-01-02-03-04-05 vlan 2 10.1.1.1 interface eth1/0/10
Switch(config)#
```

This example shows how to delete an IP Source Guard entry with the IP address 10.1.1.1 and MAC address 00-01-02-03-04-05 at VLAN 2 on port 10.

```
Switch# configure terminal
Switch(config)# no ip source binding 00-01-02-03-04-05 vlan 2 10.1.1.1 interface eth1/0/10
Switch(config)#
```

## 35-3 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

<i>IP-ADDRESS</i>	(Optional) Specifies to display the IP-source guard binding entry based on IP address.
-------------------	--

<b>MAC-ADDRESS</b>	(Optional) Specifies to display the IP-source guard binding entry based on MAC address.
<b>dhcp-snooping</b>	(Optional) Specifies to display the IP-source guard binding entry learned by DHCP binding snooping.
<b>static</b>	(Optional) Specifies to display the IP-source guard binding entry that is manually configured.
<b>vlan VLAN-ID</b>	(Optional) Specifies to display the IP-source guard binding entry based on VLAN.
<b>Interface INTERFACE-ID</b>	(Optional) Specifies to display the IP-source guard binding entry based on ports.
<b>,</b>	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
<b>-</b>	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

IP source guard binding entries are either manually configured or automatically learned by DHCP snooping to guard IP traffic.

## Example

This example shows how to display all IP Source Guard binding entries.

```
Switch#show ip source binding
```

```
MAC Address          IP Address          Lease(sec)  Type           VLAN  Interface
-----
00-01-01-01-01-01  10.1.1.10          infinite    static         100   eth1/0/3
00-01-01-01-01-10  10.1.1.11          3120       dhcp-snooping 100   eth1/0/3

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   eth1/0/3

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 port 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
eth1/0/3

MAC Address          IP Address          Lease(sec)  Type           VLAN  Interface
-----
00-01-01-01-01-10  10.1.1.11          3564       dhcp-snooping 100   eth1/0/3

Total Entries: 1

Switch#
```

## Display Parameters

<b>MAC Address</b>	The client's hardware MAC address.
<b>IP Address</b>	The client's IP address assigned from the DHCP server or configured by the user.
<b>Lease (sec)</b>	The IP address lease time.
<b>Type</b>	The binding type. Static bindings are configured manually. Dynamic binding are learned from DHCP snooping.
<b>VLAN</b>	The VLAN number of the client interface.
<b>Interface</b>	The interface that connects to the DHCP client host.

## 35-4 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

<b>Interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies a port or range of ports to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the hardware port ACL entries for a port in the hardware table. It indicates the hardware filter behavior that IP source guard is verified upon.



## Example

This example shows how to display when DHCP snooping is enabled on VLANs 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 eth1/0/3
```

```
Interface      Filter-type  Filter-mode  IP address      MAC address      VLAN
-----
eth1/0/3      ip          active      10.1.1.1       -                100
eth1/0/3      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 eth1/0/3
```

```
Interface      Filter-type  Filter-mode  IP address      MAC address      VLAN
-----
eth1/0/3      ip-mac      active      10.1.1.10      00-01-01-01-01-01 100
eth1/0/3      ip-mac      active      10.1.1.11      00-01-01-01-01-10 101
eth1/0/3      ip-mac      active      deny-all      -                102-120

Total Entries: 3

Switch#
```

## Display Parameters

<b>Interface</b>	The interface that has IP inspection enabled.
<b>Filter-type</b>	The type of IP Source Guard in operation. <ul style="list-style-type: none"> <li><b>ip</b> - Just use an IP address to authorize IP packets.</li> <li><b>ip-mac</b> - Use the IP and MAC address to authorize IP packets.</li> </ul>
<b>Filter-Mode</b>	<ul style="list-style-type: none"> <li><b>active</b> - Actively verify IP source entries.</li> <li><b>inactive-trust-port</b> - Enable DHCP snooping to trust ports with no IP source entry verification active.</li> <li><b>inactive-no-snooping-vlan</b> - No DHCP snooping VLAN configured with no IP source entry verification active.</li> </ul>
<b>IP address</b>	The client's IP address assigned from the DHCP server or configured by the user.
<b>MAC address</b>	The client's MAC address.
<b>VLAN</b>	The VLAN number of the client interface.

## 36. IP Utility Commands

### 36-1 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

<b>ip</b>	(Optional) Specifies the destination IPv4 address.
<i>IP-ADDRESS</i>	Specifies the IPv4 address of the destination host.
<b>ipv6</b>	(Optional) Specifies the destination IPv6 address.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the system to discover.
<i>HOST-NAME</i>	Specifies the host name of the system to discover.
<b>count</b> <i>TIMES</i>	(Optional) Specifies to stop after sending the specified number of echo request packets.
<b>timeout</b> <i>SECONDS</i>	(Optional) Specifies response timeout value in seconds.
<b>source</b> { <i>IP-ADDRESS</i>   <i>IPV6-ADDRESS</i> }	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

The **count** value is disabled. The ping will continue until the user terminates the process.

The **timeout** value is 1 second.

#### Command Mode

Privileged EXEC Mode.

#### Usage Guideline

Use this command to verify the reachability, reliability, and delay of the path to the destination host.

To terminate the ping before it has finished, press CTRL+C.

## Example

This example shows how to ping the host with IP address 211.21.180.1 with count 4 times.

```
Switch# ping 211.21.180.1 count 4

Reply from 211.21.180.1, time=10ms
Reply from 211.21.180.1, time<10ms
Reply from 211.21.180.1, time<10ms
Reply from 211.21.180.1, time<10ms

Ping Statistics for 211.21.180.1
Packets: Sent =4, Received =4, Lost =0

Switch#
```

This example shows how to ping the host with IPv6 address 2001:238:f8a:77:7c10:41c0:6ddd:ecab.

```
Switch# ping 2001:238:f8a:77:7c10:41c0:6ddd:ecab

Reply from 2001:238:f8a:77:7c10:41c0:6ddd:ecab , bytes=100, time<10 ms
Reply from 2001:238:f8a:77:7c10:41c0:6ddd:ecab , bytes=100, time<10 ms
Reply from 2001:238:f8a:77:7c10:41c0:6ddd:ecab , bytes=100, time<10 ms
Reply from 2001:238:f8a:77:7c10:41c0:6ddd:ecab , bytes=100, time<10 ms

Ping Statistics for 2001:238:f8a:77:7c10:41c0:6ddd:ecab
Packets: Sent =4, Received =4, Lost =0

Switch#
```

## 36-2 ping access-class

This command is used to specify an access list to restrict access via ping. Use the **no** command to remove the access list check.

**ping access-class** *IP-ACL*

**no ping access-class** *IP-ACL*

### Parameters

<i>IP-ACL</i>	Specifies a standard IP access list. The source address field of the permit or deny entry defines the valid or invalid host. To permit access via ping, specify the source address field and 'any' in the destination address field of the access list if the field is present.
---------------	---

### Default

None.

### Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to specify an access list to restrict access via ping. The specified access list does not need to exist to execute the command.

## Example

This example shows how to create a ping access-class which is used to restrict the ping only from the host 220.1.1.1 via a standard IP access list.

```
Switch# configure terminal
Switch(config)# ip access-list ping-filter
Switch(config-ip-acl)# permit 220.1.1.1 255.255.255.255
Switch(config-ip-acl)# exit
Switch(config)# ping access-class ping-filter
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** form of this command to delete an IPv6 snooping policy.

```
ipv6 snooping policy POLICY-NAME
no ipv6 snooping policy POLICY-NAME
```

#### Parameters

<i>POLICY-NAME</i>	Specifies the name of the snooping policy.
--------------------	--

#### Default

No IPv6 snooping policy is created.

#### Command Mode

Global Configuration Mode.

#### Usage Guideline

Use this command to create an IPv6 snooping policy. After an IPv6 snooping policy has been created, use the **ipv6 snooping attach-policy** command to apply the policy on a specific interface.

#### Example

This example shows how to create an IPv6 snooping policy named policy1.

```
Switch# configure terminal
Switch(config)#ipv6 snooping policy policy1
Switch(config-ipv6-snooping)#
```

### 37-2 protocol

This command is used to specify that addresses should be snooped with DHCPv6 or NDP. Use the **no** form of this command to indicate that a protocol will not to be used for snooping.

```
protocol {dhcp | ndp}
no protocol {dhcp | ndp}
```

#### Parameters

<b>dhcp</b>	Specifies that addresses should be snooped in DHCPv6 packets.
<b>ndp</b>	Specifies that addresses should be snooped in NDP packets.

#### Default

By default, both DHCPv6 and ND snooping are disabled.

## Command Mode

IPv6 Snooping Configuration Mode.

## Usage Guideline

ND Snooping is designed for a stateless auto-configuration assigned IPv6 address and manually configured IPv6 address. Before assigning an IPv6 address, the host must perform Duplicate Address Detection first. ND snooping detects DAD messages (DAD NS and DAD NA) to build its binding database. The NDP packet (NS and NA) is also used to detect whether a host is still reachable and determine whether to delete a binding or not.

DHCPv6 Snooping sniffs the DHCPv6 packets sent between the DHCPv6 client and server in the address assigning procedure. When a DHCPv6 client successfully got a valid IPv6 address, DHCPv6 snooping creates its binding database.

## Example

This example shows how to enable DHCPv6 snooping.

```
Switch# configure terminal
Switch(config)# ipv6 snooping policy policy1
Switch(config-ipv6-snooping)# protocol dhcp
Switch(config-ipv6-snooping)#
```

## 37-3 limit address-count

This command is used to limit the maximum number of IPv6 snooping binding entries. Use the **no** form of this command to revert to the default setting.

**limit address-count** *MAXIMUM*

**no limit address-count**

## Parameters

<i>MAXIMUM</i>	Specifies the maximum number of IPv6 snooping binding entries. The range is from 0 to 511.
----------------	--

## Default

By default, there is no limit configured.

## Command Mode

IPv6 Snooping Configuration Mode.

## Usage Guideline

Use this command to limit the number of IPv6 binding entries on which the IPv6 snooping policy is applied. This command helps to limit the binding table size.

## Example

This example shows how to limit the number of IPv6 snooping binding entries to 25.

```
Switch# configure terminal
Switch(config)# ipv6 snooping policy policy1
Switch(config-ipv6-snooping)# limit address-count 25
Switch(config-ipv6-snooping)#
```

## 37-4 ipv6 snooping attach-policy

This command is used to apply an IPv6 snooping policy to a specified VLAN. Use the **no** form of this command to remove the binding.

**ipv6 snooping policy attach-policy** *POLICY-NAME*

**no ipv6 snooping policy attach-policy**

### Parameters

<i>POLICY-NAME</i>	Specifies the name of the snooping policy.
--------------------	--

### Default

None.

### Command Mode

VLAN Configuration Mode.

### Usage Guideline

Use this command to apply the policy on a specific VLAN after an IPv6 snooping policy has been created.

## Example

This example shows how to enable IPv6 snooping on VLAN 200.

```
Switch# configure terminal
Switch(config)# 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** form of this command to revert to the default setting.

**ipv6 snooping station-move deny**

**no ipv6 snooping station-move deny**

## Parameters

None.

## Default

IPv6 snooping is permitting station moves.

## Command Mode

Global Configuration Mode.

## Usage Guideline

When station move is permitted, the dynamic snooping binding entry with same VLAN ID and MAC address on the specific port can move to another port if it detects the following conditions:

- A DHCPv6 snooping binding entry starts a new DHCP process on a new interface.
- An ND snooping binding entry starts a new DAD process on a new interface.

## Example

This example shows how to deny the station move function.

```
Switch# configure terminal
Switch(config)# ipv6 snooping station-move deny
Switch(config)#
```

---

## 37-6 show ipv6 snooping policy

This command is used to display DHCPv6 guard information.

```
show ipv6 snooping policy [POLICY-NAME]
```

## Parameters

---

<i>POLICY-NAME</i>	(Optional) Specifies the DHCPv6 guard policy name.
--------------------	--

---

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display DHCPv6 guard information. If no parameter is specified, information of all policies will be displayed.



## Example

This example shows how to display DHCPv6 guard information.

```
Switch#show ipv6 snooping policy
```

```
Snooping policy: policy1  
  Protocol: DHCP  
  Limit Address Count: 25  
  Target VLAN: 200
```

```
Switch#
```

---

## 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

<i>MAC-ADDRESS</i>	Specifies the MAC address of the manual binding entry.
<b>vlan</b> <i>VLAN-ID</i>	Specifies the binding VLAN of the manual binding entry.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the manual binding entry.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies the interface number of the manual binding entry.

#### Default

None.

#### Command Mode

Global Configuration Mode.

#### Usage Guideline

Use this command to set the static manual binding entry of the binding table.

#### Example

This example shows how to configure an IPv6 Source Guard entry with the IPv6 address of 2000::1 and MAC address of 00-01-02-03-04-05 at VLAN 2 on port 1.

```
Switch# configure terminal
Switch(config)# ipv6 source binding 00-01-02-03-04-05 vlan 2 2000::1 interface eth1/0/1
Switch(config)#
```

### 38-2 ipv6 source-guard policy

This command is used to create an IPv6 source guard policy and enter into the Source-guard Policy Configuration Mode. Use the **no** form of this command to remove an IPv6 source guard policy.

```
ipv6 source-guard policy POLICY-NAME
no ipv6 source-guard policy POLICY-NAME
```

#### Parameters

<i>POLICY-NAME</i>	Specifies the name of the source guard policy.
--------------------	--

#### Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to create or remove a source guard policy name. This command will enter into the Source-guard Policy Configuration Mode.

## Example

This example shows how to create an IPv6 source guard policy.

```
Switch# configure terminal
Switch(config)# ipv6 source-guard policy policy1
Switch(config-source-guard)#
```

---

## 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.

## Usage Guideline

Use this command to deny data traffic from auto-configured global address. It is useful when all global addresses on a link are assigned by DHCP and the administrator that wants to block hosts with self-configured addresses from sending traffic.

## Example

This example shows how to deny auto-configured traffic.

```
Switch# configure terminal
Switch(config)# ipv6 source-guard policy policy1
Switch(config-source-guard)# deny global-autoconfig
Switch(config-source-guard)#
```

---

## 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.

### Usage Guideline

Use this command to enable or disable 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 this command to remove the source guard from the interface.

**ipv6 source-guard attach-policy** [*POLICY-NAME*]  
**no ipv6 source-guard attach-policy**

### Parameters

---

<i>POLICY-NAME</i>	(Optional) Specifies the name of the source guard policy.
--------------------	---

---

### Default

None.

### Command Mode

Interface Configuration Mode.

### Usage Guideline

When the command is applied to a port, the received IPv6 packet except ND, RA, RS and DHCP messages will perform the address binding check. The packet is allowed when it matches any of the address binding table's entries. The binding table includes the dynamic table (created by IPv6 snooping) and the static table (created by the ipv6 neighbor binding vlan command)

If the policy name is not specified, the default source guard policy will permit packets sent by the auto-configured address and deny packets sent by the link-local address.

## Example

This example shows how to apply the IPv6 source guard policy “pol1” to port 3.

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

---

<i>POLICY-NAME</i>	(Optional) Specifies the name of the source guard policy.
--------------------	---

---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the IPv6 source guard policy configuration. If no parameter is specified, all IPv6 source guard polices will be display.

## Example

This example shows how to display the IPv6 source guard policy configuration.

```
Switch# show ipv6 dhcp guard policy

Policy Test configuration:
  permit link-local
  deny global-autoconf
  Target: eth1/0/3

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

<b>vlan</b> <i>VLAN-ID</i>	(Optional) Specifies to displays the binding entries that match the specified VLAN.
<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies to displays the binding entries that match the specified interface number.
<b>ipv6</b> <i>IPv6-ADDRESS</i>	(Optional) Specifies to displays the binding entries that match the specified IPv6 address.
<b>mac</b> <i>MAC-ADDRESS</i>	(Optional) Specifies to displays the binding entries that match the specified MAC address.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the entries of the binding table.

## Example

This example shows how to display the entries of the binding table.

```
Switch#
show ipv6 neighbor binding

Codes: D - DHCPv6 Snooping, S - Static, N - ND Snooping
 IPv6 address          MAC address      Interface      VLAN Time left
N FE80::A8BB:CCFF:FE01:F500  AABB.CC01.F500 eth1/0/1      100  8850
S FE80::21D:71FF:FE99:4900   001D.7199.4900 eth1/0/1      100  N/A
N 2001:600::1             AABB.CC01.F500 eth1/0/2      100  3181
D 2001:300::1             AABB.CC01.F500 Port-channel3 100  9559
D 2001:100::2             AABB.CC01.F600 eth1/0/1      200  9196
D 2001:400::1             001D.7199.4900 eth1/0/2      100  1568
S 2001:500::1             000A.000B.000C eth1/0/13     300  N/A

Total Entries: 7

Switch#
```

## Display Parameters

<b>Codes</b>	The codes for the IPv6 snooping owner. <ul style="list-style-type: none"> <li>• <b>D</b> - DHCPv6 Snooping.</li> <li>• <b>S</b> - Static.</li> <li>• <b>N</b> - ND Snooping.</li> </ul>
<b>IPv6 address</b>	The IPv6 address of the binding entry.
<b>MAC address</b>	The MAC address of the binding entry.

---

---

<b>Interface</b>	The interface number of the binding entry.
<b>VLAN</b>	The VLAN of the binding entry.
<b>Time left</b>	The rest time for aging the binding entry. It is the inactivity for the static binding entry.

---

---

## 39. Jumbo Frame Commands

### 39-1 max-rcv-frame-size

This command is used to configure the maximum Ethernet frame size allowed. Use the **no** form of this command to revert to the default setting.

**max-rcv-frame-size** *BYTES*

**no max-rcv-frame-size**

#### Parameters

---

<i>BYTES</i>	Specifies the maximum Ethernet frame size allowed. The range is from 64 to 12288 bytes.
--------------	---

---

#### Default

By default, this value is 1536 bytes.

#### Command Mode

Interface Configuration Mode.

#### Usage Guideline

This command is only available for physical port interface 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 3.

```
Switch# configure terminal
Switch(config)#interface eth1/0/3
Switch(config-if)#max-rcv-frame-size 6000
Switch(config-if)#
```



# 40. Link Aggregation Control Protocol (LACP) Commands

## 40-1 channel-group

This command is used to assign an interface to a channel group. Use the **no** form of this command to remove an interface from a channel-group.

```
channel-group CHANNEL-NO mode {on | active | passive}
no channel-group
```

### Parameters

<i>CHANNEL-NO</i>	Specifies the channel group ID. The valid range is 1 to 8.
<b>on</b>	Specifies that the interface is a static member of the channel-group.
<b>active</b>	Specifies the interface to operate in LACP active mode.
<b>passive</b>	Specifies the interface to operate in LACP passive mode.

### Default

None.

### Command Mode

Interface Configuration Mode.

### Usage Guideline

This command is only 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 **on** parameter is specified, the channel group type is static. If the **active** or **passive** parameter is specified, the channel group type is LACP. A channel group can only consist of either static members or LACP members. Once the type of channel group has been determined, other types of interfaces cannot join the channel group.

Use the **no** form of this command to remove the interface from the channel group. If the channel group has no member ports left after a port is removed, the channel group will be deleted automatically. A port channel can also be removed by using the **no interface port-channel** command.

If the security function is enabled on a port, this port cannot be specified as a channel group member.

### Example

This example shows how to assign ports 4 and 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 eth1/0/4-5
Switch(config-if)# channel-group 3 mode active
Switch(config-if)#
```

## 40-2 lacp port-priority

This command is used to configure the port priority. Use the **no** form of this command to revert the port priority to the default settings.

**lacp port-priority** *PRIORITY***no lacp port-priority**

## Parameters

<i>PRIORITY</i>	Specifies the port priority. The range is 1 to 65535.
-----------------	---

## Default

The default port-priority is 32768.

## Command Mode

Interface Configuration Mode.

## 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 ports 4 and 5.

```
Switch# configure terminal
Switch(config)# interface range eth1/0/4-1/0/5
Switch(config-if)# lacp port-priority 20000
Switch(config-if)#
```

## 40-3 lacp timeout

This command is used to configure the LACP long or short timer. Use the **no** form of this command to revert to the default setting.

**lacp timeout** {short | long}**no lacp timeout**

## Parameters

<b>short</b>	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.
<b>long</b>	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.

## Usage Guideline

This command is only available for physical port interface configuration.

## Example

This example shows how to configure the port LACP timeout to long mode on port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# lacp timeout long
Switch(config-if)#
```

---

## 40-4 lacp system-priority

This command is used to configure the system priority. Use the **no** form of this command to revert to the default setting.

```
lacp system-priority PRIORITY
no lacp system-priority
```

## Parameters

---

<i>PRIORITY</i>	Specifies the system priority. The range is 1 to 65535.
-----------------	---

---

## Default

The default LACP system-priority is 32768.

## Command Mode

Global Configuration Mode.

## 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)#
```

---

## 40-5 port-channel load-balance

This command is used to configure the load balance algorithm that the Switch uses to distribute packets across ports in the same channel. Use the **no** form of this command to revert to the default setting.

**port-channel load-balance {dst-ip | dst-mac | src-dst-ip | src-dst-mac | src-ip | src-mac}**  
**no port-channel load-balance**

## Parameters

<b>dst-ip</b>	Specifies that the Switch should examine the IP destination address.
<b>dst-mac</b>	Specifies that the Switch should examine the MAC destination address.
<b>src-dst-ip</b>	Specifies that the Switch should examine the IP source address and IP destination address.
<b>src-dst-mac</b>	Specifies that the Switch should examine the MAC source and MAC destination address.
<b>src-ip</b>	Specifies that the Switch should examine the IP source address.
<b>src-mac</b>	Specifies that the Switch should examine the MAC source address.

## Default

The default load balance algorithm is **src-dst-mac**.

## Command Mode

Global Configuration Mode.

## 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)#
```

## 40-6 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

<b>channel</b>	(Optional) Specifies to display information for the specified port-channels.
<i>CHANNEL-NO</i>	(Optional) Specifies the channel group ID.
<b>detail</b>	(Optional) Specifies to display detailed channel group information.
<b>neighbor</b>	(Optional) Specifies to display neighbor information.
<b>load-balance</b>	(Optional) Specifies to display the load balance information.
<b>sys-id</b>	(Optional) Specifies to display the system identifier that is being used by LACP.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

If no port-channel number is specified, all port channels will be displayed. If no parameter is specified with the **show channel-group** command, the summary information of the channel group 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 LACPDU      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 3

Member Ports: 2, Maxports = 8, Protocol: LACP

Port	Flags	LACP State	Port Priority	Port Number
eth1/0/4	FA	down	32768	0
eth1/0/5	FA	down	32768	0

```
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 LACPDU      F - Port is requesting fast LACPDU  
A - Port is in active mode                P - Port is in passive mode

Channel Group 3

Port	Partner System ID	Partner PortNo	Partner Flags	Partner Port_Pri
eth1/0/1	32768,00-12-50-28-00-02	4	FP	32768
eth1/0/2	32768,00-12-50-28-00-02	5	FP	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: 32768,3C-1E-04-A1-CC-00
```

```
Group          Protocol
```

```
-----
```

```
1              LACP
```

```
2              Static
```

```
Switch#
```

# 41. Link Layer Discovery Protocol (LLDP)

## Commands

### 41-1 clear lldp counters

This command is used to delete LLDP statistics.

```
clear lldp counters [all | interface INTERFACE-ID [, | -]]
```

#### Parameters

<b>all</b>	(Optional) Specifies to clear LLDP counter information for all interfaces and global LLDP statistics.
<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interface to clear LLDP counter information.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

#### Default

None.

#### Command Mode

Privileged EXEC Mode.

#### Usage Guideline

Use this command with the **interface** parameter to reset LLDP statistics of the specified interface(s). Use this command with the **all** parameter to clear global LLDP statistics and the LLDP statistics on all interfaces. If no parameter is specified, only the LLDP global counters will be cleared.

#### Example

This example shows how to clear all LLDP statistics.

```
Switch# clear lldp counters all
Switch#
```

### 41-2 clear lldp table

This command is used to delete LLDP information learned from neighboring devices.

```
clear lldp table {all | interface INTERFACE-ID [, | -]}
```

#### Parameters

<b>all</b>	Specifies to clear LLDP neighboring information for all interfaces.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies the interfaces to be cleared.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.

- 
- 
- (Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
- 
- 

## Default

None.

## Command Mode

Privileged EXEC Mode.

## Usage Guideline

Use this command with the **interface** parameter to clear information learned from neighboring devices on the specified interface(s). Use this command with the **all** parameter to clear all information learned from neighboring devices.

## Example

This example shows how to clear all neighboring information on all interfaces.

```
Switch# clear lldp table all
Switch#
```

## 41-3 lldp dot1-tlv-select

This command is used to specify which optional type-length-value settings (TLVs) in the IEEE 802.1 Organizational Specific TLV set will be transmitted and encapsulated in the LLDPDUs and sent to neighbor devices. Use the **no** form of this command to disable the transmission of TLVs.

```
lldp dot1-tlv-select {port-vlan | vlan-name [VLAN-ID [, | -]] | protocol-identity [PROTOCOL-NAME]}
no lldp dot1-tlv-select {port-vlan | vlan-name [VLAN-ID [, | -]] | protocol-identity [PROTOCOL-NAME]}
```

## Parameters

<b>port-vlan</b>	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 VLAN identifier (PVID) that will be associated with untagged or priority tagged frames.
<b>vlan-name</b>	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.
<i>VLAN-ID</i>	Specifies the ID of the VLAN in the VLAN name TLV. The VLAN ID range is 1 to 4094. 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.
,	(Optional) Specifies a series of VLANs or separates a range of VLANs from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.
<b>protocol-identity</b>	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.
<i>PROTOCOL-NAME</i>	(Optional) Specifies the protocol name here. The valid strings for PROTOCOL-NAME are: <ul style="list-style-type: none"> <li>• <b>eapol</b> - Extensible Authentication Protocol (EAP) over LAN</li> </ul>



- **lACP** - Link Aggregation Control Protocol
- **stp** - Spanning Tree Protocol

## Default

No IEEE 802.1 Organizationally Specific TLV is selected.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

This command is only available for physical port interface configuration. 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 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 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)#
```

## 41-4 lldp dot3-tlv-select

This command is used to specify which optional TLVs in the IEEE 802.3 Organizationally Specific TLV set will be encapsulated in the LLDPDUs and sent to neighbor devices. Use the **no** form of this command to disable the transmission of the TLVs.

```
lldp dot3-tlv-select [mac-phy-cfg | link-aggregation | power | max-frame-size]
```

```
no lldp dot3-tlv-select [mac-phy-cfg | link-aggregation | power | max-frame-size]
```

## Parameters

<b>mac-phy-cfg</b>	(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.
<b>link-aggregation</b>	(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.
<b>power</b>	(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.
<b>max-frame-size</b>	(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.

## Usage Guideline

This command is only available for physical port interface configuration.

Use this command to enable 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)#
```

## 41-5 lldp fast-count

This command is used to configure the LLDP-MED fast start repeat count option on the Switch. Use the **no** form of this command to revert to the default setting.

**lldp fast-count** *VALUE*

**no lldp fast-count**

## Parameters

<i>VALUE</i>	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.

## 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)#
```

## 41-6 lldp hold-multiplier

This command is used to configure the hold multiplier for LLDP updates on the Switch. Use the **no** form of this command to revert to the default setting.

**lldp hold-multiplier** *VALUE*

**no hold-multiplier**

## Parameters

<i>VALUE</i>	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.

## 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)#
```

## 41-7 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

<i>IP-ADDRESS</i>	(Optional) Specifies the IPv4 address that is carried in the management address TLV.
<i>IPV6-ADDRESS</i>	(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.

### Usage Guideline

This command is only available for physical port interface 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, the address will not be sent.

If no parameter is specified, 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, 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 advertised 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 configure the management IPv4 address on ports 1 to 3.

```
Switch# configure terminal
Switch(config)# interface range eth1/0/1-3
Switch(config-if-range)# lldp management-address 10.1.1.1
Switch(config-if-range)#
```

This example shows how to configure the management IPv6 address on ports 4 to 6.

```
Switch# configure terminal
Switch(config)# interface range eth1/0/4-6
Switch(config-if-range)# lldp management-address FE80::250:A2FF:FEBF:A056
Switch(config-if-range)#
```

This example shows how to remove the management IPv4 address from ports 1 to 3.

```
Switch# configure terminal
Switch(config)# interface range eth1/0/1-3
Switch(config-if-range)# no lldp management-address 10.1.1.1
Switch(config-if-range)#
```

This example shows how to remove the management IPv6 address from ports 4 to 6.

```
Switch# configure terminal
Switch(config)# interface range eth1/0/4-6
Switch(config-if-range)# no lldp management-address FE80::250:A2FF:FEBF:A056
Switch(config-if-range)#
```

This example shows how to remove all management IPv4/IPv6 addresses from port 5. No management address TLV will be sent from port 5.

```
Switch# configure terminal
Switch(config)# interface eth1/0/5
Switch(config-if)# no lldp management-address
Switch(config-if)#
```

## 41-8 lldp med-tlv-select

This command is used to specify which optional LLDP-MED TLV will be transmitted and encapsulated in the LLDPDUs and sent to neighbor devices. Use the **no** form of this command to disable the transmission of the TLVs.

**lldp med-tlv-select [capabilities | inventory-management | network-policy | power-management]**  
**no lldp med-tlv-select [capabilities | inventory-management | network-policy | power-management]**

### Parameters

<b>capabilities</b>	(Optional) Specifies to transmit the LLDP-MED capabilities TLV.
<b>inventory-management</b>	(Optional) Specifies to transmit the LLDP-MED inventory management TLV.
<b>network-policy</b>	(Optional) Specifies to transmit the LLDP-MED network policy TLV.
<b>power-management</b>	(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.

### Usage Guideline

This command is only available for physical port interface configuration.

Use this command 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 eth1/0/1
Switch(config-if)# lldp med-tlv-select capabilities
Switch(config-if)#
```

---

## 41-9 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.

### Usage Guideline

This command is only available for physical port interface configuration.

Use this command to enable a physical interface to receive LLDP messages. When LLDP is not running, the Switch does not receive LLDP messages.

## Example

This example shows how to enable a physical interface to receive LLDP messages.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# lldp receive
Switch(config-if)#
```

---

## 41-10 lldp reinit

This command is used to configure the minimum time of re-initialization the delay interval on the Switch. Use the **no** form of this command to revert to the default setting.

**lldp reinit SECONDS**

**no lldp reinit**

## Parameters

---

<i>SECONDS</i>	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.

## 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)#
```

---

## 41-11 lldp run

This command is used to enable LLDP globally. Use the **no** form of this command to revert to the default setting.

```
lldp run
no lldp run
```

## Parameters

None.

## Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## 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)#
```

---

## 41-12 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.

### 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)#
```

---

## 41-13 lldp tlv-select

This command is used to select the TLVs in the 802.1AB basic management set, will be transmitted and encapsulated in the LLDPDUs, and sent to neighbor devices. Use the **no** form of this command to disable this option.

**lldp tlv-select [port-description | system-capabilities | system-description | system-name]**  
**no lldp tlv-select [port-description | system-capabilities | system-description | system-name]**

### Parameters

---

<b>port-description</b>	(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.
-------------------------	---

---



<b>system-capabilities</b>	(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.
<b>system-description</b>	(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.
<b>system-name</b>	(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.

## Usage Guideline

This command is only available for physical port interface configuration.

Use this command 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 eth1/0/1
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 eth1/0/1
Switch(config-if)# lldp tlv-select system-name
Switch(config-if)#
```

## 41-14 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.

## Usage Guideline

This command is only available for physical port interface configuration.

Use this command to enable LLDP transmission on a physical interface. When LLDP is not running, the Switch does not transmit LLDP messages.

## Example

This example shows how to enable LLDP transmission.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# lldp transmit
Switch(config-if)#
```

---

## 41-15 lldp tx-delay

This command is used to configure the transmission delay timer. This delay timer defines the minimum interval between the sending of LLDP messages due to constantly changing MIB content. Use the **no** form of this command to revert to the default setting.

```
lldp tx-delay SECONDS
no lldp tx-delay
```

## Parameters

---

<i>SECONDS</i>	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.

## 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)#
```

## 41-16 lldp tx-interval

This command is used to configure the LLDPDU transmission interval on the Switch. Use the **no** form of this command to revert to the default setting.

**lldp tx-interval** *SECONDS*

**no lldp tx-interval**

### Parameters

---

<i>SECONDS</i>	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.

### 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)#
```

## 41-17 snmp-server enable traps lldp

This command is used to enable the sending of SNMP notifications for LLDP and LLDP-MED. Use the **no** form of this command to disable this feature.

**snmp-server enable traps lldp** [*med*]

**no snmp-server enable traps lldp** [*med*]

### Parameters

---

<i>med</i>	(Optional) Specifies to enable the LLDP-MED trap state.
------------	---

---

### Default

The LLDP and LLDP-MED trap states are disabled.

### Command Mode

Global Configuration Mode.

## 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)#
```

---

## 41-18 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 this command to disable the sending.

**lldp [med] notification enable**

**no lldp [med] notification enable**

## Parameters

---

<b>med</b>	(Optional) Specifies to enable the LLDP-MED notification state.
------------	---

---

## Default

The LLDP and LLDP-MED notification states are disabled.

## Command Mode

Interface Configuration Mode.

## 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 from port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# lldp med notification enable
Switch(config-if)#
```

---

## 41-19 lldp subtype

This command is used to configure the subtype of LLDP TLV(s).

---

**lldp subtype port-id {mac-address | local}****Parameters**

<b>port-id</b>	Specifies the subtype of the port ID TLV.
<b>mac-address</b>	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.
<b>local</b>	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.

**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 eth1/0/1
Switch(config-if)# lldp subtype port-id mac-address
Switch(config-if)#
```

---

**41-20 show lldp**

This command is used to display the general LLDP configuration of the Switch.

**show lldp**

**Parameters**

None.

**Default**

None.

**Command Mode**

User/Privileged EXEC Mode.

**Usage Guideline**

Use this command to display the global LLDP configuration of the Switch.

## Example

This example shows how to display the global LLDP configuration of the Switch.

```
Switch#show lldp

LLDP System Information
  Chassis ID Subtype      : MAC Address
  Chassis ID              : F0-7D-68-12-50-01
  System Name             : Switch
  System Description      : Gigabit Ethernet Smart Managed Switch
  System Capabilities Supported: Repeater, Bridge
  System Capabilities Enabled  : Repeater, Bridge
LLDP-MED System Information:
  Device Class            : Network Connectivity Device
  Hardware Revision       : A1
  Software Revision       : 2.03.001
  Serial Number           : DGS1250102030
  Manufacturer Name       : D-Link Corporation
  Model Name              : DGS-1250-28XMP Gigabit Ethernet
  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
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

## 41-21 show lldp interface

This command is used to display the LLDP configuration at the physical interface.

```
show lldp interface INTERFACE-ID [, | -]
```

### Parameters

<i>INTERFACE-ID</i>	Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

This command is only available for physical port interface configuration.

Use this command to display the LLDP information of each physical interface.

## Example

This example shows how to display the LLDP configuration on port 1.

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

Port ID: eth1/0/1
-----
Port ID                               :eth1/0/1
Admin Status                           :TX and RX
Notification                            :Disabled
Basic Management TLVs:
  Port Description                       :Disabled
  System Name                            :Disabled
  System Description                     :Disabled
  System Capabilities                    :Disabled
  Enabled Management Address:
    (None)
IEEE 802.1 Organizationally Specific TLVs:
  Port VLAN ID                           :Disabled
  Enabled VLAN Name
    (None)
  Enabled Protocol_Identity
    (None)
IEEE 802.3 Organizationally Specific TLVs:
  MAC/PHY Configuration/Status           :Disabled
  Power Via MDI                           :Disabled
  Link Aggregation                        :Disabled
  Maximum Frame Size                      :Disabled
LLDP-MED Organizationally Specific TLVs:
  LLDP-MED Capabilities TLV              :Disabled
  LLDP-MED Network Policy TLV            :Disabled
  LLDP-MED Extended Power Via MDI PSE TLV :Disabled
  LLDP-MED Inventory TLV                 :Disabled

Switch#
```

## Display Parameters

<b>Enabled Management Address</b>	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.
<b>Enabled VLAN Name</b>	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)”.
<b>Enabled Protocol Identity</b>	Displays the enabled protocol string for protocol identity TLVs. If there is no enabled protocol for protocol identity TLVs, the string is “(None)”.

## 41-22 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

<i>INTERFACE-ID</i>	Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>brief</b>	(Optional) Specifies to display the information in brief mode.
<b>detail</b>	(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

User/Privileged EXEC Mode.

### Usage Guideline

This command is only available for physical port interface configuration.

Use this command to display 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 eth1/0/1 detail

Port ID: eth1/0/1
-----
Port ID Subtype           : Local
Port ID                   : eth1/0/1
Port Description          : D-Link Corporation DGS-1250-28XMP
                          HW A1 firmware 2.03.001 Port 1
Port PVID                 : 1
Management Address 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 : 0000(hex)

Power Via MDI             :

CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

This example shows how to display the local information of port 1 in normal mode.

```
Switch#show lldp local interface eth1/0/1

Port ID: eth1/0/1
-----
Port ID Subtype           : Local
Port ID                   : eth1/0/1
Port Description          : D-Link Corporation DGS-1250-28XMP
                          HW A1 firmware 2.03.001 Port 1
Port PVID                 : 1
Management Address 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 eth1/0/1 brief

Port ID: eth1/0/1
-----
Port ID Subtype           : Local
Port ID                   : eth1/0/1
Port Description          : D-Link Corporation DGS-1250-28XMP
                          HW A1 firmware 2.03.001 Port 1

Switch#
```

---

## 41-23 show lldp management-address

This command is used to display the management address information.

**show lldp management-address** [*IP-ADDRESS* | *IPV6-ADDRESS*]

### Parameters

---

<i>IP-ADDRESS</i>	(Optional) Specifies to display the LLDP management information for a specific IPv4 address.
<i>IPV6-ADDRESS</i>	(Optional) Specifies to display the LLDP management information for a specific IPv6 address.

---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command 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              : 1.3.6.1.4.1.171.10.165.2.1
Advertising Ports : -

Address 2 :
-----
Subtype           : IPv4
Address           : 10.90.90.90
IF Type          : IfIndex
OID              : 1.3.6.1.4.1.171.10.165.2.1
Advertising Ports : -

Total Entries : 2

Switch#
```

## 41-24 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

<i>INTERFACE-ID</i>	Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>brief</b>	(Optional) Specifies to display the information in brief mode.
<b>detail</b>	(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

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the information learned from the neighbor devices.

## Example

This example shows how to display detailed LLDP information about neighboring devices connected to port 9.

```
Switch# show lldp neighbors interface eth1/0/9 detail

Port ID: eth1/0/9
-----
Remote Entities Count : 1
Entity 1
  Chassis ID Subtype      : MAC Address
  Chassis ID              : F0-7D-68-30-36-00
  Port ID Subtype        : Local
  Port ID                 : eth1/0/10
  Port Description       :
  System Name            :
  System Description     :
  System Capabilities    :
  Management Address Count : 0
                        (None)

  Port PVID              : 0
  PPVID Entries Count   : 0
                        (None)

  VLAN Name Entries Count : 0
                        (None)

  Protocol ID Entries Count : 0
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

This example shows how to display normal LLDP information about neighboring devices connected to port 9.

```
Switch# show lldp neighbors interface eth1/0/9

Port ID: eth1/0/9
-----
Remote Entities Count : 1
Entity 1
  Chassis ID Subtype      : MAC Address
  Chassis ID              : F0-7D-68-30-36-00
  Port ID Subtype        : Local
  Port ID                 : eth1/0/10
  Port Description       :
  System Name            :
  System Description     :
  System Capabilities    :
  Management Address Count : 0
  Port PVID              : 0
  PPVID Entries Count    : 0
  VLAN Name Entries Count : 0
  Protocol ID Entries Count : 0
  MAC/PHY Configuration/Status : (None)
  Power Via MDI          : (None)
  Link Aggregation       : (None)
  Maximum Frame Size     : 0
  LLDP-MED capabilities  : (See Detail)
  Extended power via MDI : (See Detail)
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

This example shows how to display brief LLDP information about neighboring devices connected to port 9.

```
Switch# show lldp neighbors interface eth1/0/9 brief

Port ID: eth1/0/9
-----
Remote Entities Count : 1
Entity 1
  Chassis ID Subtype      : MAC Address
  Chassis ID              : F0-7D-68-30-36-00
  Port ID Subtype        : Local
  Port ID                 : eth1/0/10
  Port Description       :

Switch#
```

## 41-25 show lldp traffic

This command is used to display the global LLDP traffic information of the Switch.

```
show lldp traffic
```

### Parameters

None.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display 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   : 0D2H6M40S
Total Inserts      : 1
Total Deletes      : 0
Total Drops        : 0
Total Ageouts      : 0

Switch#
```

## Display Parameters

<b>Last Change Time</b>	The amount of time since the last update to the remote table in days, hours, minutes, and seconds.
<b>Total Inserts</b>	Total number of inserts to the remote data table.
<b>Total Deletes</b>	Total number of deletes from the remote data table.
<b>Total Drops</b>	Total number of times the complete remote data received was not inserted due to insufficient resources.
<b>Total Ageouts</b>	Total number of times a complete remote data entry was deleted because the Time to Live interval expired.

## 41-26 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

<i>INTERFACE-ID</i>	Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display LLDP traffic on each physical interface.

## Example

This example shows how to display statistics information of port 1.

```
Switch# show lldp traffic interface eth1/0/1
```

```
Port ID : eth1/0/1
```

```
-----
Total Transmits      : 0
Total Discards       : 0
Total Errors         : 0
Total Receives       : 0
Total TLV Discards   : 0
Total TLV Unknowns   : 0
Total Ageouts        : 0
```

```
Switch#
```

## Display Parameters

<b>Total Transmits</b>	The total number of LLDP packets transmitted on the port.
<b>Total Discards</b>	The total number of LLDP frames discarded on the port for any reason.
<b>Total Errors</b>	The number of invalid LLDP frames received on the port.
<b>Total Receives</b>	The total number of LLDP packets received on the port.
<b>Total TLV Discards</b>	The number of TLVs discarded.
<b>Total TLV Unknowns</b>	The total number of LLDP TLVs received on the port where the type value is in the reserved range, and not recognized.
<b>Total Ageouts</b>	The total number of times a complete remote data entry was deleted for the port because the Time to Live interval expired.

## 42. Loopback Detection (LBD) Commands

### 42-1 loopback-detection (Global)

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

**loopback-detection [mode {port-based | vlan-based}]**

**no loopback-detection [mode]**

#### Parameters

<b>mode</b>	(Optional) Specifies the detection mode.
<b>port-based</b>	(Optional) Specifies that the loop detection will work in the port-based mode.
<b>vlan-based</b>	(Optional) 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.

#### 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)#
```

---

## 42-2 loopback-detection (Interface)

This command is used to enable the loopback detection function for an interface. Use the **no** form of this command to disable the function for an interface.

**loopback-detection**  
**no loopback-detection**

### Parameters

None.

### Default

By default, this option is disabled.

### Command Mode

Interface Configuration Mode.

### Usage Guideline

This command is only available for physical port and port-channel interface configuration. Use this command to enable or disable the loopback detection function on an interface.

## Example

This example shows how to enable the loopback detection function on port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# loopback-detection
Switch(config-if)#
```

---

## 42-3 loopback-detection interval

This command is used to configure the timer interval. Use the **no** form of this command to revert to the default setting.

**loopback-detection interval SECONDS**  
**no loopback-detection interval**

## Parameters

<i>SECONDS</i>	Specifies the interval in seconds at which LBD packets are transmitted. The valid range is from 1 to 32767.
----------------	---

## Default

By default, this value is 10 seconds.

## Command Mode

Global Configuration Mode.

## 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)#
```

## 42-4 loopback-detection vlan

This command is used to configure the VLANs to be enabled for loopback detection. Use the **no** form of this command to revert to the default setting.

```
loopback-detection vlan VLAN-LIST
no loopback-detection vlan VLAN-LIST
```

## Parameters

<i>VLAN-LIST</i>	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.

## 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.

By default, 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)#
```

---

## 42-5 show loopback-detection

This command is used to display the current loopback detection control settings..

**show loopback-detection** [**interface** *INTERFACE-ID* [, | -]]

### Parameters

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the loopback detection setting and status.

## Example

This example shows how to display the current loopback detection settings and status.

```
Switch# show loopback-detection
```

```

Loop Detection      : Enabled
Detection Mode     : port-based
LBD enabled VLAN   : all VLANs
Interval           : 10 seconds
Function Version    : v4.05

Interface          State      Result      Time Left (sec)
-----
eth1/0/1           Disabled  Normal      -
eth1/0/2           Disabled  Normal      -
eth1/0/3           Disabled  Normal      -
eth1/0/4           Disabled  Normal      -
eth1/0/5           Disabled  Normal      -
eth1/0/6           Disabled  Normal      -
eth1/0/7           Disabled  Normal      -
eth1/0/8           Disabled  Normal      -
eth1/0/9           Disabled  Normal      -
eth1/0/10          Disabled  Normal      -
eth1/0/11          Disabled  Normal      -
eth1/0/12          Disabled  Normal      -
eth1/0/13          Disabled  Normal      -
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All

```

This example shows how to display the loopback detection status for port 1.

```
Switch# show loopback-detection interface eth1/0/1
```

```

Interface          State      Result      Time Left (sec)
-----
eth1/0/1           Disabled  Normal      -

Switch#

```

## Display Parameters

<b>Interface</b>	Indicates the port that has loopback detection enabled.
<b>Status</b>	Indicates the function state on the port.
<b>Result</b>	Indicates whether a loop is detected.
<b>Time Left</b>	The remaining time before being auto-recovered.

## 42-6 snmp-server enable traps loopback-detection

This command is used to enable the sending of SNMP notifications for loopback detection. Use the **no** form of this command to revert to the default setting.

```
snmp-server enable traps loopback-detection
```

```
no snmp-server enable traps loopback-detection
```

## Parameters

None.

## Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enable or disable the sending of SNMP notifications for loopback detection.

## Example

This example shows how to enable the sending of SNMP notifications for loopback detection.

```
Switch# configure terminal
Switch(config)# snmp-server enable traps loopback-detection.
Switch(config)#
```

## 43. MAC Authentication Commands

### 43-1 mac-auth system-auth-control

This command is used to enable MAC authentication globally. Use the **no** form of this command to disable the MAC authentication globally.

```
mac-auth system-auth-control
no mac-auth system-auth-control
```

#### Parameters

None.

#### Default

By default, this option is disabled.

#### Command Mode

Global Configuration Mode.

#### Usage Guideline

MAC authentication is a feature designed to authenticate a user by MAC address when the user is trying to access the network via the Switch. The Switch itself can perform the authentication based on a local database or be a RADIUS client and perform the authentication process via the RADIUS protocol with a remote RADIUS server.

#### Example

This example shows how to enable MAC authentication globally.

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

---

### 43-2 mac-auth enable

This command is used to enable MAC authentication on the specified interface. Use the **no** form of this command to disable MAC authentication.

```
mac-auth enable
no mac-auth enable
```

#### Parameters

None.

#### Default

By default, this option is disabled.

#### Command Mode

Interface Configuration Mode.

## Usage Guideline

This command is only available for physical port interface configuration. It can be used to enable MAC authentication on the specified interface.

In addition, MAC authentication has the following limitations:

- The MAC authentication port cannot be enabled when port security is enabled on the port.
- The MAC authentication port cannot be enabled when IP-MAC-Port-Binding is enabled on the port.
- The MAC authentication port cannot be enabled on a link aggregation port.

## Example

This example shows how to enable MAC authentication on port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# mac-auth enable
Switch(config-if)#
```

## 43-3 mac-auth password

This command is used to configure the password of authentication for local and RADIUS authentication. Use the **no** form of this command to revert to the default setting.

**mac-auth password [0 | 7] STRING**

**no mac-auth password**

### Parameters

<b>0</b>	(Optional) Specifies the password in the clear text form. If neither 0 nor 7 are specified, the default form will be clear text.
<b>7</b>	(Optional) Specifies the password in the encrypted form. If neither 0 nor 7 are specified, the default form will be clear text.
<b>password STRING</b>	Specifies to set the password for MAC authentication. If in the clear text form, the length of the string cannot be over 16 characters.

### Default

By default, the password is the client's MAC address.

### Command Mode

Global Configuration Mode.

### Usage Guideline

This command is used to configure the password used in the authentication of MAC address users. If the command is not configured, the password for authentication of the MAC address user is formatted based on the MAC address. The MAC addresses format can be configured with the **authentication username mac-format** command.

## Example

This example shows how to configure the password for MAC authentication.

```
Switch# configure terminal
Switch(config)# mac-auth password newpass
Switch(config)#
```

---

## 43-4 mac-auth username

This command is used to configure the username for local and RADIUS authentication. Use the **no** form of this command to revert to the default setting.

**mac-auth username** *STRING*  
**no mac-auth username**

### Parameters

---

<i>STRING</i>	Specifies the username for MAC authentication. The length of the string cannot be over 16 characters.
---------------	---

---

### Default

By default, the username is the client's MAC address.

### Command Mode

Global Configuration Mode,

### Usage Guideline

This command is used to configure the username to authenticate MAC address users. The username is used to authenticate via both the local database and remote servers. If the command is not configured, the username for authentication is formatted based on the MAC address.

## Example

This example shows how to configure the username for MAC authentication.

```
Switch# configure terminal
Switch(config)# mac-auth username user1
Switch(config)#
```

---

## 43-5 snmp-server enable traps mac-auth

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

**snmp-server enable traps mac-auth**  
**no snmp-server enable traps mac-auth**

### Parameters

None.



## Default

By default, this feature is disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

None.

## Example

This example shows how to enable the sending of traps for MAC authentication.

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

## 44. Mirror Commands

### 44-1 monitor session destination interface

This command is used to configure the destination interface for a port monitor session, allowing packets on source ports to be monitored via a destination port. Use the **no** form of this command to delete a port monitor session or remove the destination interface of the session.

```
monitor session SESSION-NUMBER destination interface INTERFACE-ID
no monitor session SESSION-NUMBER destination interface INTERFACE-ID
no monitor session SESSION-NUMBER
```

#### Parameters

<b>session</b> SESSION-NUMBER	Specifies the session number for the port monitor session. The valid number is 1.
<b>interface</b> INTERFACE-ID	Specifies the destination interface for the port monitor session.

#### Default

None.

#### Command Mode

Global Configuration Mode.

#### 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 the physical port 1 as the destination port and three physical source ports 2 to 4 as monitor source ports.

```
Switch# configure terminal
Switch(config)# monitor session 1 destination interface eth1/0/1
Switch(config)# monitor session 1 source interface eth1/0/2-4
Switch(config)#
```

### 44-2 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

<b>session</b> <i>SESSION-NUMBER</i>	Specifies the session number for the port monitor session. The valid number is 1.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies the source interface for a port monitor session.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>both</b>	(Optional) Specifies to monitor the packets transmitted and received on the port.
<b>rx</b>	(Optional) Specifies to monitor the packets received on the port.
<b>tx</b>	(Optional) Specifies to monitor the packets transmitted on the port without forwarding, which means regardless of the port's STG status.

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Both physical ports and port channels are valid as source interfaces of monitor sessions.

For a monitor session, multiple source interfaces can be specified, but only one destination interface can be specified. An interface cannot be a source interface of one session and destination port of another session simultaneously. An interface can be configured as destination interface of multiple sessions, but it can be a source interface of only one session.

If the direction is not specified, both TX (transmitted) and RX (received) traffic are monitored.

## Example

This example shows how to create a port monitor session with session number 1. It assigns the physical port 1 as the destination port and three source physical ports 2 to 4 as monitor source ports.

```
Switch# configure terminal
Switch(config)# monitor session 1 destination interface eth1/0/1
Switch(config)# monitor session 1 source interface eth1/0/2-4
Switch(config)#
```

## 44-3 show monitor session

This command is used to display all or a specific port mirroring session.

```
show monitor session [SESSION-NUMBER]
```

## Parameters

<i>SESSION-NUMBER</i>	(Optional) Specifies the session number to be displayed. The value is 1.
-----------------------	--

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

If no parameter is specified, all monitor sessions will be 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#
```

---

# 45. Multicast Listener Discovery (MLD) Snooping Commands

## 45-1 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

<b>all</b>	Specifies to clear IPv6 MLD snooping statistics for all VLANs and all ports.
<b>vlan</b> <i>VLAN-ID</i>	Specifies the VLAN to be used.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies the interface to be used.

### Default

None.

### Command Mode

Privileged EXEC Mode.

### Usage Guideline

Use this command 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#
```

## 45-2 ipv6 mld snooping

This command is used to enable MLD snooping. Use the **no** form of this command to disable MLD snooping.

```
ipv6 mld snooping
no ipv6 mld snooping
```

### Parameters

None.

### Default

MLD snooping is disabled on all VLANs.

The MLD snooping global state is disabled by default.

### Command Mode

VLAN Configuration Mode.

Global Configuration Mode.

## Usage Guideline

For a VLAN to operate with MLD snooping, both the global state and the VLAN 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)#
```

---

## 45-3 ipv6 mld snooping fast-leave

This command is used to configure MLD snooping fast-leave on a VLAN. Use the **no** form of this command to disable the fast-leave option on the specified VLAN.

```
ipv6 mld snooping fast-leave
no ipv6 mld snooping fast-leave
```

### Parameters

None.

### Default

By default, this option is disabled.

### Command Mode

VLAN Configuration Mode.

## Usage Guideline

This command is only available for VLAN configuration.

Use this command to allow 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)#
```

## 45-4 ipv6 mld snooping last-listener-query-interval

This command is used to configure the interval at which the MLD snooping querier sends MLD group-specific or group-source-specific (channel) query messages. Use the **no** form of this command to revert to the default setting.

**ipv6 mld snooping last-listener-query-interval** *SECONDS*

**no ipv6 mld snooping last-listener-query-interval**

### Parameters

<i>SECONDS</i>	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

VLAN Configuration Mode.

### Usage Guideline

This command is only available for VLAN 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)#
```

## 45-5 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 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

<b>interface</b>	Specifies a range of interfaces as being connected to multicast-enabled routers.
<b>forbidden interface</b>	Specifies a range of interfaces as being not connected to multicast-enabled routers.
<i>INTERFACE-ID</i>	Specifies the interfaces to be displayed. Only physical port and port-channel interfaces are allowed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>learn pimv6</b>	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

VLAN Configuration Mode.

## Usage Guideline

To specify a multicast router port, the valid interface can be a physical port or a port-channel. 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 port 1 as an MLD snooping multicast router port and port 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 eth1/0/1
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)#
```



## 45-6 ipv6 mld snooping querier

This command is used to enable the MLD snooping querier on the Switch. Use the **no** form of this command to disable the MLD snooping querier function.

```
ipv6 mld snooping querier
no ipv6 mld snooping querier
```

### Parameters

None.

### Default

By default, this option is disabled.

### Command Mode

VLAN Configuration Mode.

### Usage Guideline

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)#
```

## 45-7 ipv6 mld snooping query-interval

This command is used to configure the interval at which the MLD snooping querier sends MLD general query messages periodically. Use the **no** form of this command to revert to the default setting.

```
ipv6 mld snooping query-interval SECONDS
no ipv6 mld snooping query-interval
```

### Parameters

---

<i>SECONDS</i>	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

VLAN Configuration Mode.

## Usage Guideline

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)#
```

## 45-8 ipv6 mld snooping query-max-response-time

This command is used to configure the maximum response time advertised in MLD snooping queries. Use the **no** form of this command to revert to the default setting.

**ipv6 mld snooping query-max-response-time SECONDS**

**no ipv6 mld snooping query-max-response-time**

## Parameters

<i>SECONDS</i>	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

VLAN Configuration Mode.

## Usage Guideline

Use this command to configure 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)#
```

## 45-9 ipv6 mld snooping query-version

This command is used to configure the general query packet version sent by the MLD snooping querier. Use the **no** form of this command to revert to the default setting.

**ipv6 mld snooping query-version** *NUMBER*

**no ipv6 mld snooping query-version**

## Parameters

<i>NUMBER</i>	Specifies that the version of the MLD general query sent by MLD snooping querier. The value is 1 and 2.
---------------	---

## Default

By default, this version number is 2.

## Command Mode

VLAN Configuration Mode.

## Usage Guideline

Use this command to configure the general query packet version sent by the MLD snooping querier.

## 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)#
```

## 45-10 ipv6 mld snooping robustness-variable

This command is used to set the robustness variable used in MLD snooping. Use the **no** form of this command to revert to the default value.

**ipv6 mld snooping robustness-variable** *VALUE*

**no ipv6 mld snooping robustness-variable**

## Parameters

<i>VALUE</i>	Specifies the robustness variable. The range is from 1 to 7.
--------------	--

## Default

By default, this value is 2.

## Command Mode

VLAN Configuration Mode.

## Usage Guideline

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 VLAN 1000.

```
Switch# configure terminal
Switch(config)# vlan 1000
Switch(config-vlan)# ipv6 mld snooping robustness-variable 3
Switch(config-vlan)#
```

## 45-11 ipv6 mld snooping static-group

This command is used to configure an MLD snooping static group. Use the **no** form of this command to delete a static group.

```
ipv6 mld snooping static-group IPV6-ADDRESS interface INTERFACE-ID [, | -]
no ipv6 mld snooping static-group IPV6-ADDRESS [interface INTERFACE-ID [, | -]]
```

### Parameters

<i>IPV6-ADDRESS</i>	Specifies an IPv6 multicast group address.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies the interfaces to be configured.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

By default, no static-group is configured.

### Command Mode

VLAN Configuration Mode.

### Usage Guideline

This command applies to MLD snooping on a VLAN to statically add group membership entries.

Use this command 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 eth1/0/5
Switch(config-vlan)#
```

---

## 45-12 ipv6 mld snooping minimum-version

This command is used to configure the minimum version of MLD hosts which MLD that is allowed on a VLAN. Use the **no** form of this command to remove the restriction from the VLAN.

```
ipv6 mld snooping minimum-version 2
no ipv6 mld snooping minimum-version
```

### Parameters

None.

### Default

No limit on minimum version.

### Command Mode

VLAN Configuration Mode.

### Usage Guideline

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)#
```

---

## 45-13 show ipv6 mld snooping

This command is used to display MLD snooping information on the Switch.

```
show ipv6 mld snooping [vlan VLAN-ID]
```

### Parameters

---

<b>vlan</b> <i>VLAN-ID</i>	(Optional) Specifies the VLAN to be displayed.
----------------------------	--

---

### Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

If no parameter is specified, MLD snooping information for all VLANs on which MLD snooping are enabled will be displayed.

## Example

This example shows how to display MLD snooping information.

```
Switch# show ipv6 mld snooping

MLD snooping global state: Enabled

VLAN #1 configuration
  MLD snooping state           : Enabled
  Minimum version              : v1
  Fast leave                   : Disabled (port-based)
  Mrouter port learning        : Enabled
  Querier state                : Disabled
  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#
```

## 45-14 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

<i>IPv6-ADDRESS</i>	(Optional) Specifies the group IPv6 address. If no IPv6 address is specified, all MLD group information will be displayed.
<b>vlan</b> <i>VLAN-ID</i>	(Optional) Specifies the VLAN. If no interface is specified, MLD group information about all interfaces will be displayed.

### Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display MLD group information.

## Example

This example shows how to display MLD 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	1/0/7
1	FF1E::3	*	EX	258	1/0/7
1	FF1E::4	3620:110:1::3a2b	IN	258	1/0/7

```
Total Entries: 3
```

```
Switch#
```

## Display Parameters

<b>FM</b>	The value of the Filter Mode (FM) can be either IN (Include) or EX (Exclude). <ul style="list-style-type: none"> <li><b>EX</b> - The filter mode is Exclude.</li> <li><b>IN</b> - The filter mode is Include.</li> </ul>
<b>Exp (sec)</b>	Specifies the Expire Time (Exp) in seconds before the entry expires.

## 45-15 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

<b>vlan VLAN-ID</b>	(Optional) Specifies the VLAN to be displayed.
---------------------	--

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display dynamically learned or manually configured multicast router interfaces. If no parameter is specified, MLD snooping Multicast Router Information on all VLANs will be displayed.

## Example

This example shows how to display MLD snooping multicast router information.

```
Switch# show ipv6 mld snooping mrouter
```

```

VLAN    Ports
-----
1       1/0/3, 1/0/4 (static)
        1/0/6 (forbidden)
        1/0/7 (dynamic)

3       1/0/8 (static)
        1/0/9 (dynamic)

Total Entries: 2

Switch#

```

## 45-16 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

<i>GROUP-ADDRESS</i>	(Optional) Specifies the group IPv6 address to be displayed.
<b>vlan</b> <i>VLAN-ID</i>	Optional) Specifies the VLAN ID to be displayed.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display 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#

```



## 45-17 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

<b>interface</b>	Specifies to display statistics counters by interface.
<i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
<b>vlan</b>	Specifies to display statistics counters by VLAN.
<i>VLAN-ID</i>	(Optional) Specifies the VLAN ID to be displayed.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the MLD snooping related statistics information.

### Example

This example shows how to display MLD snooping statistics information on port 4.

```
Switch# show ipv6 mld snooping statistics interface eth1/0/4

Interface eth1/0/4
  Rx: v1Report 0, v2Report 0, Query 0, v1Done 0
  Tx: v1Report 0, v2Report 0, Query 0, v1Done 0

Total Entries: 1

Switch#
```

This example shows how to display MLD snooping statistics information of VLAN 1.

```
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#
```

## 46. Multiple Spanning Tree Protocol (MSTP) Commands

### 46-1 instance

This command is used to map VLANs to an MST instance. Use the **no instance** *INSTANCE-ID* command to remove the specified MST instance. Use the **no instance** *INSTANCE-ID* **vlan** *VLAN-ID* [, | -] command to return the VLANs to the default instance (CIST).

```
instance INSTANCE-ID vlan VLAN-ID [, | -]
no instance INSTANCE-ID [vlan VLAN-ID [, | -]]
```

#### Parameters

<i>INSTANCE-ID</i>	Specifies the MSTP instance identifier to which the specified VLANs are mapped. This value must be between 1 and 32.
<b>vlan</b> <i>VLAN-ID</i>	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 VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.

#### Default

None.

#### Command Mode

MST Configuration Mode.

#### Usage Guideline

Any unmapped VLAN is mapped to the CIST instance. When mapping the VLANs to an instance, if the instance does not 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 vlan 1-100
Switch(config-mst)#
```

### 46-2 name

This command is used to configure the name of an MST region. Use the **no** form of this command to revert to the default setting.

```
name NAME
no name NAME
```

## Parameters

<i>NAME</i>	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 MAC address of the Switch.

## Command Mode

MST Configuration Mode.

## 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)#
```

## 46-3 revision

This command is used to configure the revision number for the MST configuration. Use the **no** form of this command to revert to the default setting.

**revision** *VERSION*

**no revision**

## Parameters

<i>VERSION</i>	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.

## 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)#
```

## 46-4 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

<b>configuration</b>	(Optional) Specifies the MST configuration of the equipment.
<b>digest</b>	(Optional) Specifies to display the MD5 digest included in the current MST configuration identifier (MSTCI).
<b>instance</b> <i>INSTANCE-ID</i>	(Optional) Specifies the instance number to be displayed.
,	(Optional) Specifies a series of instances or separates a range of instances from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of instances. No space is allowed before or after the hyphen.
<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interface ID to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the 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: Enabled,protocol: MSTP
Number of MST instances: 1

>>>MST00 vlans mapped : 1-4094
Bridge address: 00-50-40-3C-75-B0, priority: 32768 (32768 sysid 0)
Designated root address: 00-12-50-28-00-02, priority: 32768 (32768 sysid 0)
CIST external root cost : 0
Regional root bridge address: 00-12-50-28-00-02, priority: 32768 (32768 sysid 0)
CIST internal root cost : 20000
Designated bridge address: 00-12-50-28-00-02, priority: 32768 (32768 sysid 0)
Topology changes count: 2

eth1/0/1
  Port state: forwarding
  Port role: root
  Port info : port id 128.1, priority: 128, cost: 20000
  Designated root address: 00-12-50-28-00-02, priority: 32768
  Regional root address: 00-12-50-28-00-02, priority: 32768
  Designated bridge address: 00-12-50-28-00-02, priority: 32768, port id: 128.1

eth1/0/2
  Port state: blocking
  Port role: alternate
  Port info : port id 128.2, priority: 128, cost: 20000
  Designated root address: 00-12-50-28-00-02, priority: 32768
  Regional root address: 00-12-50-28-00-02, priority: 32768
  Designated bridge address: 00-12-50-28-00-02, priority: 32768, port id: 128.2

Switch#
```

This example shows how to display MSTP detailed information of port 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: edge, operation status: non-edge
  Bpdu statistic counter: sent: 5, received: 5624

>>>MST instance: 00, vlans mapped : 1-4094
  Port state: forwarding
  Port role: root
  Port info : port id 128.1, priority: 128, cost: 20000
  Designated root address: 00-12-50-28-00-02, priority: 32768
  Regional root address: 00-12-50-28-00-02, priority: 32768
  Designated bridge address: 00-12-50-28-00-02, priority: 32768, port id: 128.1

Switch#
```

This example shows how to display MSTP summary information.

```
Switch#show spanning-tree mst

Spanning tree: Enabled,protocol: MSTP
Number of MST instances: 1

>>>MST00 vlans mapped : 1-4094
Bridge address: 00-50-40-3C-75-B0, priority: 32768 (32768 sysid 0)
Designated root address: 00-12-50-28-00-02, priority: 32768 (32768 sysid 0)
CIST external root cost : 0
Regional root bridge address: 00-12-50-28-00-02, priority: 32768 (32768 sysid 0)
CIST internal root cost : 20000
Designated bridge address: 00-12-50-28-00-02, priority: 32768 (32768 sysid 0)
Topology changes count: 2

Interface      Role      State      Cost      Priority Link
-----      ----      -
eth1/0/1      root      forwarding 20000     128.1   p2p   non-edge
eth1/0/2      alternate blocking 20000     128.2   p2p   non-edge

Switch#
```

This example shows how to display MSTP summary information of ports 3 to 4.

```
Switch#show spanning-tree mst interface eth1/0/3-4

eth1/0/3
Configured link type: auto, operation status: point-to-point
Configured fast-forwarding: edge, operation status: non-edge
Bpdu statistic counter: sent: 5, received: 51

Instance Role      State      Cost      Priority
-----      ----      -
MST00      root      forwarding 20000     128.3
MST01      root      forwarding 20000     128.3

eth1/0/4
Configured link type: auto, operation status: point-to-point
Configured fast-forwarding: edge, operation status: non-edge
Bpdu statistic counter: sent: 4, received: 48

Instance Role      State      Cost      Priority
-----      ----      -
MST00      alternate blocking 20000     128.4
MST01      alternate blocking 20000     128.4

Switch#
```

This example shows how to display MSTP summary information of ports 3 to 4 with instance 2.

```
Switch#show spanning-tree mst instance 2 interface eth1/0/3-4

>>>>MST02 vlans mapped : 2
Bridge address: 00-50-40-3C-75-B0, priority: 32770 (32768 sysid 2)
Regional root address: 00-12-50-28-00-02, priority: 32770 (32768 sysid 2)
MSTI internal root cost : 20000
Designated bridge address: 00-12-50-28-00-02, priority: 32770 (32768 sysid 2)
Topology changes count: 1

Interface      Role      State      Cost      Priority Link
-----      -
eth1/0/3      root      forwarding 20000     128.3    p2p      non-edge
eth1/0/4      alternate blocking 20000     128.4    p2p      non-edge

Switch#
```

This example shows how to display MSTP instance mapping configuration.

```
Switch# show spanning-tree mst configuration

Name      : MName
Revision  : 2,Instances configured: 3
Instance   Vlans
-----
0         21-4094
1         1-10
2         11-20

Switch#
```

## 46-5 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). Use the **no** form of this command to revert to the default setting.

**spanning-tree mst** *INSTANCE-ID* {**cost** *COST* | **port-priority** *PRIORITY*}

**no spanning-tree mst** *INSTANCE-ID* {**cost** | **port-priority**}

### Parameters

<i>INSTANCE-ID</i>	Specifies the MSTP instance identifier.
<b>cost</b> <i>COST</i>	Specifies the path cost for an instance. This value must be between 1 and 200000000.
<b>port-priority</b> <i>PRIORITY</i>	Specifies the port priority for an instance. This value must be between 0 and 240 in increments of 16.

### Default

The cost is defined based on the port speed. The faster the speed is, the smaller cost value it is. MST always uses long path cost.

The port priority is 128.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

When entering the cost value, do not include a comma in the entry. For example, enter 1000 instead of 1,000.

## Example

This example shows how to configure the path cost of port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# spanning-tree mst 0 cost 17031970
Switch(config-if)#
```

---

## 46-6 spanning-tree mst configuration

This command is used to enter the MST Configuration Mode. Use the **no** form of this command to revert to the default setting.

**spanning-tree mst configuration**  
**no spanning-tree mst configuration**

## Parameters

None.

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command 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)#
```

---

## 46-7 spanning-tree mst max-hops

This command is used to configure the MSTP maximum hop count value. Use the **no** form of this command to revert to the default setting.

**spanning-tree mst max-hops HOP-COUNT**  
**no spanning-tree mst max-hops**



---

## Parameters

---

<b>max-hops</b> <i>HOP-COUNT</i>	Specifies the MSTP maximum hop count number. The range is from 6 to 40 hops.
----------------------------------	--

---

## Default

By default, this value is 20 hops.

## Command Mode

Global Configuration Mode.

## 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)#
```

---

## 46-8 spanning-tree mst hello-time

This command is used to configure the per-port hello time used in the MSTP version. Use the **no** form of this command to revert to the default setting.

**spanning-tree mst hello-time** *SECONDS*  
**no spanning-tree mst hello-time**

## Parameters

---

<i>SECONDS</i>	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.

## Usage Guideline

This MSTP hello-time only takes effect in the MSTP mode.

## Example

This example shows how to configure the hello time used in MSTP version on port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# spanning-tree mst hello-time 1
Switch(config-if)#
```

## 46-9 spanning-tree mst priority

This command is used to configure the bridge priority value for the selected MSTP instance. Use the **no** form of this command to revert to the default setting.

**spanning-tree mst** *INSTANCE-ID* **priority** *PRIORITY*

**no spanning-tree mst** *INSTANCE-ID* **priority**

### Parameters

<i>INSTANCE-ID</i>	Specifies the MSTP instance identifier. Instance 0 represents the default instance, CIST.
<i>PRIORITY</i>	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.

### 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)#
```

# 47. Neighbor Discovery (ND) Inspection Commands

## 47-1 ipv6 nd inspection policy

This command is used to create an ND inspection policy. This command will enter the ND Inspection Policy Configuration Mode. Use the **no** form of this command to remove the ND inspection policy.

```
ipv6 nd inspection policy POLICY-NAME  
no ipv6 nd inspection policy POLICY-NAME
```

### Parameters

---

<i>POLICY-NAME</i>	Specifies the ND inspection policy name.
--------------------	--

---

### Default

None.

### Command Mode

Global Configuration Mode.

### Usage Guideline

Use this command to create an ND inspection policy. This command will enter the ND Inspection Policy Configuration Mode. ND inspection is mainly for inspection of Neighbor Solicitation (NS) and Neighbor Advertisement (NA) messages.

### Example

This example shows how to create an ND policy name called "policy1".

```
Switch# configure terminal  
Switch(config)# ipv6 nd inspection policy policy1  
Switch(config-nd-inspection)#
```

## 47-2 validate source-mac

This command is used to check the source MAC address against the link-layer address for ND messages. Use the **no** form of this command to disable the check.

```
validate source-mac  
no validate source-mac
```

### Parameters

None.

### Default

By default, this option is disabled.

## Command Mode

ND Inspection Policy Configuration Mode.

## Usage Guideline

When the Switch receives an ND message that contains a link-layer address, the source MAC address is checked against the link-layer address. The packet will be dropped if the link-layer address and the MAC addresses are different from each other.

## Example

This example shows how to enable the Switch to drop an ND message whose link-layer address does not match the MAC address.

```
Switch# configure terminal
Switch(config)# ipv6 nd inspection policy policy1
Switch(config-nd-inspection)# validate source-mac
Switch(config-nd-inspection)#
```

## 47-3 device-role

This command is used to specify the role of the attached device. Use the **no** form of this command to revert to the default setting.

**device-role {host | router}**

**no device-role**

## Parameters

<b>host</b>	Specifies to set the role of the device to host.
<b>router</b>	Specifies to set the role of the device to router.

## Default

By default, the device's role is **host**.

## Command Mode

ND Inspection Policy Configuration Mode.

## Usage Guideline

Use this command to specify the role of the attached device. By default, the device's role is set as host and inspection for NS and NA messages are performed. If the device role is set as router, the NS and NA inspection is not performed. When performing NS/NA inspection, the message will be verified against the dynamic binding table learned from the ND protocol or from the DHCP.

## Example

This example shows how to create a ND policy named "policy1" and configures the device's role to host.

```
Switch# configure terminal
Switch(config)# ipv6 nd inspection policy policy1
Switch(config-nd-inspection)# device-role host
Switch(config-nd-inspection)#
```

## 47-4 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

---

<i>POLICY-NAME</i>	(Optional) Specifies the ND inspection policy name.
--------------------	---

---

### Default

By default, ND inspection policy is not applied.

### Command Mode

Interface Configuration Mode.

### Usage Guideline

This command is only available for physical port interface configuration.

Use this command to apply the ND Inspection policy on a specified interface. If no parameter is specified, the behavior of the default policy is as follows:

- NS/NA messages are inspected.
- Layer 2 header source MAC address validations are disabled.

### Example

This example shows how to apply ND inspection policy called “policy1” on port 3.

```
Switch# configure terminal
Switch(config)# ipv6 nd inspection policy policy1
Switch(config-nd-inspection)# device-role host
Switch(config-nd-inspection)# validate source-mac
Switch(config-nd-inspection)# exit
Switch(config)# interface eth1/0/3
Switch(config-if)# ipv6 nd inspection attach-policy policy1
Switch(config-if)#
```

## 47-5 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

---

<i>POLICY-NAME</i>	(Optional) Specifies the IPv6 RA guard policy name.
--------------------	---

---

### Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display Router Advertisement (RA) guard policy information. If no parameter is specified, information of all policies will be displayed.

## Example

This example shows how to display the policy configuration for a policy named "inspect1".

```
Switch# show ipv6 nd inspection policy inspect1
```

```
Policy inspect1 configuration:  
  Device Role: host  
  Validate Source MAC: Enabled  
  Target: eth1/0/1-1/0/2
```

```
Switch#
```

## 48. Network Access Authentication Commands

### 48-1 authentication guest-vlan

This command is used to configure the guest VLAN setting. Use the **no** form of this command to remove the guest VLAN.

```
authentication guest-vlan VLAN-ID
```

```
no authentication guest-vlan
```

#### Parameters

---

<i>VLAN-ID</i>	Specifies the authentication guest VLAN.
----------------	--

---

#### Default

None.

#### Command Mode

Interface Configuration Mode.

#### 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)#
```

### 48-2 authentication host-mode

This command is used to specify the authentication mode. Use the **no** form of this command to revert to the default setting.

---

**authentication host-mode {multi-host | multi-auth}**

**no authentication host-mode**

## Parameters

---

<b>multi-host</b>	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.
<b>multi-auth</b>	Specifies the port to operate in the multi-auth mode. Each host will be authenticated individually.

---

## Default

By default, **multi-host** is used.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

If the port is operated in the **multi-host** mode, and one of the hosts is authenticated, 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, 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 port 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)#
```

---

## 48-3 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.



## Usage Guideline

Use this command to enable or disable periodic re-authentication for a port.

## Example

This example shows how to enable periodic re-authentication on port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# authentication periodic
Switch(config-if)#
```

---

## 48-4 authentication timer reauthentication

This command is used to configure the timer to re-authenticate a session. Use the **no** form of this command to revert to the default setting.

**authentication timer reauthentication** {SECONDS}

**no authentication timer reauthentication**

## Parameters

---

<i>SECONDS</i>	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.

## 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 port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# authentication timer reauthentication 200
Switch(config-if)#
```

---

## 48-5 authentication timer restart

This command is used to configure the timer to restart the authentication after the last failed authentication. Use the **no** form of this command to revert to the default setting.

**authentication timer restart** SECONDS

**no authentication timer restart**

## Parameters

<i>SECONDS</i>	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.

## 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 port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# authentication timer restart 20
Switch(config-if)#
```

## 48-6 authentication username

This command is used to create a user in the local database for authentication. Use the **no** form of this command to remove a user in the local database.

**authentication username** *NAME* **password** *PASSWORD* [**vlan** *VLAN-ID*]

**no authentication username** *NAME* [**vlan**]

## Parameters

<i>NAME</i>	Specifies the username with a maximum of 32 characters.
<b>password</b> <i>PASSWORD</i>	Specifies the password in the clear text form for authentication with a maximum of 32 characters.
<b>vlan</b> <i>VLAN-ID</i>	Specifies the VLAN to be assigned.

## Default

None.

## Command Mode

Global Configuration Mode.

## 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)#
```

## 48-7 clear authentication sessions

This command is used to remove authentication sessions.

```
clear authentication sessions { dot1x | all | interface INTERFACE-ID [dot1x] | mac-address MAC-ADDRESS}
```

### Parameters

<b>dot1x</b>	Specifies to clear all dot1x sessions.
<b>all</b>	Specifies to clear all sessions.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies a port to clear sessions.
<b>mac-address</b> <i>MAC-ADDRESS</i>	Specifies a specific user to clear session.

### Default

None.

### Command Mode

Privileged EXEC Mode.

### Usage Guideline

Use this command to clear the authentication sessions.

## Example

This example shows how to remove authentication sessions on port 1.

```
Switch# clear authentication sessions interface eth1/0/1
Switch#
```

## 48-8 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 revert 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

<b>lowercase</b>	Specifies that when using the lowercase format, the RADIUS authentication username will be formatted as: aa-bb-cc-dd-ee-ff.
<b>uppercase</b>	Specifies that when using uppercase format, the RADIUS authentication username will be formatted as: AA-BB-CC-DD-EE-FF.
<b>hyphen</b>	Specifies that when using “-” as delimiter, the format is: AA-BB-CC-DD-EE-FF.
<b>colon</b>	Specifies that when using “:” as delimiter, the format is: AA:BB:CC:DD:EE:FF.
<b>dot</b>	Specifies that when using “.” as delimiter, the format is: AA.BB.CC.DD.EE.FF.
<b>none</b>	Specifies that when not using any delimiter, the format is: AABCCDDEEFF.
<b>number</b>	Specifies the delimiter number value. Choose one of the following delimiter options: <b>1:</b> Single delimiter, the format is: AABCC.DDEEFF. <b>2:</b> Double delimiters, the format is: AAB.CCDD.EEFF. <b>5:</b> 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.

## Usage Guideline

This command is used to configure the formatting of usernames used for RADIUS authentication 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)#
```

## 48-9 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 this command to revert to the default settings.

**authentication max users** *NUMBER*

**no authentication max users**

## Parameters

<i>NUMBER</i>	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.

## 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.

This command is limited to 802.1X 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)#
```

---

## 48-10 authentication mac-move deny

This command is used to deny MAC move on the Switch. Use the **no** form of this command to revert to the default setting.

**authentication mac-move deny**

**no authentication mac-move deny**

## Parameters

None.

## Default

By default, this option is permitted.

## Command Mode

Global Configuration Mode.

## Usage Guideline

This command controls 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, 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, 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, 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, this is treated as a violation error.

## Example

This example shows how to enable MAC move on a switch.

```
Switch# configure terminal
Switch(config)# authentication mac-move deny
Switch(config)#
```

---

## 48-11 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.

### Usage Guideline

Use this command to enable or disable the acceptance of an authorized configuration. When authorization is enabled for authentication, the authorized attributes (for example, VLAN) assigned by the RADIUS server will be accepted if the authorization status is enabled.

## Example

This example shows how to enable the authorization status.

```
Switch# configure terminal
Switch(config)# no authorization disable
Switch(config)#
```

---

## 48-12 show authentication sessions

This command is used to display authentication information.

**show authentication sessions** [**dot1x** | **interface** *INTERFACE-ID* [, | -] [**dot1x**] | **mac-address** *MAC-ADDRESS*]

## Parameters

<b>dot1x</b>	(Optional) Specifies to display all dot1x sessions.
<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>mac-address</b> <i>MAC-ADDRESS</i>	(Optional) Specifies to display a specific user.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

If no parameter is specified, the sessions associated with all ports will be displayed.

## Example

This example shows how to display sessions on port 1.

```
Switch#show authentication sessions interface eth1/0/1
```

```
Interface: eth1/0/1
MAC Address: 00-E0-4C-68-2D-6F
Authentication VLAN: 1
Authentication State: Success
Authentication Username: abc
Aging Time: 3144 sec
Method    State
 802.1X   : Success, Selected
 802.1X Authenticator State: AUTHENTICATED
 802.1X Backend State: IDLE
```

```
Total Authenticating Hosts: 0
Total Authenticated Hosts: 1
Total Blocked Hosts: 0
```

```
Switch#
```

## Display Parameters

<b>Interface</b>	The authentication host received interface.
<b>MAC Address</b>	The MAC address of authentication host.
<b>Authentication VLAN</b>	The original VLAN of the host start authentication.
<b>Authentication State</b>	The authentication status of host.

	<ul style="list-style-type: none"> <li>• <b>Start</b> - Host received, but no any authentication start.</li> <li>• <b>Initialization</b>- Authentication resource ready, but no new authentication start.</li> <li>• <b>Authenticating</b> - Host is under authenticating.</li> <li>• <b>Failure</b> - Authentication failure.</li> <li>• <b>Success</b> - Host pass authentication.</li> </ul>
<b>Authentication Username</b>	It indicates the user name of host.
<b>Assigned VLAN</b>	Effectively assigned VLAN ID that was authorized after the host passed authentication.
<b>Method</b>	The Authentication method, such as 802.1X.
<b>State</b>	<p>The method authentication state.</p> <ul style="list-style-type: none"> <li>• <b>Authenticating</b> - Host is under authentication by this method.</li> <li>• <b>Success</b> - Host pass this method authentication.</li> <li>• <b>Selected</b> - This method's authentication result is taken and parsed by system for the host.</li> <li>• <b>Failure</b> - Host fail at this method authentication.</li> <li>• <b>No Information</b> - Authentication info is unavailable.</li> </ul>
<b>Aging Time/Block Time</b>	<ul style="list-style-type: none"> <li>• <b>Aging Time</b> - 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.</li> <li>• <b>Blocked Time</b> - 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.</li> </ul>
<b>802.1X Authenticator State</b>	<p>Indicates the 802.1X authenticator PAE state: It can be one of the following values:</p> <ul style="list-style-type: none"> <li>• <b>INITIALIZE</b> - Indicates the authenticator is initializing the state machine and ready to authenticate the supplicant.</li> <li>• <b>DISCONNECTED</b> - Indicates that the state machine initialization has finished, but no supplicant connects to this port.</li> <li>• <b>CONNECTING</b> - Indicates that the Switch has detected a supplicant connecting to this port. The PAE will attempt to establish communication with a supplicant.</li> <li>• <b>AUTHENTICATING</b> - Indicates that a supplicant is being authenticated.</li> <li>• <b>AUTHENTICATED</b> - Indicates that the Authenticator has successfully authenticated the supplicant.</li> <li>• <b>ABORTING</b> - 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.</li> <li>• <b>HELD</b> - 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.</li> <li>• <b>FORCE_AUTH</b> - Indicates that the supplicant is always authorized.</li> <li>• <b>FORCE_UNAUTH</b> - Indicates that the supplicant is always unauthorized.</li> </ul>
<b>802.1X Backend State</b>	<p>Indicates the 802.1X backend PAE state. It can be one of the following values:</p> <ul style="list-style-type: none"> <li>• <b>REQUEST</b> - 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.</li> <li>• <b>RESPONSE</b> - 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.</li> <li>• <b>SUCCESS</b> - 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.</li> </ul>



- **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.
- 
-

# 49. Network Protocol Port Protection

## Commands

### 49-1 network-protocol-port protect

This command is used to enable the network protocol port protection function. Use the **no** form of this command to disable this function.

```
network-protocol-port protect {tcp | udp}
no network-protocol-port protect {tcp | udp}
```

#### Parameters

<b>tcp</b>	Specifies to protect the TCP port.
<b>udp</b>	Specifies to protect the UDP port.

#### Default

By default, this function is enabled.

#### Command Mode

Global Configuration Mode.

#### Usage Guideline

Use this command to enable or disable the network protocol port protection function. If the port is protected, the Switch will not send any response packet to the closed TCP or UDP port.

#### Example

This example shows how to enable TCP port protection.

```
Switch# configure terminal
Switch(config)# network-protocol-port protect tcp
Switch(config)#
```

### 49-2 show network-protocol-port protect

This command is used to display the information of the network protocol port protection.

```
show network-protocol-port protect
```

#### Parameters

None.

#### Default

None.

#### Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the information of the network protocol port protection.

## Example

This example shows how to display the information of the network protocol port protection.

```
Switch# show network-protocol-port protect
```

```
    TCP Port protect state: Enabled
```

```
    UDP Port protect state: Enabled
```

```
Switch#
```

## 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

<b>all</b>	Specifies to delete all auto-learned secured entries.
<b>address</b> <i>MAC-ADDR</i>	Specifies to delete the specified auto -learned secured entry based on the MAC address entered.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies to delete all auto-learned secured entries on the specified physical interface.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>vlan</b> <i>VLAN-ID</i>	Specifies to delete the auto-learned secured entry learned with the specified VLAN.

#### Default

None.

#### Command Mode

Privileged EXEC Mode.

#### Usage Guideline

Use this command to clear 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

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.

---



---

-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>address</b>	(Optional) Specifies to display all the secure MAC addresses, including both configured and learned entries.

---



---

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the current port security settings.

## Example

This example shows how to display the port security settings on ports 1 to 3.

```
Switch# show port-security interface 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 the sending of SNMP notifications for port security address violations. Use the **no** form of this command to disable the sending of SNMP notifications.

```
snmp-server enable traps port-security [trap-rate TRAP-RATE]
```

```
no snmp-server enable traps port-security [trap-rate]
```

## Parameters

---



---

<b>trap-rate TRAP-RATE</b>	(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.

## Usage Guideline

Use this command to enable or disable the sending of SNMP notifications for port security address violations and configure the number of traps per second.

## Example

This example shows how to enable the sending of SNMP notifications for port security address violations and set the number of traps per second to 3.

```
Switch# configure terminal
Switch(config)#snmp-server enable traps port-security trap-rate 3
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

<b>maximum</b> <i>VALUE</i>	(Optional) Specifies to set the maximum number of secure MAC addresses allowed. If not specified, the default value is 32. The valid range is from 0 to 64.
<b>protect</b>	(Optional) Specifies to drop all packets from the insecure hosts at the port-security process level, but does not increment the security-violation count.
<b>restrict</b>	(Optional) Specifies to drop all packets from the insecure hosts at the port-security process level, increment the security-violation count, and record the system log.
<b>shutdown</b>	(Optional) Specifies to shut down the port if there is a security violation and record the system log.
<b>permanent</b>	(Optional) Specifies that under this mode, all learned MAC addresses will not be purged out unless the user manually deletes those entries.
<b>delete-on-timeout</b>	(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.
<b>mac-address</b> <i>MAC-ADDRESS</i>	(Optional) Specifies to add a secure MAC address to gain port access rights.
<b>permanent</b>	(Optional) Specifies to set the secure permanent configured MAC address of the port. This entry is same as the one learned under the permanent mode.
<b>vlan</b> <i>VLAN-ID</i>	(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.

## 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 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 on port 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 this command to revert to the default settings.

**switchport port-security aging {time MINUTES | type absolute}**

**no switchport port-security aging {time | type}**

### Parameters

<b>time</b> <i>MINUTES</i>	Specifies the aging time for the auto-learned dynamic secured address on this port. The range is from 0 to 1440 in minutes.
<b>type</b>	Specifies to set the aging type.
<b>absolute</b>	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.

### 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.

### 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 on port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# switchport port-security aging time 1
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 revert to the default setting.

**port-security limit global VALUE**

**no port-security limit global**

### Parameters

<i>VALUE</i>	Specifies the maximum number of port security entries that can be learned on the system. The range is from 1 to 3328. If the setting is smaller than the number of current learned entries, the command will be rejected.
--------------	---



## Default

None.

## Command Mode

Global Configuration Mode.

## 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 (DGS-1250-28XMP and DGS-1250-52XMP Only)

## 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

---

<i>TEXT</i>	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.

### Usage Guideline

Use this command to configure a description for the PD connected to the port.

### Example

This example shows how to configure the PoE PD description on port 1.

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

## 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 port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
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** form of this command to revert to the default setting.

**poe pd priority {critical | high | low}**

**no poe pd priority**

## Parameters

<b>critical</b>	Specifies the PD connected to the port gains the highest priority.
<b>high</b>	Specifies the PD connected to the port gains the second high priority.
<b>low</b>	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.

## 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 the **poe policy preempt** command.

If the policy preempt setting is disabled, 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, 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 port 1 to the first priority.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
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 this command to revert to the default setting.

**poe policy preempt**

**no poe policy preempt**

### Parameters

None.

### Default

By default, this option is disabled.

### Command Mode

Global Configuration Mode.

### 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, 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, 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 PoE ports. Use the **no** form of this command to remove the time range profile association or revert 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

<b>auto</b>	Specifies to enable the auto-detection of PDs and provision power to the PD.
<b>max</b> <i>MAX-WATTAGE</i>	(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.
<b>time-range</b> <i>PROFILE-NAME</i>	(Optional) Specifies the name of the time-range profile to delineate the activation period.
<b>never</b>	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.

## 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 **no poe power-inline** command 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 provide power to the PoE device plugged into port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# poe power-inline auto
Switch(config-if)#
```

This example shows how to configure the PoE port 1 to allow powered devices under 7000mw.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# poe power-inline auto max 7000
Switch(config-if)#
```

This example shows how to disable PD detection and not provide power to the PoE device plugged into port 1.

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

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
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 revert to the default setting.

```
poe usage-threshold PERCENTAGE
no poe usage-threshold
```

### Parameters

<i>PERCENTAGE</i>	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.

### Usage Guideline

When the usage threshold is configured, if the utilization of the PSE exceeds the configured threshold, the *EXCEED* log will be recorded. Once the percentage decreases and become lower than the threshold, the *RECOVER* log is recorded.

### Example

This example shows how to configure the usage threshold to 50%.

```
Switch# configure terminal
Switch(config)# poe usage-threshold 50
Switch(config)#
```

## 51-7 snmp-server enable traps poe

This command is used to enable the sending of PoE notifications. Use the **no** form of this command to disable sending power over Ethernet notifications.

```
snmp-server enable traps poe
no snmp-server enable traps poe
```

### Parameters

None.

## Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enable or disable the sending of PoE notifications.

## Example

This example shows how to enable the sending of PoE notifications.

```
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

<b>all</b>	Specifies to clear PoE statistics for all interfaces.
<b>interface</b> <i>INTERFACE-ID</i>	Specifies the interfaces to be cleared.
<b>,</b>	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
<b>-</b>	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

## Default

None.

## Command Mode

Privileged EXEC Mode.

## Usage Guideline

There are counters on ports to record the statistic and they can be displayed by entering the **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 port 1.

```
Switch# clear poe statistic interface eth1/0/1
Switch#
```

## 51-9 show poe power-inline

This command is used to display the PoE status for the specified PoE port, or for all PoE ports on the Switch.

**show poe power-inline** [*INTERFACE-ID* [, | -]] {**status** | **configuration** | **statistics** | **measurement** | **lldp-classification**}

### Parameters

<i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>status</b>	Specifies to display the port PoE status.
<b>configuration</b>	Specifies to display the port configuration information.
<b>statistics</b>	Specifies to display the port error counters.
<b>measurement</b>	Specifies to display the port voltage, current, consumed power, and temperature.
<b>lldp-classification</b>	Specifies to display the data link layer classification using information of power via MDI TLV.

### Default

None.

### Command Mode

Privileged EXEC Mode.

### Usage Guideline

Use this command 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, 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
eth1/0/1	delivering	class-1	7.0	3.4	For VoIP usage
eth1/0/2	searching	n/a	0.0	0.0	
eth1/0/3	searching	n/a	0.0	0.0	
eth1/0/4	searching	n/a	0.0	0.0	
eth1/0/5	searching	n/a	0.0	0.0	
eth1/0/6	searching	n/a	0.0	0.0	
eth1/0/7	searching	n/a	0.0	0.0	
eth1/0/8	searching	n/a	0.0	0.0	
eth1/0/9	searching	n/a	0.0	0.0	
eth1/0/10	searching	n/a	0.0	0.0	
eth1/0/11	searching	n/a	0.0	0.0	
eth1/0/12	searching	n/a	0.0	0.0	
eth1/0/13	searching	n/a	0.0	0.0	
eth1/0/14	searching	n/a	0.0	0.0	
eth1/0/15	searching	n/a	0.0	0.0	
eth1/0/16	searching	n/a	0.0	0.0	
eth1/0/17	searching	n/a	0.0	0.0	
eth1/0/18	searching	n/a	0.0	0.0	
eth1/0/19	searching	n/a	0.0	0.0	
eth1/0/20	searching	n/a	0.0	0.0	
eth1/0/21	searching	n/a	0.0	0.0	
eth1/0/22	searching	n/a	0.0	0.0	
eth1/0/23	searching	n/a	0.0	0.0	
eth1/0/24	searching	n/a	0.0	0.0	

Faulty code

```
[1] MPS (Maintain Power Signature) Absent
[2] PD short
[3] Overload
[4] Power Denied
[5] Thermal Shutdown
[6] Startup Failure
[7] Classification Failure
```

```
Switch#
```

## Display Parameters

<b>Interface</b>	The PoE interface ID.
<b>State</b>	<p>The port status can be of the following:</p> <ul style="list-style-type: none"> <li>• <b>Disabled</b> - The PSE function is disabled.</li> <li>• <b>Searching</b> - The remote PD is not connected.</li> <li>• <b>Requesting</b> - The remote PD is inserted, but the PSE doesn't provide power yet.</li> <li>• <b>Delivering</b> - The remote PD is now powering by PoE system.</li> <li>• <b>Faulty[X]</b> - The device detection or a powered device is in a faulty state. X is the error code number. <ul style="list-style-type: none"> <li>• <b>[1]</b> - MPS (Maintain Power Signature) Absent.</li> <li>• <b>[2]</b> - PD Short.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• <b>[3]</b> - Overload.</li> <li>• <b>[4]</b> - Power Denied.</li> <li>• <b>[5]</b> - Thermal Shutdown.</li> <li>• <b>[6]</b> - Startup Failure.</li> <li>• <b>[7]</b> - Classification Failure(IEEE 802.3at).</li> </ul>
<b>Class</b>	The IEEE classification: N/A or a value from IEEE class 0 to 4.
<b>Max(W)</b>	The maximum amount of power could be allocated to the powered device in watts.
<b>Used(W)</b>	The amount of power is currently allocated to PoE ports in watts.
<b>Description</b>	The configured description of the connected PD.

This example shows how to display the PoE power inline configuration.

```
Switch# show poe power-inline configuration
```

```
Interface Admin   Priority Legacy-Support Time-Range
-----
eth1/0/1  auto(M)  critical  enabled
eth1/0/2  auto     low       disabled
eth1/0/3  auto     low       disabled
eth1/0/4  auto     low       disabled
eth1/0/5  auto     low       disabled
eth1/0/6  auto     low       disabled
eth1/0/7  auto     low       disabled
eth1/0/8  auto     low       disabled
eth1/0/9  auto     low       disabled
eth1/0/10 auto     low       disabled
eth1/0/11 auto     low       disabled
eth1/0/12 auto     low       disabled
eth1/0/13 auto     low       disabled
eth1/0/14 auto     low       disabled
eth1/0/15 auto     low       disabled
eth1/0/16 auto     low       disabled
eth1/0/17 auto     low       disabled
eth1/0/18 auto     low       disabled
eth1/0/19 auto     low       disabled
eth1/0/20 auto     low       disabled
eth1/0/21 auto     low       disabled
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

## Display Parameters

<b>Interface</b>	The PoE interface ID.
<b>Admin</b>	<p>The user configured mode can be of the following:</p> <ul style="list-style-type: none"> <li>• <b>Auto</b> - The powered device will be automatically detected and maximum power is based on the detection result.</li> <li>• <b>Auto(M)</b> - The powered device will be automatically detected and maximum power is the user configured value.</li> <li>• <b>Never</b> - The powered device will not be detected, and no power to the port.</li> </ul>
<b>Priority</b>	<p>The priority used to prioritize the service order when power constrain happens within at the power unit.</p> <ul style="list-style-type: none"> <li>• Legacy-Support Enabled - The legacy PD can be detected.</li> </ul>

- Disabled - The legacy PD cannot be detected.

---

<b>Time-Range</b>	The time-range profile name which sets the activation time frame for a port.
-------------------	--

---

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
eth1/0/1	2	5	0	10	7
eth1/0/2	0	0	0	0	9
eth1/0/3	0	0	0	0	9
eth1/0/4	0	0	0	0	10
eth1/0/5	0	0	0	0	157
eth1/0/6	0	0	0	0	157
eth1/0/7	0	0	0	0	156
eth1/0/8	0	0	0	0	158
eth1/0/9	0	0	0	0	166
eth1/0/10	0	0	0	0	165
eth1/0/11	0	0	0	0	165
eth1/0/12	0	0	0	0	166
eth1/0/13	0	0	0	0	143
eth1/0/14	0	0	0	0	143
eth1/0/15	0	0	0	0	143
eth1/0/16	0	0	0	0	144
eth1/0/17	0	0	0	0	166
eth1/0/18	0	0	0	0	166
eth1/0/19	0	0	0	0	166
eth1/0/20	0	0	0	0	161
eth1/0/21	0	0	0	0	163

```
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

## Display Parameters

<b>MPS Absent</b>	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.
<b>Overload</b>	If the PD is drawing too much power to exceed the maximum output power that the port can supply, the overload counter is increased.
<b>Short</b>	If the PD's internal circuit is shorted for some reason, this counter is increased.
<b>Power Denied</b>	If the PoE software system decides to disallow providing power to the attached PD, this counter is increased.
<b>Invalid Signature</b>	Increased if the PSE detects a PD who has an invalid PD signature.

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)
eth1/0/1	54.2	109	35	5.9
eth1/0/2	n/a	n/a	n/a	n/a
eth1/0/3	n/a	n/a	n/a	n/a
eth1/0/4	n/a	n/a	n/a	n/a
eth1/0/5	n/a	n/a	n/a	n/a
eth1/0/6	n/a	n/a	n/a	n/a
eth1/0/7	n/a	n/a	n/a	n/a
eth1/0/8	n/a	n/a	n/a	n/a
eth1/0/9	n/a	n/a	n/a	n/a
eth1/0/10	n/a	n/a	n/a	n/a
eth1/0/11	n/a	n/a	n/a	n/a
eth1/0/12	n/a	n/a	n/a	n/a
eth1/0/13	n/a	n/a	n/a	n/a
eth1/0/14	n/a	n/a	n/a	n/a
eth1/0/15	n/a	n/a	n/a	n/a
eth1/0/16	n/a	n/a	n/a	n/a
eth1/0/17	n/a	n/a	n/a	n/a
eth1/0/18	n/a	n/a	n/a	n/a
eth1/0/19	n/a	n/a	n/a	n/a
eth1/0/20	n/a	n/a	n/a	n/a
eth1/0/21	n/a	n/a	n/a	n/a

CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All

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 eth1/0/2
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 eth1/0/3
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.
-----------	-----------------------

---

<b>Power type</b>	The power type field which is in the Power via MDI TLV from PSE or PD LLDP packet.
<b>Power source</b>	The power source field which is in the Power via MDI TLV from PSE or PD LLDP packet.
<b>Power priority</b>	The power priority field which is in the Power via MDI TLV from PSE or PD LLDP packet.
<b>PD requested power value</b>	The PD requested power value field which is in the Power via MDI TLV from PSE or PD LLDP packet.
<b>PSE allocated power value</b>	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 [detail]**

### Parameters

<b>detail</b>	(Optional) Specifies to display more detailed chip parameter information.
---------------	---

### Default

None.

### Command Mode

Privileged EXEC Mode.

### Usage Guideline

Use this command to display the detailed power information and PoE chip parameters for PoE modules.

### Example

This example shows how to display the power information of the PoE power system.

```
Switch#show poe power module
```

```
Unit  Delivered(W)  Power Budget(W)  Usage-Threshold(%)  Preempt  Trap State
-----
1      0              370              99                 Enabled  Disabled
```

```
Switch#
```

### Display Parameters

<b>Unit</b>	The unit ID of the Switch.
<b>Delivered</b>	The actual amount of power delivered to the PD in watts.
<b>Power budget</b>	The total power can be provided by the device in watts.
<b>Usage-Threshold</b>	The utilization threshold to record a log.

<b>Preempt</b>	<ul style="list-style-type: none"> <li>• <b>Enabled</b> - The power management mode is policy preempt, high priority PD can preempt the provided power of lower priority PD.</li> <li>• <b>Disabled</b> - The power management mode is first in first serviced.</li> </ul>
<b>Trap State</b>	<ul style="list-style-type: none"> <li>• <b>Enabled</b> - The trap is sent when the PoE usage threshold exceeds the specified value.</li> <li>• <b>Disabled</b> - The trap is not sent when the PoE usage threshold exceeds the specified value.</li> </ul>

This example shows how to display the PoE detailed parameters.

```
Switch#show poe power module detail
```

```
Unit  Delivered(W)  Power Budget(W)  Usage-Threshold(%)  Preempt  Trap State
-----
1      0              370              99                 Disabled  Disabled
```

```
PoE system parameters:
```

```
Unit  Max Ports  Device ID  SW Version
-----
1      24         E121      30
```

```
Switch#
```

## Display Parameters

<b>Max ports</b>	The maximum port number of the PoE sub-system.
<b>Device ID</b>	The hardware version of the PoE chip.
<b>S/W version</b>	The firmware version of the PoE chip.

## 51-11 poe pd alive

This command is used to enable the PD alive check function for the PD connected to the PoE port. Use the **no** form of this command to disable the function.

```
poe pd alive [{ip IP-ADDRESS | interval INTERVAL-TIME | retry RETRY-COUNT | waiting-time WAITING-TIME | action {reset | notify | both}]
```

```
no poe pd alive [{ip | interval | retry | waiting-time | action}]
```

### Parameters

<b>ip</b>	(Optional) Specifies the IPv4 address of the target PD for the system executing the ping action.
<b>interval</b>	(Optional) Specifies the interval for the system to issue ping requests to detect the target PD. The valid range is from 10 to 300 seconds.
<b>retry</b>	(Optional) Specifies the retry counts of ping requests when PD has no response. The valid range is from 0 to 5.
<b>waiting-time</b>	(Optional) Specifies the waiting time for PD to recover from rebooting. The valid range is from 30 to 300 seconds.
<b>action</b>	(Optional) Specifies the action of the system when PD does not reply the ping request.
<b>reset</b>	(Optional) Specifies to disable and then enable the PoE port state.

<b>notify</b>	(Optional) Specifies to send logs and traps to notify the administrator.
<b>both</b>	(Optional) Specifies to send log and trap first, and then reset the PoE port state.

## Default

By default, this function is disabled.

The default IP address of the target PD is none.

The default interval for system to issue ping requests is 30 seconds.

The default retry counts for ping requests is 2 times.

The default waiting time for PD to recover from rebooting is 90 seconds.

The default action when PD does not reply the ping request is **both**.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

This function only takes effect on PoE enabled ports with power feeding.

The PD alive check function provides the solution for the PD device that stops working or has no response via the ping mechanism.

Use this command without any parameter to enable or disable the PD alive check function.

By default, there is no IP address of the target PD for the system to execute the ping action. The IP address of the target PD must be configured by using the **po e pd alive ip** command before executing the PD alive check.

The system needs to periodically monitor the specific PD by using the ping function. When there is no response, the system takes one of the actions configured by the **po e pd alive action** command. The interval between retry attempts can be configured by the **po e pd alive interval** command.

The system implements the retry mechanism to check the PD status. The system will reset the PoE port power feeding after the retry by using Ping without any response from a PD. The retry count can be configured by the **po e pd alive retry** command.

If the action is **reset** or **both**, the system needs to wait for PD to recover from rebooting and then executes the Ping function again. The waiting time for PD to recover from rebooting can be configured by the **po e pd alive waiting-time** command.

If the PoE time range function is configured on the port that also enables the PD alive check function, the time range function has higher priority, and the PD alive check function will not work When the PoE time range function is still active.



**NOTE:** If the PD does not support ICMP, this function cannot work normally.



**NOTE:** It is required to setup IP settings properly that the PD can be reached via Ping, otherwise this function cannot work as expected.



**NOTE:** The reset action can only work on the direct-connected PD. If the PD is not connected directly, the reset action may not work as expected.





**NOTE:** If the direct-connected PD is also a PSE, all the next level PDs connect to this PSE will be power cycling whenever the PD alive check function takes effect on the reset or both action.

## Example

This example shows how to enable the PoE PD alive check function on ports 1 to 2.

```
Switch# configure terminal
Switch(config)#interface range eth1/0/1-2
Switch(config-if-range)#poe pd alive
Switch(config-if-range)#
```

This example shows how to configure the IP address of the target PD.

```
Switch# configure terminal
Switch(config)#interface eth1/0/2
Switch(config-if)#poe pd alive ip 192.168.1.150
Switch(config-if)#
```

This example shows how to configure the interval between ping requests.

```
Switch# configure terminal
Switch(config)#interface eth1/0/2
Switch(config-if)#poe pd alive interval 60
Switch(config-if)#
```

This example shows how to configure the retry counts of ping requests.

```
Switch# configure terminal
Switch(config)#interface eth1/0/2
Switch(config-if)#poe pd alive retry 4
Switch(config-if)#
```

This example shows how to configure the waiting time for PD to reboot.

```
Switch# configure terminal
Switch(config)#interface eth1/0/2
Switch(config-if)#poe pd alive waiting-time 120
Switch(config-if)#
```

This example shows how to configure the action to reset when PD does not reply.

```
Switch# configure terminal
Switch(config)#interface eth1/0/2
Switch(config-if)#poe pd alive action reset
Switch(config-if)#
```

---

## 51-12 show poe pd alive

This command is used to display the PD alive check settings.

---

**show poe pd alive** [interface *INTERFACE-ID* [, | -]]

## Parameters

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

---

## Default

None.

## Command Mode

Privileged EXEC Mode.

## Usage Guideline

Use this command to display the PD alive check settings on the specified ports. If no parameter is specified, information of all PoE ports will be displayed.

## Example

This example shows how to display the PD alive check settings on ports 1 to 2.

```
Switch# show poe pd alive interface eth1/0/1-2
```

```
Port ID: eth1/0/1
```

```
-----
PD Alive State           : Disabled
PD IP Address            : 0.0.0.0
Poll Interval            : 30
Retry Count              : 2
Waiting Time             : 90
Action                   : both
```

```
Port ID: eth1/0/2
```

```
-----
PD Alive State           : Disabled
PD IP Address            : 192.168.1.150
Poll Interval            : 30
Retry Count              : 4
Waiting Time             : 120
Action                   : reset
```

```
Switch#
```

---

## 52. Power Saving Commands

### 52-1 dim led

This command is used to disable the port LED function. Use the **no** form of this command to revert to the default setting.

```
dim led
no dim led
```

#### Parameters

None.

#### Default

By default, this option is disabled.

#### Command Mode

Global Configuration Mode.

#### Usage Guideline

Use this command to turn off or turn on the port 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 this command to disable these functions.

```
power-saving {link-detection | length-detection | port-shutdown | dim-led | hibernation}
no power-saving {link-detection | length-detection | port-shutdown | dim-led | hibernation}
```

#### Parameters

<b>link-detection</b>	Specifies that power saving will be applied by link status.
<b>length-detection</b>	Specifies that power saving will be applied by cable length detection.
<b>port-shutdown</b>	Specifies that power saving will be applied by scheduled port shutdown.
<b>dim-led</b>	Specifies that power saving will be applied by scheduled dimming LEDs.
<b>hibernation</b>	Specifies that power saving will be applied by scheduled system hibernation.

#### Default

By default, all the options are disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to 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.

## 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 this command to disable the EEE function.

**power-saving eee**

**no power-saving eee**

## Parameters

None.

## Default

By default, this option is disabled.

## Command Mode

Interface Configuration Mode.

## 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 this 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

<i>PROFILE-NAME</i>	Specifies the name of the time range profile to be configured. The maximum length is 32 characters.
---------------------	---

### Default

None.

### Command Mode

Global Configuration Mode.

### 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 LEDs 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 this command to delete the specified time range profile.

**power-saving hibernation time-range** *PROFILE-NAME*

**no power-saving hibernation time-range** *PROFILE-NAME*

### Parameters

<i>PROFILE-NAME</i>	Specifies the name of the time range profile to be configured. The maximum length is 32 characters.
---------------------	---

## Default

None.

## Command Mode

Global Configuration Mode.

## 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.

## 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 this command to delete the specified time range profile.

**power-saving shutdown time-range** *PROFILE-NAME*

**no power-saving shutdown time-range** *PROFILE-NAME*

## Parameters

<i>PROFILE-NAME</i>	Specifies the name of the time range profile to be configured. The maximum length is 32 characters.
---------------------	---

## Default

None.

## Command Mode

Interface Configuration Mode.

## 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] [length-detection] [dim-led] [port-shutdown] [hibernation] [eee]
```

### Parameters

---

---

<b>link-detection</b>	(Optional) Specifies to display the link detection state.
<b>length-detection</b>	(Optional) Specifies to display the cable length detection state.
<b>dim-led</b>	(Optional) Specifies to display the dim LED state.
<b>port-shutdown</b>	(Optional) Specifies to display the port shutdown state.
<b>hibernation</b>	(Optional) Specifies to display the hibernation state.
<b>eee</b>	(Optional) Specifies to display the EEE state.

---

---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

If no parameter is 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

Length Detection Power Saving
  State: Disabled

Scheduled Hibernation 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

Switch#
```

---



## 53. Protocol Independent Commands

### 53-1 ip route

This command is used to create a static route entry. Use the **no** form of this command to remove a static route entry.

```
ip route NETWORK-PREFIX NETWORK-MASK IP-ADDRESS [primary | backup]
```

```
no ip route NETWORK-PREFIX NETWORK-MASK IP-ADDRESS
```

#### Parameters

<i>NETWORK-PREFIX</i>	Specifies the network address.
<i>NETWORK-MASK</i>	Specifies the network mask.
<i>IP-ADDRESS</i>	Specifies the IP address of the next hop that can be used to reach destination network.
<b>primary</b>	(Optional) Specifies the route as the primary route to the destination.
<b>backup</b>	(Optional) Specifies the route as the backup route to the destination.

#### Default

None.

#### Command Mode

Global Configuration Mode.

#### 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** form of this command to remove an IPv6 static route entry.

```
ipv6 route {default | NETWORK-PREFIX/PREFIX-LENGTH} [INTERFACE-ID] NEXT-HOP-ADDRESS  
[primary | backup]
```

```
no ipv6 route {default | NETWORK-PREFIX/PREFIX-LENGTH} [INTERFACE-ID] NEXT-HOP-ADDRESS
```

## Parameters

<b>default</b>	Specifies to add or delete a default route.
<i>NETWORK-PREFIX/PREFIX-LENGTH</i>	Specifies the network prefix and the prefix length of the static route.
<i>INTERFACE-ID</i>	(Optional) Specifies the forwarding interface for routing the packet.
<i>NEXT-HOP-ADDRESS</i>	(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.
<b>primary</b>	(Optional) Specifies the route as the primary static route to the destination.
<b>backup</b>	(Optional) Specifies the route as the backup static route to the destination.

## Default

None.

## Command Mode

Global Configuration Mode.

## 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

<i>IP-ADDRESS</i>	(Optional) Specifies the network address of which routing information should be displayed.
<i>MASK</i>	(Optional) Specifies the subnet mask for the specified network.
<b>connected</b>	(Optional) Specifies to display directly connected route.
<b>static</b>	(Optional) Specifies to display the static route.
<b>hardware</b>	(Optional) Specifies to display the routes that have been written into chip.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## 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 10.1.1.254 to network 0.0.0.0

S*   0.0.0.0/0 via 10.1.1.254, vlan1
C    10.0.0.0/8 is directly connected, vlan1

Total Entries: 2

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

User/Privileged EXEC Mode.

### 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 [connected | static] [database]
```

### Parameters

<b>connected</b>	(Optional) Specifies to display directly connected route.
<b>static</b>	(Optional) Specifies to display the static route.
<b>database</b>	(Optional) Specifies to display all the related entries in the routing database instead of just the best route.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the best routes that are currently at work.

## Example

This example shows how to display the IPv6 routing table.

```
Switch# show ipv6 route

IPv6 Routing Table
Code: C - connected, S - static
      SLAAC - Stateless address autoconfiguration

C    200::/64 is directly connected, vlan1

Total Entries: 1 entries, 1 routes
Switch#
```

This example shows how to display the IPv6 database routing table.

```
Switch# show ipv6 route database

IPv6 Routing Table
Code: C - connected, S - static
      SLAAC - Stateless address autoconfiguration
      > - selected route, * - valid route

C    *> 200::/64 is directly connected, vlan1

Total Entries: 1 entries, 1 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

User/Privileged EXEC Mode.

### 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          1
SLAAC           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** form of this command to remove the policy definition for the specified class.

**class** *NAME*

**no class** *NAME*

**class class-default**

#### Parameters

<i>NAME</i>	Specifies the name of the class map to be associated with a traffic policy.
-------------	---

#### Default

None.

#### Command Mode

Policy-map Configuration Mode.

#### Usage Guideline

Use this command to the Policy-map 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.

```
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)#
```

### 54-2 class-map

This command is used to create or modify a class-map that defines the criteria for packet matching. Use the **no** form of this command to remove an existing class map from the Switch.

**class-map** [**match-all** | **match-any**] *NAME*

**no class-map** *NAME*

## Parameters

<b>match-all</b>	(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 <b>match-all</b> nor <b>match-any</b> is specified, <b>match-any</b> is implied.
<b>match-any</b>	(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 <b>match-all</b> nor <b>match-any</b> is specified, <b>match-any</b> is implied.
<i>NAME</i>	Specifies the name of the class map with a maximum of 32 characters.

## Default

None.

## Command Mode

Global Configuration Mode.

## 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** parameter 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** form of this 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

<b>access-group name</b> <i>ACCESS-LIST-NAME</i>	Specifies an access list to be matched. Traffic that is permitted by the access list will be classified.
<b>cos</b> <i>COS-LIST</i>	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.

---



---

<b>[ip] dscp</b> <i>DSCP-LIST</i>	<p>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.</p> <ul style="list-style-type: none"> <li>• <b>ip</b> - (Optional) Specifies that the match is for IPv4 packets only. If not specified, the match is for both IPv4 and IPv6 packets.</li> </ul>
<b>[ip] precedence</b> <i>IP-PRECEDENCE-LIST</i>	<p>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.</p> <ul style="list-style-type: none"> <li>• <b>ip</b> - (Optional) 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.</li> </ul>
<b>protocol</b> <i>PROTOCOL-NAME</i>	<p>Specifies the protocol name to be matched.</p>
<b>vlan</b> <i>VLAN-ID-LIST</i>	<p>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.</p>

---



---

## Default

None.

## Command Mode

Class-map Configuration Mode.

## 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)#
```

## 54-4 mls qos cos

This command is used to configure the default Class of Service (CoS) value of a port. Use the **no** form of this command to revert to the default settings.

```
mls qos cos {COS-VALUE | override}
no mls qos cos
```

### Parameters

<i>COS-VALUE</i>	Specifies to assign a default CoS value to a port. This CoS will be applied to the incoming untagged packets received by the port.
<b>override</b>	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.

### Usage Guideline

When the **override** parameter 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** parameter is specified, the port default CoS will be applied to all packets received by the port. Use the **override** parameter 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 to configure the default CoS value to 3 on port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# mls qos cos 3
Switch(config-if)#
```

## 54-5 mls qos dscp-mutation

This command is used to attach an ingress Differentiated Services Code Point (DSCP) mutation map to the interface. Use the **no** form of this command to remove the ingress DSCP mutation map association from the interface.

```
mls qos dscp-mutation DSCP-MUTATION-TABLE-NAME
no mls qos dscp-mutation
```

### Parameters

<i>DSCP-MUTATION-TABLE-NAME</i>	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.

### 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 attach the ingress-DSCP mutation map named "mutemap1" to port 1.

```
Switch# configure terminal
Switch(config)# mls qos map dscp-mutation mutemap1 30 to 8
Switch(config)# interface eth1/0/1
Switch(config-if)# mls qos dscp-mutation mutemap1
Switch(config-if)#
```

## 54-6 mls qos map dscp-cos

This command is used to define a DSCP-to- CoS map. Use the **no** form of this command to revert to the default setting.

```
mls qos map dscp-cos DSCP-LIST to COS-VALUE
no mls qos map dscp-cos DSCP-LIST
```

## Parameters

<b>dscp-cos</b> <i>DSCP-LIST to COS-VALUE</i>	Specifies the list of DSCP code points to be mapped to a CoS value. The range is from 0 to 63. 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.
<i>DSCP-LIST</i>	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.

## 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 on port 6.

```
Switch# configure terminal
Switch(config)# interface eth1/0/6
Switch(config-if)# mls qos map dscp-cos 12,16,18 to 1
Switch(config-if)#
```

## 54-7 mls qos map dscp-mutation

This command is used to define a named DSCP mutation map. Use the **no** form of this command to remove the mutation map.

```
mls qos map dscp-mutation MAP-NAME INPUT-DSCP-LIST to OUTPUT-DSCP
no mls qos map dscp-mutation MAP-NAME
```

## Parameters

<i>MAP-NAME</i>	Specifies the name of the DSCP mutation map in a string length up to 32 characters (no space is allowed).
<i>INPUT-DSCP-LIST</i>	Specifies the list of DSCP code point to be mutated to another DSCP 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.
<i>OUTPUT-DSCP</i>	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.

## 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)#
```

## 54-8 mls qos scheduler

This command is used to configure the scheduling mechanism. Use the **no** form of this command to revert to the default setting.

```
mls qos scheduler {sp | rr | wrr | wdr}
no mls qos scheduler
```

### Parameters

<b>sp</b>	Specifies that all queues are in Strict Priority (SP) scheduling.
<b>rr</b>	Specifies that all queues are in Round-Robin (RR) scheduling.
<b>wrr</b>	Specifies the queues in the frame count Weighted Round-Robin (WRR) scheduling. If the weight of a queue be configured to zero, the queue is in the SP scheduling mode.
<b>wdr</b>	Specifies the queues of all ports in the frame length (quantum) Weighted Deficit Round-Robin (WDRR) 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.

## 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 eth1/0/1
Switch(config-if)# mls qos scheduler sp
Switch(config-if)#
```

## 54-9 mls qos trust

This command is used to configure the trust state of a port to trust either the CoS field or the DSCP field of the arriving packet for subsequent QoS operation. Use the **no** form of this command to revert to the default setting.

**mls qos trust {cos | dscp}**

**no mls qos trust**

### Parameters

<b>cos</b>	Specifies that the CoS bits of the arriving packets are trusted for subsequent QoS operations.
<b>dscp</b>	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.

### 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

## Example

This example shows how to configure port 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)#
```

---

## 54-10 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. Use the **no** form of this command to delete a policy map.

**policy-map** *NAME*

**no policy-map** *NAME*

### Parameters

---

<i>NAME</i>	Specifies the name of the policy map. The name can be a maximum of 32 alphanumeric characters.
-------------	--

---

### Default

None.

### Command Mode

Global Configuration Mode.

### Usage Guideline

Use this 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 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 0
Switch(config-pmap-c)#
```

## 54-11 priority-queue cos-map

This command is used to define a CoS to queue map. Use the **no** form of this command to revert to the default setting.

```
priority-queue cos-map QUEUE-ID COS1 [COS2 [COS3 [COS4 [COS5 [COS6 [COS7 [COS8]]]]]]]
no priority-queue cos-map
```

### Parameters

<i>QUEUE-ID</i>	Specifies the queue ID the CoS will be mapped.
<i>COS1</i>	Specifies the mapping CoS value. Valid values are from 0 to 7.
<i>COS2...COS8</i>	(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.

### 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)#
```

## 54-12 queue rate-limit

This command is used to specify or modify the bandwidth allocated for a queue. Use the **no** form of this command to remove the bandwidth allocated for a queue.

**queue** *QUEUE-ID* **rate-limit** {*MIN-BANDWIDTH-KBPS* | **percent** *MIN-PERCENTAGE*} {*MAX-BANDWIDTH-KBPS* | **percent** *MAX-PERCENTAGE*}

**no queue** *QUEUE-ID* **rate-limit**

### Parameters

<i>QUEUE-ID</i>	Specifies the queue ID to set minimal guaranteed and maximum bandwidth.
<i>MIN-BANDWIDTH-KBPS</i>	Specifies the minimal guaranteed bandwidth in kilobits per second allocated to a specified queue.
<i>MAX-BANDWIDTH-KBPS</i>	Specifies the maximum bandwidth in kilobits per second for a specified queue.
<i>MIN-PERCENTAGE</i>	Specifies to set the minimal bandwidth by percentage. The valid range is from 1 to 100.
<i>MAX-PERCENTAGE</i>	Specifies to set the maximum bandwidth by percentage. The valid range is from 1 to 100.

### Default

None.

### Command Mode

Interface Configuration Mode.

### 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 port 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 eth1/0/1
Switch(config-if)# queue 1 rate-limit 100 2000
Switch(config-if)# queue 2 rate-limit percent 10 percent 50
Switch(config-if)#
```



## 54-13 rate-limit {input | output}

This command is used to set the received or transmitted bandwidth limit values for an interface. Use the **no** form of this command to disable the bandwidth limit.

```
rate-limit {input | output} {NUMBER-KBPS | percent PERCENTAGE} [BURST-SIZE]
no rate-limit {input | output}
```

### Parameters

<b>input</b>	Specifies the bandwidth limit for ingress packets.
<b>output</b>	Specifies the bandwidth limit for egress packets.
<i>NUMBER-KBPS</i>	Specifies the number of kilobits per second as the maximum bandwidth limit.
<i>PERCENTAGE</i>	Specifies to set the limited rate by percentage. The valid range is 1 to 100.
<i>BURST-SIZE</i>	(Optional) Specifies the limit for burst traffic in Kbyte.

### Default

By default, there is no limitation.

### Command Mode

Interface Configuration Mode.

### 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 to configure the maximum bandwidth limits on port 5. The ingress bandwidth is limited to 2000Kbps and 30K bytes for burst traffic.

```
Switch# configure terminal
Switch(config)# interface eth1/0/5
Switch(config-if)# rate-limit input 2000 30
Switch(config-if)#
```

## 54-14 service-policy

This command is used to attach a policy map to an input interface. Use the **no** form of this command to remove a service policy from an input interface.

```
service-policy input NAME
no service-policy input
```

### Parameters

<b>input</b>	Specifies to apply the policy map for ingress flow on the interface.
<i>NAME</i>	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.

## Usage Guideline

Use this 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 to create a policy map “cust1-class” and attach to port 1 for ingress traffic..

```
Switch#configure terminal
Switch(config)#policy-map cust1-class
Switch(config-pmap)#exit
Switch(config)#interface eth1/0/1
Switch(config-if)#service-policy input cust1-class
Switch(config-if)#
```

## 54-15 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. Use the **no** form of this command to remove the set.

```
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

<b>precedence</b> <i>PRECEDENCE</i>	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.
<b>dscp</b> <i>DSCP</i>	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.
<b>cos</b> <i>COS</i>	Specifies to assign a new CoS value to the packet. The range is from 0 to 7.
<b>cos-queue</b> <i>COS-QUEUE</i>	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.

## 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.

## Example

This example shows how to configure the policy map "policy1" with the policy for the class1 class. The packets that are included in the class1 class will be set to a DSCP of 10.

```
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)#
```

---

## 54-16 show class-map

This command is used to display the class map configuration.

```
show class-map [NAME]
```

### Parameters

---

<i>NAME</i>	(Optional) Specifies the name of the class map. The class map name can be a maximum of 32 alphanumeric characters.
-------------	--

---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display all class maps and their matching criteria.

## Example

This example shows how to define two class maps. 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#
```

## 54-17 show mls qos interface

This command is used to display port level QoS configuration.

```
show mls qos interface INTERFACE-ID [, | -] {cos | scheduler | trust | rate-limit | queue-rate-limit | dscp-mutation | map dscp-cos}
```

### Parameters

<i>INTERFACE-ID</i>	Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>cos</b>	Specifies to displays the port default CoS.
<b>scheduler</b>	Specifies to displays the transmit queue scheduling settings.
<b>trust</b>	Specifies to displays the port trust State.
<b>rate-limit</b>	Specifies to displays the bandwidth limitation configured for the port.
<b>queue-rate-limit</b>	Specifies to displays the bandwidth allocation configured for the queue.
<b>dscp-mutation</b>	Specifies to displays the DSCP mutation map attached to the interface.
<b>map dscp-cos</b>	Specifies to displays the mapping of DSCP to CoS.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display port level QoS configuration.

## Example

This example shows how to display the default CoS for ports 2 to 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 ports 2 to 5.

```
Switch# show mls qos interface eth1/0/2-5 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 ports 1 to 2.

```
Switch# show mls qos interface eth1/0/1-2 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 ports 1 to 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 ports 1 to 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 ports 1 to 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 CoS map for port 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 01 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#
```

## 54-18 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

<i>MAP-NAME</i>	(Optional) Specifies the name of the DSCP mutation map to be displayed.
-----------------	---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command 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: mutemap1
```

```
Attaching interface:
```

```
eth1/0/3
```

```

      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  08 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#
```

## 54-19 show mls qos queueing

This command is used to display the QoS queueing information and weight configuration for different scheduler algorithm on specified interface(s).

```
show mls qos queueing [interface INTERFACE-ID [, | -]]
```

### Parameters

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the QoS queueing information and weight configuration for different scheduler algorithm on specified interface(s). If no parameter is specified, the system-wide map of CoS to queue ID will be 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 queueing 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 port 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#
```

---

## 54-20 show policy-map

This command is used to display the policy map configuration.

---

```
show policy-map [POLICY-NAME] interface INTERFACE-ID
```

## Parameters

<b>POLICY-NAME</b>	(Optional) Specifies the name of the policy map. If not specified, all policy maps will be displayed.
<b>interface <i>INTERFACE-ID</i></b>	(Optional) Specifies the physical port interface to be displayed.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the class policy configured for the policy map.

## Example

This example shows how to display the class policy configured for the policy map.

```
Switch#show policy-map

Policy Map cust1-classes
Class Map gold

Switch#
```

---

## 54-21 wdr queue bandwidth

This command is used to set the queue quantum in the WDRR scheduling mode. Use the **no** form of this command to revert to the default setting.

```
wdr queue bandwidth QUANTUM1...QUANTUM8
no wdr queue bandwidth
```

## Parameters

<b><i>QUANTUM1</i> ...<i>QUANTUM8</i></b>	Specifies the quantum value (frame length count) for each of the eight quantum queues used in WDRR scheduling. The quantum value range is from 0 to 127.
---	--

## Default

By default, the quantum value is 1 for all queues.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

This command takes effect when the scheduling mode is in the WDRR mode. Use the **mls qos scheduler wdr** command to change the scheduling mode to the 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 port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# mls qos scheduler wdr
Switch(config-if)# wdr-queue bandwidth 1 2 3 4 5 6 7 8
Switch(config-if)#
```

## 54-22 wrr-queue bandwidth

This command is used to set the queue weight in the WRR scheduling mode. Use the **no** form of this command to revert to the default setting.

**wrr-queue bandwidth WEIGHT1...WEIGHT8**

**no wrr-queue bandwidth**

## Parameters

<i>WEIGHT1 ...WEIGHT8</i>	Specifies the weight value (frame count) for each of the eight weight queues used in WRR scheduling. The weight value range is from 0 to 127.
---------------------------	---

## Default

By default, the weight value for WEIGHT1 to WEIGHT7 is 1.

By default, the weight value for WEIGHT8 is 0.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

This command takes effect when the scheduling mode is in the WDRR mode. Use the **mls qos scheduler wdr** command to change the scheduling mode to the WDRR mode. To meet 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 port 1.

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

<i>INDEX</i>	Specifies the Remote Network Monitoring (RMON) table index. The range is from 1 to 65535.
<i>owner NAME</i>	Specifies the owner string. The maximum length is 127.

### Default

By default, this option is disabled.

### Command Mode

Interface Configuration Mode.

### 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 port 2.

```
Switch# configure terminal
Switch(config)# interface eth1/0/2
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

<i>INDEX</i>	Specifies the history group table index. The range is from 1 to 65535.
<i>owner NAME</i>	Specifies the owner string. The maximum length is 127.

<b>buckets</b> <i>NUM</i>	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.
<b>interval</b> <i>SECONDS</i>	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.

## 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 port 8.

```
Switch# configure terminal
Switch(config)# interface eth1/0/8
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. Use the **no** form of this command to remove an alarm entry.

**rmon alarm** *INDEX VARIABLE INTERVAL {delta | absolute} rising-threshold VALUE [RISING-EVENT-NUMBER] falling-threshold VALUE [FALLING-EVENT-NUMBER] [owner STRING]*

**no rmon alarm** *INDEX*

## Parameters

<i>INDEX</i>	Specifies the alarm index. The range is from 1 to 65535.
<i>VARIABLE</i>	Specifies the object identifier of the variable to be sampled.
<i>INTERVAL</i>	Specifies the interval in seconds for the sampling of the variable and checking against the threshold. The valid range is from 1 to 2147483647.
<b>delta</b>	Specifies that the delta of two consecutive sampled values is monitored.
<b>absolute</b>	Specifies that the absolute sampled value is monitored.
<b>rising-threshold</b> <i>VALUE</i>	Specifies the rising threshold. The valid range is from 0 to 2147483647.
<i>RISING-EVENT-NUMBER</i>	(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.
<b>falling-threshold</b> <i>VALUE</i>	Specifies the falling threshold. The valid range is from 0 to 2147483647.
<i>FALLING-EVENT-NUMBER</i>	(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.

---

<b>owner</b> <i>STRING</i>	Specifies the owner string. The maximum length is 127.
----------------------------	--

---

**Default**

None.

**Command Mode**

Global Configuration Mode.

**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. Use the **no** form of this command to remove an event entry.

```
rmon event INDEX [log] [[trap COMMUNITY] [owner NAME] [description STRING]]
no rmon event INDEX
```

**Parameters**


---

<i>INDEX</i>	Specifies the index of the alarm entry. The valid range is from 1 to 65535.
<b>log</b>	(Optional) Specifies to generate log message for the notification.
<b>trap</b> <i>COMMUNITY</i>	(Optional) Specifies to generate SNMP trap messages for the notification. The maximum length is 127.
<b>owner</b> <i>NAME</i>	(Optional) Specifies the owner string. The maximum length is 127.
<b>description</b> <i>STRING</i>	(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.

**Usage Guideline**

If the **log** parameter is specified but not the **trap** parameter, the created entry will cause a log entry to be generated on an event occurrence. If the **trap** parameter is specified but not the **log** parameter, the created entry will cause an SNMP notification to be generated on an event occurrence.

If both **log** and **trap** 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 display the alarm configuration.

```
show rmon alarm
```

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the RMON alarm table.

## Example

This example shows how to display 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**

User/Privileged EXEC Mode.

**Usage Guideline**

Use this command to display the RMON event table.

**Example**

This example shows how to display 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: 0:0:0, 0

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**

User/Privileged EXEC Mode.

**Usage Guideline**

Use this command to display 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 eth1/0/2
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

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display RMON Ethernet statistics.

## Example

This example shows how to display RMON Ethernet statistics.

```
Switch# show rmon statistics

Index 32, owned by it@domain.com, Data Source is eth1/0/3
  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 sending of SNMP notifications for RMON. Use the **no** form of this command to disable the sending of SNMP notifications for RMON.

**snmp-server enable traps rmon [rising-alarm | falling-alarm]**

**no snmp-server enable traps rmon [rising-alarm | falling-alarm]**

### Parameters

<b>rising-alarm</b>	(Optional) Specifies to configure the rising alarm trap state.
<b>falling-alarm</b>	(Optional) Specifies to configure the falling alarm trap state.

### Default

By default, this option is disabled.

### Command Mode

Global Configuration Mode.

### Usage Guideline

Use this command to to enable or disable the sending of SNMP notifications for RMON.

## 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 rguard policy

This command is used to create an RA guard policy. The command will enter into the RA Guard Policy Configuration Mode mode. Use the **no** form of this command to remove an RA guard policy.

```
ipv6 nd rguard policy POLICY-NAME
no ipv6 nd rguard policy POLICY-NAME
```

#### Parameters

<i>POLICY-NAME</i>	Specifies the IPv6 RA guard policy name.
--------------------	--

#### Default

None.

#### Command Mode

Global Configuration Mode.

#### Usage Guideline

Use this command to create or remove an RA guard policy. This command will enter the RA Guard Policy Configuration Mode.

#### Example

This example shows how to create an RA guard policy named policy1.

```
Switch# configure terminal
Switch(config)# ipv6 nd rguard 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 this command to revert to the default setting.

```
device-role {host | router}
no device-role
```

#### Parameters

<b>host</b>	Specifies to set the role of the attached device to host.
<b>router</b>	Specifies to set the role of the attached device to router.

#### Default

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

## Command Mode

RA Guard Policy Configuration Mode.

## Usage Guideline

Use this command to set the role of the attached device. By default, the device role is **host**, and all the inbound router advertisement and redirect messages are blocked. If the device role is set to **router**, all messages, Router Solicitation (RS), Router Advertisement (RA), or redirect are allowed on this port.

## Example

This example shows how to create an RA guard policy named “raguard1” and set the device as **host**.

```
Switch# configure terminal
Switch(config)# ipv6 nd raguard policy raguard1
Switch(config-ra-guard)# device-role host
Switch(config-ra-guard)#
```

---

## 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 this command to disable the filtering.

```
match ipv6 access-list IPV6-ACCESS-LIST-NAME
no match ipv6 access-list
```

## Parameters

---

<i>IPV6-ACCESS-LIST-NAME</i>	Specifies a standard IPv6 access list.
------------------------------	--

---

## Default

None.

## Command Mode

RA Guard Policy Configuration Mode

## Usage Guideline

Use this command to filter RA messages based on the sender IP address when the interface device role is set to **router**. If the **match ipv6 access-list** command is not configured, all RA messages are bypassed. An access list is configured using the **ipv6 access-list** command.

## Example

This example shows how to create an RA guard policy and matches the IPv6 addresses in the access list named list1.

```
Switch# configure terminal
Switch(config)# ipv6 nd raguard policy raguard1
Switch(config-ra-guard)# match ipv6 access-list list1
Switch(config-ra-guard)#
```

## 56-4 ipv6 nd rguard attach-policy

This command is used to apply an RA guard policy on a specified interface. Use the **no** form of this command to remove the binding.

```
ipv6 nd rguard attach-policy [POLICY-NAME]
no ipv6 nd rguard
```

### Parameters

---

<i>POLICY-NAME</i>	(Optional) SSpecifies the IPv6 RA guard policy name.
--------------------	--

---

### Default

None.

### Command Mode

Interface Configuration Mode.

### Usage Guideline

Only one RA policy can be attached. If no parameter is specified, the default policy will set the device role to **host**.

### Example

This example shows how to apply the RA guard policy on port 3.

```
Switch# configure terminal
Switch(config)# ipv6 nd rguard policy rguard1
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 rguard attach-policy rguard1
Switch(config-if)#
```

---

## 56-5 show ipv6 nd rguard policy

This command is used to display RA guard policy information.

```
show ipv6 nd rguard policy [POLICY-NAME]
```

### Parameters

---

<i>POLICY-NAME</i>	(Optional) SSpecifies the IPv6 RA guard policy name.
--------------------	--

---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display RA guard policy information. If no parameter is specified, information of all policies will be displayed for all policies.

## Example

This example shows how to display the information of the RA guard policy "raguard1".

```
Switch# show ipv6 nd raguard policy raguard1
```

```
Policy raguard1 configuration:
```

```
Device Role: host
```

```
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

<b>all</b>	Specifies to clear all CPU protect counters.
<b>sub-interface [manage   protocol   route]</b>	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.
<b>type [PROTOCOL-NAME]</b>	Specifies to clear the CPU protect related counters of the specified protocol. If no protocol name is specified, then all protocols will be cleared.

#### Default

None.

#### Command Mode

Privileged EXEC Mode.

#### Usage Guideline

Use this command to clear the CPU protect related counters.

#### Example

This example shows how to clear all CPU protect related statistics.

```
Switch# clear cpu-protect counters all
Switch#
```

### 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

<b>threshold</b>	(Optional) Specifies to configure the utilization to control when the Safeguard Engine function will activate.
<i>RISING-THRESHOLD</i>	(Optional) Specifies to set a percentage value of the rising CPU utilization which will trigger the Safeguard Engine function. Once the CPU utilization rises over the specified percentage, the Safeguard Engine mechanism will initiate. The valid range is from 20 to 100.
<i>FALLING-THRESHOLD</i>	(Optional) Specifies to set a percentage value of the falling CPU utilization which will trigger the Safeguard Engine function to cease. Once the CPU utilization falls

---



---

to the specified percentage, the Safeguard Engine mechanism will shut down.  
The valid range is from 20 to 100.

---



---

## Default

By default, Safeguard Engine is disabled.

By default, the rising threshold of CPU utilization is 70.

By default, the falling threshold of CPU utilization is 20.

## Command Mode

Global Configuration Mode.

## 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 for the CPU by sub-interface types. Use the **no** form of this command to revert to the default settings.

**cpu-protect sub-interface {manage | protocol | route} pps *RATE***

**no cpu-protect sub-interface {manage | protocol | route}**

## Parameters

---



---

<i>RATE</i>	Specifies the threshold value. The unit is packets per second. When set to 0, all packets of the specified sub-interface type will be dropped.
-------------	--

---



---

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

The reasons of packets that are destined to the CPU can be classified into three groups: **manage**, **protocol** and **route**. The sub-interface is a logical interface, which handles the CPU received packets by different groups. Generally speaking, the protocol packets should have higher priority to make sure the functions work normally. The CPU usually is not involved in the routing of packets. In few cases, such as learning new IP address or if the



default route is not specified, some packets will be sent to the CPU for software routing. Use this command to limit the rate of routed packets to avoid the CPU spending too much time for routing packets.

## Example

This example shows how to configure the rate limit of packets for the management sub-interface and the threshold is 1000 packets per seconds.

```
Switch# configure terminal
Switch(config)# cpu-protect sub-interface manage pps 1000
Switch(config)#
```

## 57-4 cpu-protect type

This command is used to configure the rate limit of traffic destined for the CPU by the protocol type. Use the **no** form of this command to revert to the default setting.

```
cpu-protect type PROTOCOL-NAME pps RATE
no cpu-protect type PROTOCOL-NAME
```

## Parameters

<i>PROTOCOL-NAME</i>	Specifies the protocol name to be configured.
<i>RATE</i>	Specifies the threshold value. The unit is packets per second. When set to 0, all packets of the specified protocol are dropped.

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

The CPU must handle certain packets, such as routing protocols, Layer 2 protocols, and packets for management. If the traffic destined to the CPU overloads it, the CPU will spend much time processing unnecessary traffic and the routing processes are impacted. To mitigate the impact on the CPU, use this command to control the threshold of individual protocol packets.

The following lists the reference for the supported protocols for the CPU protect type command. According to the purpose of packets destined to CPU, the router creates three virtual sub-interfaces to process the packets:

- **manage** - The packets are destined to any router interface or system network management interface via the interactive access protocol, such as Telnet and SSH.
- **protocol** - The packets are protocol control packets which can be identified by the router.
- **route** - Other packets traversing the router for routing that must be processed by the router's CPU before it can be routed without the CPU's involvement.

The following table lists the supported protocol names for this command:

Protocol Name	Description	Classification (sub-interface)
<b>8021x</b>	Port-based Network Access Control	Protocol
<b>arp</b>	IP Address Resolution Protocol (ARP)	Protocol
<b>dhcp</b>	Dynamic Host Configuration	Protocol
<b>dns</b>	Domain Name Services	Protocol

<b>icmpv4</b>	IPv4 Internet Control Message Protocol	Protocol
<b>icmpv6-neighbor</b>	IPv6 ICMP Neighbor Discover Protocol (NS/NA/RS/RA)	Protocol
<b>icmpv6-other</b>	IPv6 ICMP except NDP NS/NA/RS/RA	Protocol
<b>igmp</b>	Internet Group Management Protocol	Protocol
<b>lACP</b>	Link Aggregation Control Protocol	Protocol
<b>snmp</b>	Simple Network Management Protocol	Manage
<b>ssh</b>	Secured shell	Manage
<b>stp</b>	Spanning Tree Protocol (802.1D)	Protocol
<b>telnet</b>	Telnet	Manage
<b>tftp</b>	Trivial File Transfer Protocol	Manage
<b>web</b>	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

User/Privileged EXEC Mode.

### Usage Guideline

Use this command 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

---

<b>Safeguard Engine Status</b>	Displays the current mode that CPU utilization stays. The possible displayed strings are: <ul style="list-style-type: none"> <li>• <b>Exhausted</b> - 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.</li> <li>• <b>Normal</b> - The Safeguard Engine is not triggered to take actions.</li> </ul>
--------------------------------	--

---

## 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}
```

### Parameters

---

<b>manage</b>	Specifies the manager sub-interface to be displayed.
<b>protocol</b>	Specifies the protocol sub-interface to be displayed.
<b>route</b>	Specifies the route sub-interface to be displayed.

---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the configured rate limit and drop count of the safeguard engine of a specific group. These counters are counted by the software.

## Example

This example shows how to display the configured rate limit and drop count of the safeguard engine of a specific group..

```
Switch#show cpu-protect sub-interface manage

Sub-Interface: manage
Rate Limit: N/A

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*

### Parameters

<i>PROTOCOL-NAME</i>	Specifies the configured rate limit and statistics of the specified protocol to be displayed.
----------------------	---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display the rate limit and statistics of the safeguard engine.

## Example

This example shows how to display the rate limit and statistics of the safeguard engine.

```
Switch#show cpu-protect type arp

Type: arp
Rate Limit: N/A

Switch#
```

## 57-8 snmp-server enable traps safeguard-engine

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

## Usage Guideline

Use this command to enable or disable the sending of SNMP notifications for the Safeguard Engine.

## Example

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

<b>rsa</b>	Specifies to generate the RSA key pair.
<b>modulus <i>MODULUS-SIZE</i></b>	(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.
<b>dsa</b>	Specifies to generate the DSA key pair. The DSA key size is fixed as 1024 bit.

#### Default

None.

#### Command Mode

Privileged EXEC Mode.

#### Usage Guideline

Use this command 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

<b>rsa</b>	Specifies to delete the RSA key pair.
<b>dsa</b>	Specifies to delete the DSA key pair.

## Default

None.

## Command Mode

Privileged EXEC Mode.

## Usage Guideline

Use this command to delete 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. Use the **no** form of this command to revert to the default settings.

```
ip ssh {timeout SECONDS | authentication-retries NUMBER}
no ip ssh {timeout | authentication-retries}
```

## Parameters

<b>timeout</b> <i>SECONDS</i>	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.
<b>authentication-retries</b> <i>NUMBER</i>	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.

## 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** form of this 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.

### Usage Guideline

Use this command to enable or disable 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** form of this command to revert to the default setting.

```
ip ssh service-port TCP-PORT
no ip ssh service-port
```



---

## Parameters

---

<i>TCP-PORT</i>	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.

## Usage Guideline

Use this command to specify the TCP port 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

---

<b>rsa</b>	Specifies to display information regarding the RSA public key.
<b>dsa</b>	Specifies to display information regarding the DSA public key.

---

## Default

None.

## Command Mode

Privileged EXEC Mode.

## Usage Guideline

Use this command to display the RSA or DSA public key pairs.

## Example

This example shows how to display the information of 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 aClyc2EA 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

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display 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**

User/Privileged EXEC Mode.

**Usage Guideline**

Use this command to display the status of SSH server connections on the Switch.

**Example**

This example shows how to display the status of SSH server connections.

Switch# show ssh

```

SID Ver. Cipher                               Userid           Client IP Address
-----
0   V2  3des-cbc/hmac-sha1-96                     zhang3          192.168.0.100
1   V2  3des-cbc/hmac-sha1                         lee4567890123456 2000::243

```

Total Entries: 2

Switch#

**Display Parameters**

<b>SID</b>	A unique number that identifies the SSH session.
<b>Ver</b>	Indicates the SSH version of this session.
<b>Cipher</b>	The cryptographic / Hashed Message Authentication Code (HMAC) algorithm that the SSH client is using.
<b>Userid</b>	The login username of the session.
<b>Client IP Address</b>	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 revert to the default settings.

```
ssh user NAME authentication-method {password | publickey URL | hostbased URL host-name
HOSTNAME [IP-ADDRESS | IPV6-ADDRESS]}
```

```
no ssh user NAME authentication-method
```

## Parameters

<i>NAME</i>	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.
<b>password</b>	Specifies to use the password authentication method for this user account. This is the default authentication method.
<b>publickey</b> <i>URL</i>	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.
<b>hostbased</b> <i>URL</i>	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.
<b>host-name</b> <i>HOSTNAME</i>	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.
<i>IP-ADDRESS</i>	(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.
<i>IPV6-ADDRESS</i>	(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.

## 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 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

<i>NAME</i>	Specifies the name of the certificate to be deleted.
-------------	--

#### Default

None.

#### Command Mode

Certificate Chain Configuration Mode.

#### 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** *fttp://IP-ADDRESS[DIRECTORY]FILE-NAME* [**password** *PASSWORD-PHRASE*] {**ca** | **local** | **both**}

## Parameters

<i>TRUSTPOINT</i>	Specifies the name of the trust-point that is associated with the imported certificates and key pairs.
<i>FILE-SYSTEM</i>	Specifies the file system for certificates and key pairs. A colon (:) is required after the specified file system. For example, <b>flash:</b> represents the system FLASH.
<i>DIRECTORY</i>	(Optional) Specifies the directory name where the Switch should import the certificates and key pairs in the Switch or TFTP server.
<i>FILE-NAME</i>	Specifies the name of the certificates and key pairs to be imported. By default, the Switch will append this name with <i>.ca</i> , <i>.prv</i> and <i>.crt</i> for CA certificate, private key and certificate respectively.
<b>password</b> <i>PASSWORD-PHRASE</i>	(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.
<b>tftp:</b>	Specifies the source URL for a TFTP network server.
<i>IP-ADDRESS</i>	Specifies the IP address of the TFTP server.
<b>ca</b>	Specifies to import the CA certificate only.
<b>local</b>	Specifies to import local certificate and key pairs only.
<b>both</b>	Specifies to import the CA certificate, local certificate and key pairs.

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command 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 does not 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# configure terminal
Switch(config)# 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(config)#

```

## 59-3 crypto pki trustpoint

This command is used to declare the trust-point that the Switch will use. Use the **no** form of this command to delete all certificates and key pairs associated with the trust-point.

```

crypto pki trustpoint NAME
no crypto pki trustpoint NAME

```

### Parameters

---

<i>NAME</i>	Specifies to create a name for the trust-point.
-------------	---

---

### Default

None.

### Command Mode

Global Configuration Mode.

### Usage Guideline

Use this command to declare a trust-point, which can be a self-signed root certificate authority (CA) or a subordinate CA. Issuing this command will enter the CA-Trust-Point Configuration Mode.

## Example

This example shows how to declare a trust-point "TP1" and specify it is a primary trust-point.

```
Switch# configure terminal
Switch(config)# crypto pki trustpoint TP1
Switch(ca-trustpoint)# primary
Switch(ca-trustpoint)#
```

---

## 59-4 crypto pki certificate chain

This command is used to enter the Certificate Chain Configuration Mode.

**crypto pki certificate chain** *NAME*

### Parameters

---

<i>NAME</i>	Specifies the name for the trust-point.
-------------	---

---

### Default

None.

### Command Mode

Global Configuration Mode.

### Usage Guideline

Use this command to enter the Certificate Chain Configuration Mode. If the specified trust-point name does not exist, an error message will be displayed.

## Example

This example shows how to enter the 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 trustpoint as the primary trustpoint of the Switch. Use the **no** form of this command to unbind the setting.

**primary**  
**no primary**

### Parameters

None.

### Default

By default, this option is disabled.



## Command Mode

CA-Trust-Point Configuration Mode.

## Usage Guideline

Use this command to specify a given trust-point as primary. This trust-point can be used as default trust-point when the application does not 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

---

---

<i>TRUSTPOINT</i>	(Optional) Specifies the name of the trust-point to be displayed.
-------------------	---

---

---

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## 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

---

<i>POLICY-NAME</i>	(Optional) Specifies the name of the SSL service policy.
--------------------	--

---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

If no parameter is 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      : policyForHttp
  Enabled Versions :
    TLS 1.0
    TLS 1.1
    TLS 1.2
  Enabled CipherSuites :
    DHE_DSS_WITH_3DES_EDE_CBC_SHA,
    RSA_WITH_3DES_EDE_CBC_SHA,
    RSA_WITH_RC4_128_SHA,
    RSA_WITH_RC4_128_MD5,
    RSA_EXPORT_WITH_RC4_40_MD5
    RSA_WITH_AES_128_CBC_SHA
    RSA_WITH_AES_256_CBC_SHA
    RSA_WITH_AES_128_CBC_SHA256
    RSA_WITH_AES_256_CBC_SHA256
    DHE_DSS_WITH_AES_256_CBC_SHA
    DHE_RSA_WITH_AES_256_CBC_SHA
  Session Cache Timeout: 600
  Secure Trustpoint   : ggg

SSL Policy Name      : policyForFTP
  Enabled Versions :
    TLS 1.0
    TLS 1.1
    TLS 1.2
  Enabled CipherSuites :
    RSA_WITH_RC4_128_MD5,
    RSA_EXPORT_WITH_RC4_40_MD5
  Session Cache Timeout: 1200
  Secure Trustpoint   : domain2

Switch#
```

## 59-8 ssl-service-policy

This command is used to configure the SSL service policy. Use the **no** form of this command to remove the SSL service policy.

**ssl-service-policy** *POLICY-NAME* [**version** [*VERSION*] | **ciphersuite** [*CIPHERSUITE*] | **secure-trustpoint** *TRUSTPOINT* | **session-cache-timeout** *TIME-OUT*]

**no ssl-service-policy** *POLICY-NAME* [**version** [*VERSION*] | **ciphersuite** [*CIPHERSUITE*] | **secure-trustpoint** *TRUSTPOINT* | **session-cache-timeout** *TIME-OUT*]

### Parameters

<i>POLICY-NAME</i>	Specifies the name of the SSL service policy.
<b>version</b> <i>VERSION</i>	(Optional) Specifies the TLS version. One of the following keywords can be used: <ul style="list-style-type: none"> <li><b>tls1.0</b> - Specifies to use TLS version 1.0 as the SSL service policy.</li> <li><b>tls1.1</b> - Specifies to use TLS version 1.1 as the SSL service policy.</li> </ul>

---



---

	<ul style="list-style-type: none"> <li>• <b>tls1.2</b> - Specifies to use TLS version 1.2 as the SSL service policy.</li> </ul>
<b>ciphersuite</b> <i>CIPHERSUITE</i>	<p>(Optional) Specifies the cipher suites that should be used by the secure service when negotiating a connection with a remote peer. 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.</p> <p>The following keywords can be used:</p> <ul style="list-style-type: none"> <li>• <b>dhe-dss-3des-ede-cbc-sha</b> - Specifies to use DH key exchange with 3DES-EDE-CBC encryption and SHA for message digest.</li> <li>• <b>rsa-3des-ede-cbc-sha</b> - Specifies to use RSA key exchange with 3DES and DES-EDE3-CBC for message encryption and the Secure Hash Algorithm (SHA) for message digest.</li> <li>• <b>rsa-rc4-128-sha</b> - Specifies to use RSA key exchange with RC4 128-bit encryption for message encryption and SHA for message digest.</li> <li>• <b>rsa-rc4-128-md5</b> - Specifies to use RSA key exchange with RC4 128-bit encryption for message encryption and Message Digest 5 (MD5) for message digest.</li> <li>• <b>rsa-export-rc4-40-md5</b> - Specifies to use RSA EXPORT key exchange with RC4 40 bits for message encryption and MD5 for message digest.</li> <li>• <b>rsa-aes-128-cbc-sha</b> - Specifies to use RSA key exchange with AES 128-bit encryption for message encryption and SHA for message digest.</li> <li>• <b>rsa-aes-256-cbc-sha</b> - Specifies to use RSA key exchange with AES 256-bit encryption for message encryption and SHA for message digest.</li> <li>• <b>rsa-aes-128-cbc-sha256</b> - Specifies to use RSA key exchange with AES 128-bit encryption for message encryption and SHA 256-bit for message digest.</li> <li>• <b>rsa-aes-256-cbc-sha256</b> - Specifies to use RSA key exchange with AES 256-bit encryption for message encryption and SHA 256-bit for message digest.</li> <li>• <b>dhe-dss-aes-256-cbc-sha</b> - Specifies to use DH key exchange with AES 256-bit encryption and SHA for message digest.</li> <li>• <b>dhe-rsa-aes-256-cbc-sha</b> - Specifies to use DH key exchange with AES 256-bit encryption and SHA for message digest.</li> </ul>
<b>secure-trustpoint</b> <i>TRUSTPOINT</i>	<p>(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.</p>
<b>session-cache-timeout</b> <i>TIME-OUT</i>	<p>(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.</p>

---



---

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command 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)#
```

## 59-9 crypto pki certificate generate

This command is used to generate a new self-signed certificate.

**crypto pki certificate generate**

### Parameters

None.

### Default

By default, the Switch automatically generates a random build-in certificate.

### Command Mode

Global Configuration Mode.

### Usage Guideline

Use this command to generate a new self-signed certificate regardless there is a build-in self-signed certificate or not. The Switch will generate a new self-signed certificate automatically if no certificate is detected after the Switch booted up.

The certificate generated by this command does not affect the user-downloaded certificates.



**NOTE:** This command only supports self-signature RSA certificate with the key length of 2048.

## Example

This example shows how to generate a new self-signed certificate.

```
Switch# configure terminal
Switch(config)# crypto pki certificate generate

Start generating key ...
Start generating self-signed certificate ...
Done.
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

<code>interface <i>INTERFACE-ID</i></code>	(Optional) Specifies the interfaces to be displayed.
<code>,</code>	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
<code>-</code>	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

#### Default

None.

#### Command Mode

User/Privileged EXEC Mode.

#### Usage Guideline

Use this command to display per interface link up/down trap state. If no parameter is specified, all interfaces will be displayed.

#### Example

This example shows how to display the link up/down trap state on ports 1 to 9.

```
Switch# show snmp trap link-status interface eth1/0/1-9
```

```
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**

---

<b>traps</b>	(Optional) Specifies to display trap related settings.
--------------	--

---

**Default**

None.

**Command Mode**

User/Privileged EXEC Mode.

**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

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

---

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the per port trap sending state. If no parameter is specified, all interfaces will be displayed.

## Example

This example shows how to display the trap sending state on ports 1 to 9.

```
Switch# show snmp-server trap-sending interface eth1/0/1-9
```

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** form of this command to disable the SNMP agent.

```
snmp-server
```

```
no snmp-server
```

## Parameters

None.



## Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## 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** form of this command to remove the setting.

**snmp-server contact** *TEXT*

**no snmp-server contact**

## Parameters

---

<i>TEXT</i>	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.

## Usage Guideline

Use this command to configure 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** form of this command to disable the sending of trap packets.

**snmp-server enable traps**

**no snmp-server enable traps**

### Parameters

None.

### Default

By default, this option is disabled.

### Command Mode

Global Configuration Mode.

### Usage Guideline

Use this command to enable or disable the device to send the SNMP notification traps globally.

### 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. Use the **no** form of this command to disable the sending of all or specific SNMP notifications.

**snmp-server enable traps snmp [authentication] [linkup] [linkdown] [coldstart] [warmstart]**

**no snmp-server enable traps snmp [authentication] [linkup] [linkdown] [coldstart] [warmstart]**

### Parameters

<b>authentication</b>	(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.
<b>linkup</b>	(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.
<b>linkdown</b>	(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.
<b>coldstart</b>	(Optional) Specifies to control the sending of SNMP coldStart notifications.

---



---

<b>warmstart</b>	(Optional) Specifies to control the sending of SNMP warmStart notifications.
------------------	--

---



---

## Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enable or disable 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** form of this command to remove the setting.

```
snmp-server location TEXT
no snmp-server location
```

## Parameters

---



---

<i>TEXT</i>	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.

## 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** form of this command to remove the setting.

```
snmp-server name NAME
no snmp-server name
```

### Parameters

---

<i>NAME</i>	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.

### 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 sending of notifications for the port. Use the **no** form of this command to enable the sending of notifications for the port.

```
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.

## Usage Guideline

Use this command to disable or enable the sending of notifications for the port. When disabled, 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 notifications for port 8.

```
Switch# configure terminal
Switch(config)# interface eth1/0/8
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 revert to the default setting.

**snmp-server service-port** *PORT-NUMBER*

**no snmp-server service-port**

## Parameters

---

<i>PORT-NUMBER</i>	Specifies the UDP port number. The range is from 1 to 65535. Some numbers may conflict with other protocols.
--------------------	--

---

## Default

By default, this number is 161.

## Command Mode

Global Configuration Mode.

## 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.

### Usage Guideline

Use this command 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.

## Usage Guideline

Use this command 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 port 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

<b>community</b>	Specifies to display SNMP community information.
<b>host</b>	Specifies to display SNMP trap recipient information.
<b>view</b>	Specifies to display SNMP view information.
<b>group</b>	Specifies to display SNMP group information.
<b>engineID</b>	Specifies to display SNMP local engine ID information.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display 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                                  ro      CommunityView checked with IP access control
list: SalesDvision
public                                   ro      CommunityView checked with IP access control
list: HB5
Develop                                  ro      RD2
private                                  ro      CommunityView 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
  NotifyView    : CommunityView
IP access control list:

GroupName: public          SecurityModel: v2c
  ReadView      : CommunityView
  NotifyView    : CommunityView
IP access control list:

GroupName: initial         SecurityModel: v3/noauth
  ReadView      : restricted
  NotifyView    : restricted
IP access control list:

GroupName: private         SecurityModel: v1
  ReadView      : CommunityView
  NotifyView    : CommunityView
IP access control list:

GroupName: private         SecurityModel: v2c
  ReadView      : 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: 800000ab033c1e04a1b9e000

Switch#
```

---

## 60-15 show snmp user

This command is used to display information about the configured SNMP user.

**show snmp user** [*USER-NAME*]

### Parameters

---

<i>USER-NAME</i>	(Optional) Specifies the name of a specific user to display SNMP information.
------------------	---

---

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

If no parameter is specified, all configured users will be displayed. The community string created will not be displayed by this command.

### Example

This example shows how to display SNMP users.

```
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: 0000000902000000C025808
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** form of this command to remove the community string.

```
snmp-server community COMMUNITY-STRING [view VIEW-NAME] [ro | rw] [access IP-ACL-NAME]
no snmp-server community COMMUNITY-STRING
```

### Parameters

<i>COMMUNITY-STRING</i>	Specifies the community with a maximum of 32 alphanumeric characters.
<b>view</b> <i>VIEW-NAME</i>	(Optional) Specifies a view name of a previously defined view. It defines the view accessible by the SNMP community.
<b>ro</b>	(Optional) Specifies read-only access.
<b>rw</b>	(Optional) Specifies read-write access.
<b>access</b> <i>IP-ACL-NAME</i>	(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.

### 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 **view** is not specified, it is permitted to access all objects.

### Example

This example shows how create a MIB view “interfacesMibView” and a community string “comaccess” which can do read write access the interfacesMibView view.

```
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** form of this command to revert to the default setting.

```
snmp-server engineID local ENGINEID-STRING
no snmp-server engineID local
```

## Parameters

<i>ENGINEID-STRING</i>	Specifies the engine ID string of a maximum of 24 characters.
------------------------	---

## Default

None.

## Command Mode

Global Configuration Mode.

## 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** form of this command to remove a SNMP group or remove a group from using a specific security model.

**snmp-server group** *GROUP-NAME* {**v1** | **v2c** | **v3** {**auth** | **noauth** | **priv**}} [**read** *READ-VIEW*] [**write** *WRITE-VIEW*] [**notify** *NOTIFY-VIEW*] [**access** *IP-ACL-NAME*]

**no snmp-server group** *GROUP-NAME* {**v1** | **v2c** | **v3** {**auth** | **noauth** | **priv**}}

## Parameters

<i>GROUP-NAME</i>	Specifies the group name of a maximum of 32 characters. The syntax is general string that does not allow space.
<b>v1</b>	Specifies that the group user can use the SNMPv1 security model.
<b>v2c</b>	Specifies that the group user can use the SNMPv2c security model.
<b>v3</b>	Specifies that the group user can use the SNMPv3 security model.
<b>auth</b>	Specifies to authenticate the packet but not encrypt it.
<b>noauth</b>	Specifies not to authenticate and not to encrypt the packet.
<b>priv</b>	Specifies to authenticate and encrypt the packet.
<b>read</b> <i>READ-VIEW</i>	(Optional) Specifies a read-view that the group user can access.
<b>write</b> <i>WRITE-VIEW</i>	(Optional) Specifies a write-view that the group user can access.
<b>notify</b> <i>NOTIFY-VIEW</i>	(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.
<b>access</b> <i>IP-ACL-NAME</i>	(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
Public	SNMPv1	None	CommunityView	None	CommunityView
Public	SNMPv2c	None	CommunityView	None	CommunityView
Private	SNMPv1	None	CommunityView	CommunityView	CommunityView
Private	SNMPv2c	None	CommunityView	CommunityView	CommunityView

By default, no ACL is associated with any SNMP group.

## Command Mode

Global Configuration Mode.

## 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 model, 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** form of this command to remove the recipient.

```
snmp-server host {IP-ADDRESS | IPV6-ADDRESS} [version {1 | 2c | 3 {auth | noauth | priv}}]
COMMUNITY-STRING [port PORT-NUMBER]
```

```
no snmp-server host {IP-ADDRESS | IPV6-ADDRESS} [COMMUNITY-STRING]
```

## Parameters

<i>IP-ADDRESS</i>	Specifies the IPv4 address of the SNMP notification host.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the SNMP notification host.
<b>version</b>	(Optional) Specifies the version of the SNMP used to send the traps. If not specified, the default is SNMPv1. <ul style="list-style-type: none"> <li>• 1 - SNMPv1.</li> <li>• 2c - SNMPv2c.</li> <li>• 3 - SNMPv3.</li> </ul>
<b>auth</b>	(Optional) Specifies to authenticate the packet but not to encrypt it.
<b>noauth</b>	(Optional) Specifies not to authenticate and to encrypt the packet.
<b>priv</b>	(Optional) Specifies to both authenticate and to encrypt the packet.
<i>COMMUNITY-STRING</i>	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 <code>snmp-server user</code> command.
<i>PORT-NUMBER</i>	(Optional) Specifies the UDP port number. The default trap UDP port number is 162. The range of UDP port numbers is from 1 to 65535. Some port numbers may conflict with other protocols.

## Default

By default, the version used is 1.

## Command Mode

Global Configuration Mode.

## 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 user

This command is used to create an SNMP user. Use the **no** form of this command to remove an SNMP user.

**snmp-server user** *USER-NAME* *GROUP-NAME* {**v1** | **v2c** | **v3** [**encrypted**] [**auth** {**md5** | **sha**} *AUTH-PASSWORD* [**priv** *PRIV-PASSWORD*]]} [**access** *IP-ACL-NAME*]

**no snmp-server user** *USER-NAME* *GROUP-NAME* {**v1** | **v2c** | **v3**}

### Parameters

<i>USER-NAME</i>	Specifies a username of a maximum of 32 characters. The syntax is general string that does not allow spaces.
<i>GROUP-NAME</i>	Specifies the name of the group to which the user belongs. The syntax is general string that does not allow spaces.
<b>v1</b>	Specifies that the user uses the SNMPv1 security model.
<b>v2c</b>	Specifies that the user uses the SNMPv2c security model.
<b>v3</b>	Specifies that the user uses the SNMPv3 security model.
<b>encrypted</b>	(Optional) Specifies that the following password is in encrypted format.
<b>auth</b>	(Optional) Specifies the authentication level.
<b>md5</b>	(Optional) Specifies to use HMAC-MD5-96 authentication.
<b>sha</b>	(Optional) Specifies to use HMAC-SHA-96 authentication.
<i>AUTH-PASSWORD</i>	(Optional) 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 <b>encrypted</b> parameter is specified, the length is 32 for MD5 and 40 for SHA. The format is a hexadecimal value.
<b>priv</b>	(Optional) Specifies the type of encryption.
<i>PRIV-PASSWORD</i>	(Optional) Specifies the private password in the plain-text form. This password can be up to 64 characters. If the <b>encrypted</b> parameter is specified, the length is fixed to 16 octets.
<b>access</b> <i>IP-ACL-NAME</i>	(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.

## Usage Guideline

To create a SNMP 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 to configure the plain-text password 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 to use the MD5 digest string instead of the plain text password.

```
Switch#configure terminal
Switch(config)# snmp-server user user1 public v3 encrypted auth md5
00112233445566778899AABBCCDDEEFF
Switch(config)#
```

## 60-21 snmp-server view

This command is used to create or modify a view entry. Use the **no** form of this command to remove a specified SNMP view entry.

**snmp-server view** *VIEW-NAME* *OID-TREE* {**included** | **excluded**}

**no snmp-server view** *VIEW-NAME*

### Parameters

<i>VIEW-NAME</i>	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.
<i>OID-TREE</i>	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.
<b>included</b>	Specifies the sub-tree to be included in the SNMP view.
<b>excluded</b>	Specifies the sub-tree to be excluded from the SNMP view.

### Default

<b>VIEW-NAME</b>	<b>OID-TREE</b>	<b>View Type</b>
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.

## 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. Spanning Tree Protocol (STP) Commands

## 61-1 clear spanning-tree detected-protocols

This command is used to restart the protocol migration.

```
clear spanning-tree detected-protocols {all | interface INTERFACE-ID}
```

### Parameters

<b>all</b>	Specifies to trigger the detection action for all ports.
<b>interface <i>INTERFACE-ID</i></b>	Specifies the port interface that will be triggered the detecting action.

### Default

None.

### Command Mode

Privileged EXEC Mode.

### Usage Guideline

Use this command to force the port protocol migrating state machine 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#
```

## 61-2 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

<b>interface <i>INTERFACE-ID</i></b>	(Optional) Specifies the interfaces to be displayed.
<b>,</b>	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
<b>-</b>	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the 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
```

```
Spanning Tree: Enabled
Protocol mode: RSTP
Tx-hold-count: 6
Root ID Priority: 32768
    Address: 00-12-50-28-00-02
    Hello Time: 2 sec, Max Age: 20 sec, Forward Delay: 15 sec
Bridge ID Priority: 32768 (priority 32768 sys-id-ext 0)
    Address: 00-50-40-3C-75-B0
    Hello Time: 2 sec, Max Age: 20 sec, Forward Delay: 15 sec,
Topology changes count: 13
```

Interface	Role	State	Cost	Priority	Link	Edge
-----	----	-----	----	-----	-----	----
eth1/0/3	designated	forwarding	20000	128.3	p2p	edge
eth1/0/5	alternate	blocking	20000	128.5	p2p	non-edge
eth1/0/6	alternate	blocking	20000	128.6	p2p	non-edge
eth1/0/7	root	forwarding	20000	128.7	p2p	non-edge

```
Switch#
```

## 61-3 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

<i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## 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 of port 1.

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

```
eth1/0/1
Spanning tree state : Enabled
Port path cost: 0
Port priority: 128
Port identifier: 128.1
Link type: auto
Port fast: edge
Guard root: Disabled
TCN filter : Disabled
Bpdu forward: Disabled
```

```
Switch#
```

---

## 61-4 snmp-server enable traps stp

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

```
snmp-server enable traps stp [new-root] [topology-chg]
```

```
no snmp-server enable traps stp [new-root] [topology-chg]
```

## Parameters

<b>new-root</b>	(Optional) Specifies the sending of STP new root notification.
<b>topology-chg</b>	(Optional) Specifies the sending of STP topology change notification.

## Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enable or disable the sending of notification traps for STP. If no parameter is specified, both STP notification types are enabled or disabled.

## Example

This example shows how to enable the sending of the all traps for STP 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)#
```

## 61-5 spanning-tree global state

This command is used to enable the global state of STP. Use the **no** form of this command to disable the state.

**spanning-tree global state {enable | disable}**

**no spanning-tree global state**

### Parameters

<b>enable</b>	Specifies to enable the STP's global state.
<b>disable</b>	Specifies to disable the STP's global state.

### Default

By default, this option is disabled.

### Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to enable or disable the global state of STP.

## Example

This example shows how to enable the STP function.

```
Switch# configure terminal
Switch(config)# spanning-tree global state enable
Switch(config)#
```

## 61-6 spanning-tree (timers)

This command is used to configure the Spanning Tree timer value. Use the **no** form of this command to revert to the default settings.

**spanning-tree {hello-time SECONDS | forward-time SECONDS | max-age SECONDS}**

**no spanning-tree {hello-time | forward-time | max-age}**

## Parameters

<b>hello-time</b> <i>SECONDS</i>	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.
<b>forward-time</b> <i>SECONDS</i>	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.
<b>max-age</b> <i>SECONDS</i>	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.

## Usage Guideline

Use this command 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)#
```

## 61-7 spanning-tree state

This command is used to enable or disable the STP operation. Use the **no** form of this command to revert to the default setting.

**spanning-tree state {enable | disable}**

**no spanning-tree state**

## Parameters

<b>enable</b>	Specifies to enable STP for the configured interface.
<b>disable</b>	Specifies to disable STP for the configured interface.

## Default

By default, this option is enabled.

## Command Mode

Interface Configuration Mode.

## 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 port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# spanning-tree state enable
Switch(config-if)#
```

## 61-8 spanning-tree cost

This command is used to configure the value of the port path-cost on the specified port. Use the **no** form of this command to revert to the auto-computed path cost.

**spanning-tree cost** *COST*

**no spanning-tree cost**

## Parameters

<i>COST</i>	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.

## 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 on port 7.

```
Switch# configure terminal
Switch(config)# interface eth1/0/7
Switch(config-if)# spanning-tree cost 20000
Switch(config-if)#
```

## 61-9 spanning-tree guard root

This command is used to enable the root guard mode. Use the **no** form of this command to revert to the default setting.

**spanning-tree guard root**  
**no spanning-tree guard root**

## Parameters

None.

## Default

By default, this option is disabled.

## Command Mode

Interface Configuration Mode.

## 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 port 1 from being a root port.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# spanning-tree guard root
Switch(config-if)#
```

---

## 61-10 spanning-tree link-type

This command is used to configure a link-type for a port. Use the **no** form of this command to revert to the default setting.

**spanning-tree link-type {point-to-point | shared}**  
**no spanning-tree link-type**

## Parameters

<b>point-to-point</b>	Specifies that the port's link type is point-to-point.
<b>shared</b>	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.



## 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 on port 7.

```
Switch# configure terminal
Switch(config)# interface eth1/0/7
Switch(config-if)# spanning-tree link-type point-to-point
Switch(config-if)#
```

## 61-11 spanning-tree mode

This command is used to configure the STP mode. Use the **no** form of this command to revert to the default setting.

**spanning-tree mode {mstp | rstp | stp}**

**no spanning-tree mode**

### Parameters

<b>mstp</b>	Specifies the Multiple Spanning Tree Protocol (MSTP).
<b>rstp</b>	Specifies the Rapid Spanning Tree Protocol (RSTP).
<b>stp</b>	Specifies the Spanning Tree Protocol (IEEE 802.1D Compatible)

### Default

By default, this mode is **rstp**.

### Command Mode

Global Configuration Mode.

### 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)#
```

## 61-12 spanning-tree portfast

This command is used to specify the port's fast mode. Use the **no** form of this command to revert to the default setting.

```
spanning-tree portfast {disable | edge| network}
no spanning-tree portfast
```

### Parameters

<b>disable</b>	Specifies to set the port to the port fast disabled mode.
<b>edge</b>	Specifies to set the port to the port fast edge mode.
<b>network</b>	Specifies to set the port to the port fast network mode.

### Default

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

### Command Mode

Interface Configuration Mode.

### 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 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)#
```

## 61-13 spanning-tree port-priority

This command is used to configure the value of the STP port priority on the specified port. It is only used for RSTP and STP versions. Use the **no** form of this command to revert to the default setting.

```
spanning-tree port-priority PRIORITY
no spanning-tree port-priority
```

## Parameters

<i>PRIORITY</i>	Specifies the port priority. Valid values are from 0 to 240.
-----------------	--

## Default

By default, this value is 128.

## Command Mode

Interface Configuration Mode.

## 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 on port 7.

```
Switch# configure terminal
Switch(config)# interface eth1/0/7
Switch(config-if)# spanning-tree port-priority 0
Switch(config-if)#
```

## 61-14 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

<i>PRIORITY</i>	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.

## 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 **spanning-tree mst priority** command 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)#
```

---

## 61-15 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.

### 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 7.

```
Switch# configure terminal
Switch(config)# interface eth1/0/7
Switch(config-if)# spanning-tree tcnfilter
Switch(config-if)#
```

---

## 61-16 spanning-tree tx-hold-count

This command is used to limit the maximum number of BPDUs that can be sent before pausing for one second. Use the **no** form of this command to revert to the default setting.

**spanning-tree tx-hold-count** *VALUE*

**no spanning-tree tx- hold-count**

## Parameters

---

<i>VALUE</i>	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.

## Usage Guideline

Use this command to specify 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)#
```

---

## 61-17 spanning-tree forward-bpdu

This command is used to enable the forwarding of the spanning tree BPDU. Use the **no** form of this 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.

## 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 eth1/0/2
Switch(config-if)# spanning-tree forward-bpdu
Switch(config-if)#
```

---

## 62. Storm Control Commands

### 62-1 snmp-server enable traps storm-control

This command is used to to enable or control the command to enable the sending of SNMP notifications for storm control. Use the **no** form of this command to disable the sending of SNMP notifications.

**snmp-server enable traps storm-control [storm-occur] [ storm-clear]**

**no snmp-server enable traps storm-control [storm-occur] [ storm-clear]**

#### Parameters

<b>storm-occur</b>	(Optional) Specifies to send a notification when a storm event is detected.
<b>storm-clear</b>	(Optional) Specifies to send a notification when a storm event is cleared.

#### Default

By default, this option is disabled.

#### Command Mode

Global Configuration Mode.

#### Usage Guideline

Use this command to enable or disable the sending of notifications for storm control. If no parameter is specified, both **storm-occur** and **storm-clear** parameters are enabled or disabled.

#### Example

This example shows how to enable the sending of notifications for storm control for both storm occurred and cleared.

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

### 62-2 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 revert to the 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

<b>broadcast</b>	Specifies to set the broadcast rate limit.
<b>multicast</b>	Specifies to set the multicast rate limit.
<b>unicast</b>	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.

<b>level pps</b> <i>PPS-RISE</i> [ <i>PPS-LOW</i> ]	Specifies the threshold value in packets count per second. The range is from 0 to 14881000. If the low PPS value is not specified, the default value is 80% of the specified risen PPS.
<b>level kbps</b> <i>KBPS-RISE</i> [ <i>KBPS-LOW</i> ]	Specifies the threshold value as a rate of 16 kbps per unit at which traffic is received on the port. The range is from 0 to 625000. If the low KBPS is not specified, the default value is 80% of the specified risen KBPS.
<b>level</b> <i>LEVEL-RISE</i> [ <i>LEVEL-LOW</i> ]	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.
<b>action shutdown</b>	Specifies to shut down the port when the value specified for rise threshold is reached.
<b>action drop</b>	Specifies to discards packets that exceed the risen threshold.
<b>action none</b>	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.

## Usage Guideline

Use the storm control function to protect the network from the storm of broadcast packets, multicast packets, or unknown DA flooding packets. Enter the **storm-control** command to enable storm control for a specific traffic type on the interface.

There are two ways to recover an error disabled port.

- The user can use the **errdisable recovery cause** command to enable the automatic recovery of ports that were error disabled by storm control.
- The user can manually recover the port by entering the **shutdown** command, followed by the **no shutdown** command for the port.

There is only one meter mode (percentage, kbps or pps) that can take effect on an interface. On an interface, if the later specified meter mode option is different from the previous mode, the previous configured storms will reset to their default states (disabled in this specification).

Due to hardware limitations, when the meter mode is percentage or kbps:

- The action cannot be specified to the shutdown mode.
- There are no traps and logs for the drop and none modes.

This feature is unable to give the precise suppression level of the total bandwidth in percentage (0 to 100) of a specific port interface. The current calculation formula assumes that the packet size is 64 bytes.



## Example

This example shows how to enable broadcast storm control on ports 1 and 2. It sets the threshold of port 1 to 500 packets per second with the shutdown action and sets the threshold of port 2 between 60% and 70% with the drop action.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# storm-control broadcast level pps 500
Switch(config-if)# storm-control action shutdown
Switch(config-if)# exit
Switch(config)# interface eth1/0/2
Switch(config-if)# storm-control broadcast level 70 60
Switch(config-if)# storm-control action drop
Switch(config-if)#
```

## 62-3 storm-control polling

This command is used to configure the polling interval of received packet counts. Use the **no** form of this command to revert to the default settings.

**storm-control polling** {interval *SECONDS* | retries {*NUMBER* | infinite}}

**no storm-control polling** {interval | retries}

### Parameters

<b>interval</b> <i>SECONDS</i>	Specifies the polling interval of received packet counts. This value must be between 5 and 600 seconds.
<b>retries</b> <i>NUMBE</i>	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.

### Usage Guideline

Use this command 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)#
```

## 62-4 show storm-control

This command is used to display the current storm control settings.

```
show storm-control interface INTERFACE-ID [, | -] [broadcast | multicast | unicast]
```

### Parameters

<i>INTERFACE-ID</i>	Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>broadcast</b>	(Optional) Specifies to display the current broadcast storm setting.
<b>multicast</b>	(Optional) Specifies to display the current multicast storm setting.
<b>unicast</b>	(Optional) Specifies to display the current unicast (DLF) storm setting.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

If no packet type is specified, all types of storm control settings will be displayed.

### Example

This example shows how to display the current broadcast storm control settings on ports 1 to 6.

```
Switch#show storm-control interface ethernet 1/0/1-1/0/6 broadcast
```

```

Interface   Action   Threshold           Current           State
-----
eth1/0/1   Drop    500/300 pps        200 pps          Forwarding
eth1/0/2   Drop    80/64 %            20 %             Forwarding
eth1/0/3   Drop    80/64 %            70 %             Dropped
eth1/0/4   Shutdown 60/50 %            20 %             Forwarding
eth1/0/5   None    60000/50000 kbps   2000 kbps        Forwarding
eth1/0/6   None    -                  -                Inactive

Total Entries: 6

Switch#
```

This example shows how to display all types of storm control settings on ports 1 to 2.

```
Switch# show storm-control interface eth1/0/1-2

Polling Interval      : 15 sec           Shutdown Retries      : Infinite
Trap                  : Disabled
Interface      Storm      Action      Threshold      Current      State
-----
eth1/0/1      Broadcast  Drop        80/64 %        50%          Forwarding
eth1/0/1      Multicast  Drop        80/64 %        50%          Forwarding
eth1/0/1      Unicast    Drop        80/64 %        50%          Forwarding
eth1/0/2      Broadcast  Shutdown    500/300 pps    -            Error Disabled
eth1/0/2      Multicast  Shutdown    500/300 pps    -            Error Disabled
eth1/0/2      Unicast    Shutdown    500/300 pps    -            Error Disabled

Total Entries: 6

Switch#
```

## Display Parameters

<b>Interface</b>	The interface ID.
<b>Action</b>	The configured action, the possible actions are: Drop, Shutdown, None.
<b>Threshold</b>	The configured threshold.
<b>Current</b>	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.
<b>State</b>	The current state of storm control on a given interface for a given traffic type. The possible states are: <ul style="list-style-type: none"> <li>• <b>Forwarding</b> - No storm event has been detected.</li> <li>• <b>Dropped</b> - A storm event has occurred and the storm traffic exceeding the threshold is dropped.</li> <li>• <b>Error Disabled</b> - The port is disabled due to a storm.</li> <li>• <b>Link Down</b> - The port is physically linked down.</li> <li>• <b>Inactive</b> - Indicates that storm control is not enabled for the given traffic type.</li> </ul>

## 63. Surveillance VLAN Commands

### 63-1 surveillance vlan

This command is used to enable the global surveillance VLAN state and configure the surveillance VLAN. Use the **no** form of this command to disable the surveillance VLAN state.

**surveillance vlan** *VLAN-ID*

**no surveillance vlan**

#### Parameters

<i>VLAN-ID</i>	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.

#### Usage Guideline

Use this command to enable the global surveillance VLAN function and to specify the surveillance VLAN on the Switch. The Switch has only one Surveillance VLAN. This surveillance VLAN also supports to recognize the surveillance devices, like IP Cameras (IPC) and Network Video Recorders (NVR), using the ONVIF protocol.

Both the **surveillance vlan** command in the Global Configuration Mode and the **surveillance vlan enable** command in the 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 automatically be learned as a surveillance VLAN untagged member. Received untagged surveillance packets will be forwarded in surveillance VLAN. Received packets are determined as surveillance packets if the source MAC addresses of packets comply with the OUI addresses configured by the **surveillance vlan mac-address** command.

An auto-surveillance VLAN can also be used to carry video traffic from an IP camera and its related components like Video Management Servers (VMS), VMS clients, and video encoders. These devices can be recognized by an OUI address and the ONVIF protocol. If the IPC is recognized by the ONVIF protocol, the Switch will learn the IPC on a port by snooping Hello/ProbeMatch packets and then insert the port into the surveillance VLAN.

The Switch regards a host as an NVR once it connects to the IPC via HTTP, HTTPS, or RTSP. The Switch will learn the NVR on this port and move it into the surveillance VLAN until the triggered aging mechanism age-out or the LAN cable is removed.

When the host sends an ARP request to an IPC, the Switch still regards the host as an NVR but only temporarily move it into the surveillance VLAN. The host will automatically be moved out of the surveillance VLAN after about 30 seconds if it is not recognized as an NVR anymore.



**NOTE:** The same PC, or PCs connected to the same LAN port on the Switch, cannot simultaneously manage the Switch and the IP cameras connected to the Switch.

If the IPC is recognized by OUI address, the Switch will determine whether a received packet is a video packet or not by checking its IPC MAC address. If the source MAC addresses of the untagged packets has the same MAC address as the IPC. These packets are determined as video packets and transmitted in surveillance VLANs. If the incoming video packet is tagged, and its VLAN ID is equal to the surveillance VLAN, the priority of the packet will be remarked with video traffic priority.

When the IPC is recognized by its OUI address and ONVIF protocol at the same time, this IPC will be recognized by the ONVIF protocol and take action. If the resource supported ONVIF device is depleted, the IPC will be recognized by OUI address.

The VLAN to be specified as a surveillance VLAN needs to pre-exist to use this command.

If the surveillance VLAN is configured, the surveillance VLAN by the **vlan** command cannot be removed.

## 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)#
```

---

## 63-2 surveillance vlan aging

This command is used to configure the aging time for aging out the surveillance VLAN dynamic member ports. Use the **no** form of this command to revert to the default setting.

**surveillance vlan aging** *MINUTES*

**no surveillance vlan aging**

### Parameters

---

---

<i>MINUTES</i>	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.

### 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)#
```

---

## 63-3 surveillance vlan enable

This command is used to enable the surveillance VLAN state of ports. Use the **no** form of this command to disable the surveillance VLAN state of ports.

**surveillance vlan enable**

**no surveillance vlan enable**

## Parameters

None.

## Default

By default, this option is disabled.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

This command is only 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 OUI addresses configured by the **surveillance vlan mac-address** command.

## Example

This example shows how to enable surveillance VLAN function on port 1.

```
Switch# configure terminal
Switch(config)#interface eth1/0/1
Switch(config-if)#surveillance vlan enable
Switch(config-if)#
```

## 63-4 surveillance vlan mac-address

This command is used to add the user-defined surveillance device OUI. Use the **no** form of this command to delete the user-defined surveillance device OUI.

**surveillance vlan mac-address** *MAC-ADDRESS MASK* [**component-type** {*vms* | *vms-client* | *video-encoder* | *network-storage* | *other*} **description** *TEXT*]

**no surveillance vlan mac-address** *MAC-ADDRESS MASK*

## Parameters

<i>MAC-ADDRESS</i>	Specifies the OUI MAC address.
<i>MASK</i>	Specifies the OUI MAC address matching bitmask.
<b>component-type</b>	(Optional) Specifies surveillance components that could be auto-detected by surveillance VLAN.
<b>vms</b>	(Optional) Specifies the surveillance components type as Video Management Server (VMS).
<b>vms-client</b>	(Optional) Specifies the surveillance components type as VMS client.

<b>video-encoder</b>	(Optional) Specifies the surveillance components type as Video Encoder.
<b>network-storage</b>	(Optional) Specifies the surveillance components type as Network Storage.
<b>other</b>	(Optional) Specifies the surveillance components type as other IP Surveillance Devices.
<b>description</b> <i>TEXT</i>	(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.

## 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)#
```

## 63-5 surveillance vlan onvif-discover-port

This command is used to configure the TCP/UDP port number for RTSP stream snooping. Use the **no** form of this command to revert to the default setting.

**surveillance vlan onvif-discover-port** *VALUE*

**no surveillance vlan onvif-discover-port**

## Parameters

<i>VALUE</i>	Enter the TCP/UDP port number here. The range is either 554, or from 1025 to 65535.
--------------	---

## Default

By default, this value is 554.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to configure the TCP/UDP port number for RTSP stream snooping. ONVIF-capable IPC and ONVIF-capable NVR utilize WS-Discovery to find other devices. Once IPCs are discovered, the Switch can further discover NVRs by snooping RTSP, HTTP, and HTTPS packets between NVRs and IPCs. These packets cannot be snooped if the TCP/UDP port is not equal to the RTSP port number.

## Example

This example shows how to configure the TCP/UDP port number to 2000 for RTSP stream snooping.

```
Switch# configure terminal
Switch(config)# surveillance vlan onvif-discover-port 2000
Switch(config)#
```

## 63-6 surveillance vlan onvif-ipc state

This command is used to configure the ONVIF recognition IPC state. Use the no form of this command to revert to the default setting.

**surveillance vlan onvif-ipc** *IP-ADDRESS* [**mac-address** *MAC-ADDRESS*] **state** {**enable** | **disable**}

**no surveillance vlan onvif-ipc** *IP-ADDRESS* [**mac-address** *MAC-ADDRESS*] **state**

## Parameters

<i>IP-ADDRESS</i>	Enter the IP address of the IPC here.
<b>mac-address</b> <i>MAC-ADDRESS</i>	(Optional) Enter the MAC address of the IPC that is recognized with ONVIF.
<b>enable</b>	Specifies that the ONVIF recognition IPC state will be enabled.
<b>disable</b>	Specifies that the ONVIF recognition IPC state will be disabled.

## Default

By default, this feature is enabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to configure the ONVIF recognition IPC state with only the IP address of the IPC, or both the IP and MAC address of the IPC. When the ONVIF IPC is recognized, the state can be configured for the specified device. If there is more than one IPC with the same IP address and the MAC addresses of those IPCs are not specified, the state of those IPCs will be affected.

This feature is used to block IPC traffic or not. If the IPC state on the port is disabled, the traffic from the IPC will be blocked.



## Example

This example shows how to enable the state of IPC with the IP address 172.18.60.1.

```
Switch# configure terminal
Switch(config)# surveillance vlan onvif-ipc 172.18.60.1 state enable
Switch(config)#
```

## 63-7 surveillance vlan onvif-ipc description

This command is used to configure the description of the ONVIF recognized IPC. Use the **no** command to remove the description.

```
surveillance vlan onvif-ipc IP-ADDRESS [mac-address MAC-ADDRESS] description TEXT
no surveillance vlan onvif-ipc IP-ADDRESS [mac-address MAC-ADDRESS] description
```

### Parameters

<i>IP-ADDRESS</i>	Enter the IP address of the ONVIF recognized IPC.
<b>mac-address</b> <i>MAC-ADDRESS</i>	(Optional) Enter the MAC address of the IPC that is recognized with ONVIF.
<i>TEXT</i>	Enter the description of the ONVIF recognized IPC here. This can be up to 32 characters long.

### Default

By default, there is no description defined for an ONVIF recognized IPC.

### Command Mode

Global Configuration Mode.

### Usage Guideline

Use this command to configure the description of the ONVIF recognized IPC with only the IP address of the IPC, or both the IP and MAC address of the IPC. If there is more than one IPC with the same IP address and the MAC addresses of those IPCs are not specified, the description of those IPCs will be configured.

## Example

This example shows how to define the description of the IPC with an IP address of 172.18.60.1 to 'ipc1'.

```
Switch# configure terminal
Switch(config)# surveillance vlan onvif-ipc 172.18.60.1 description ipc1
Switch(config)#
```

## 63-8 surveillance vlan onvif-nvr description

This command is used to configure the description of an ONVIF recognized NVR. Use the **no** command to remove this description.

```
surveillance vlan onvif-nvr IP-ADDRESS [mac-address MAC-ADDRESS] description TEXT
no surveillance vlan onvif-nvr IP-ADDRESS [mac-address MAC-ADDRESS] description
```

## Parameters

<i>IP-ADDRESS</i>	Enter the IP address of the ONVIF recognized NVR.
<b>mac-address</b> <i>MAC-ADDRESS</i>	(Optional) Enter the MAC address of the NVR that is recognized with ONVIF.
<i>TEXT</i>	Enter the description of the ONVIF recognized NVR here. This can be up to 32 characters long.

## Default

By default, there is no description defined for an ONVIF recognized NVR.

## Command Mode

Global Configuration Mode.

## Usage Guideline

When an ONVIF NVR is recognized, the description for specified device can be configured.

Use this command to configure the description of the ONVIF recognized NVR with only the IP address of the NVR, or both the IP and MAC address of the NVR. If there is more than one NVR with the same IP address and the MAC addresses of those NVRs are not specified, the description of those NVRs will be configured.

## Example

This example shows how to define the description of the NVR with an IP address of 172.18.60.2 to 'nvr1'.

```
Switch#configure terminal
Switch(config)# surveillance vlan onvif-nvr 172.18.60.2 description nvr1
Switch(config)#
```

## 63-9 surveillance vlan qos

This command is used to onfigure the CoS priority for the incoming surveillance VLAN traffic. Use the **no** form of this command to revert to the default settings.

**surveillance vlan qos** *COS-VALUE*

**no surveillance vlan qos**

## Parameters

<i>COS-VALUE</i>	Specifies the priority of surveillance VLAN. The available value is from 0 to 7.
------------------	--

## Default

The default value 5.

## Command Mode

Global Configuration Mode.

## 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)#
```

## 63-10 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

<b>device</b>	Specifies to display the learned surveillance devices information.
<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies to display surveillance VLAN information of ports.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

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 display the surveillance VLAN global settings.

```
Switch#show surveillance vlan
```

```

Surveillance VLAN ID   : 100
Surveillance VLAN CoS  : 5
Aging Time             : 30 minutes
ONVIF Discover Port    : 554
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#
```

## 63-11 show surveillance vlan onvif-ipc interface

This command is used to display ONVIF-based IPC information.

```
show surveillance vlan onvif-ipc interface [INTERFACE-ID [, | -]] {brief | detail}
```

### Parameters

<i>INTERFACE-ID</i>	(Optional) Specifies the port to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>brief</b>	Specifies to display brief ONVIF-based IP camera information.
<b>detail</b>	Specifies to display detailed ONVIF-based IP camera information.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display brief or detailed ONVIF-based IPC information.

## Example

This example shows how to display brief ONVIF-based IP camera information.

```
Switch#show surveillance vlan onvif-ipc interface eth1/0/1 brief

Interface      : eth1/0/1
IP Address     : 10.90.90.1
MAC Address    : 00-01-02-03-04-05
Model         : P3384-VE
Manufacturer   : D-Link
Traffic        : Enabled
Throughput     : 5 Mbps
Description    : P3384-VE

Total Entries: 1

Switch#
```

This example shows how to display detailed ONVIF-based IP camera information.

```
Switch#show surveillance vlan onvif-ipc interface eth1/0/1 detail

Interface      : eth1/0/1
IP Address     : 10.90.90.1
MAC Address    : 00-01-02-03-04-05
Model         : P3384-VE
Manufacturer   : D-Link
State          : Enabled
Throughput     : 5 Mbps
Description    : P3384-VE
Protocol       : ONVIF
Power Consumption: 1.9W/15W
PoE            : 802.3af
PoE Status     : Enable

Total Entries: 1

Switch#
```

## 63-12 show surveillance vlan onvif-nvr interface

This command is used to display ONVIF-based NVR and group information.

```
show surveillance vlan onvif-nvr interface [INTERFACE-ID [, | -]] [ipc-list]
```

### Parameters

<i>INTERFACE-ID</i>	(Optional) Specifies the port to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
ipc-list	(Optional) Specifies to display NVR group information.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display ONVIF-based NVR and group information. The group ID is the group ID of the IPCs that belong to the NVR group. NVRs and IPCs, managed by it, must have the same group ID.

## Example

This example shows how to display ONVIF-based NVR information.

```
Switch# show surveillance vlan onvif-nvr interface eth1/0/1

Interface      : eth1/0/1
IP Address     : 111.111.111.111
MAC Address    : 00-03-02-03-04-08
IPC Number     : 2
Throughput    : 10 Mbps
Group         : Group 1
Description    : D-Link-NVR

Total Entries: 1

Switch#
```

This example shows how to display ONVIF-based NVR information associated with the group ID 'ipc-list'.

```
Switch# show surveillance vlan onvif-nvr interface eth1/0/1 ipc-list

Interface IP Address      MAC address      Group  Description
-----
1         10.90.90.90.1    00-01-02-03-04-05 1      D-Link-IPC-1
1         10.90.90.90.2    00-01-02-03-04-06 1      D-Link-IPC-2

Total Entries: 2

Switch#
```

## 64. Switch Port Commands

### 64-1 duplex

This command is used to configure the duplex setting of the physical port. Use the **no** form of command to revert to the default setting.

```
duplex {full | half | auto}
no duplex
```

#### Parameters

<b>full</b>	Specifies that the port operates in the full-duplex mode.
<b>half</b>	Specifies that the port operates in the half-duplex mode.
<b>auto</b>	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.

#### 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** parameter is set to a fixed speed and the **duplex** parameter 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 port 1 to operate at a forced speed of 100Mbps 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)#
```

### 64-2 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

<b>on</b>	Specifies to enable a port to send PAUSE frames or process PAUSE frames from remote ports.
<b>off</b>	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.

## 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 port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# flowcontrol on
Switch(config-if)#
```

## 64-3 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

<b>auto</b>	Specifies to set the port interface's MDIX state to the auto-MDIX mode.
<b>normal</b>	Specifies to force the port interface's MDIX state to the normal mode.
<b>cross</b>	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.



## 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 auto on port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# mdix auto
Switch(config-if)#
```

## 64-4 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

<b>10</b>	Specifies to force the speed to 10 Mbps.
<b>100</b>	Specifies to force the speed to 100 Mbps.
<b>1000</b>	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.
<b>master   slave</b>	Specifies the port operates as master or slave timing. This parameter is only applicable to 1000BASE-T connections.
<b>10giga</b>	Specifies to force the speed to 10 Gbps.
<b>auto</b>	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.
<b>SPEED-LIST</b>	(Optional) Specifies a list of speeds that the Switch will only auto-negotiate to. The speed can be <b>10</b> , <b>100</b> , and/or <b>1000</b> . 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.

### 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** parameter is set to a fixed speed and the **duplex** parameter 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 port 1 to only auto-negotiate to 10Mbps or 100Mbps.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# speed auto 10,100
Switch(config-if)#
```

---

## 65. System File Management Commands

### 65-1 boot config

This command is used to specify the file that will be used as the configuration file for the next boot.

```
boot config {Config1 | Config2}
```

#### Parameters

<b>Config1</b>	Specifies to use Config1 as the startup configuration file.
<b>Config2</b>	Specifies to use Config2 as the startup configuration file.

#### Default

By default, Config1 is used.

#### Command Mode

Global Configuration Mode.

#### Usage Guideline

The command is used to specify the startup configuration file. 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 "Config2" as the startup configuration file.

```
Switch#configure terminal
Switch(config)#boot config Config2
Switch(config)#
```

### 65-2 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] {Image1 | Image2}
```

#### Parameters

<b>check</b>	(Optional) Specifies to display the firmware information for the specified file. This information includes the version number and model description.
<b>Image1</b>	Specifies to use Image1 as the boot image file.
<b>Image2</b>	Specifies to use Image2 as the boot image file.

#### Default

By default, Image1 is the boot image.

#### Command Mode

Global Configuration Mode.

## 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.

## Example

This example shows how to specify that the Switch should use the image file named "Image1" as the boot image file for the next startup.

```
Switch#configure terminal
Switch(config)#boot image Image1
Switch(config)#
```

## 65-3 clear running-config

This command is used to clear the system's running configuration.

**clear running-config**

### Parameters

None.

### Default

None.

### Command Mode

Privileged EXEC Mode.

## 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. 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#
```

## 65-4 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

Privileged EXEC Mode.

### Usage Guideline

Use this command to clear the system's configuration. 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 the system's configuration to the factory
default settings, including the IP address.
```

```
Clear system configuration, save, reboot? (y/n) [n] y
```

```
Saving configurations and logs to NV-RAM..... Done.
```

```
Please wait, the switch is rebooting...
```

## 65-5 configure replace

This command is used to replace the current running configuration with the indicated configuration file.

**configure replace** **{tftp: //LOCATION/FILENAME | flash: {Config1 | Config2}}** **[force]**

### Parameters

<b>tftp:</b>	Specifies that the configuration file is from the TFTP server.
<b>//LOCATION/FILENAME</b>	Specifies the URL of the configuration file on the TFTP server.
<b>flash:</b>	Specifies that the configuration file is from the NVRAM of the device.
<b>Config1</b>	Specifies the Config1 file as the boot config file.
<b>Config2</b>	Specifies the Config2 file as the boot config file.
<b>force</b>	(Optional) Specifies to execute the command immediately with no confirmation needed.

## Default

None.

## Command Mode

Privileged EXEC Mode.

## Usage Guideline

Use this command 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 “Config1” file stored in the NVRAM of the device. Execute the command immediately without confirmation.

```
Switch#configure replace flash: Config1 force
```

```
Executing script file Config1 .....
Executing done
```

```
Switch#
```

## 65-6 copy

This command is used to copy a file to another file.

**copy** *SOURCE-URL* *DESTINATION-URL*

**copy** *SOURCE-URL* **tftp:** [*//LOCATION/DESTINATION-URL*]

**copy** **tftp:** [*//LOCATION/SOURCE-URL*] *DESTINATION-URL*

## Parameters

<i>SOURCE-URL</i>	<p>Specifies the source URL for the source file to be copied. One special form of the URL is represented by the following keywords.</p> <p>If <b>startup-config</b> is specified as the <i>SOURCE-URL</i>, 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.</p> <p>If <b>running-config</b> is specified as the <i>SOURCE-URL</i>, 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.</p> <p>If <b>flash:</b> [<i>PATH-FILE-NAME</i>] is specified as the <i>SOURCE-URL</i>, the purpose is to specify the source file to be copied in the file system.</p> <p>If <b>log</b> is specified as the <i>SOURCE-URL</i>, the system log can be retrieved to the TFTP server.</p> <p>If <b>attack-log</b> is specified as the <i>SOURCE-URL</i>, the purpose is to upload the attack log.</p>
<i>DESTINATION-URL</i>	<p>Specifies the destination URL for the copied file. One special form of the URL is represented by the following keywords.</p> <p>If <b>running-config</b> is specified as the <i>DESTINATION-URL</i>, the purpose is to apply a configuration to the running configuration.</p> <p>If <b>startup-config</b> is specified as the <i>DESTINATION-URL</i>, 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 <b>boot config</b> command.</p> <p>If <b>flash:</b> {<i>Image1</i>   <i>Image2</i>   <i>Config1</i>   <i>Config2</i>} is specified as the <i>DESTINATION-URL</i>, the purpose is to specify the copied file in the file system.</p> <p>If <b>flash:</b> <i>certificate-key</i> [<i>STRING</i>] is specified as the <i>DESTINATION-URL</i>, the purpose is to specify the destination certificate file or key file to be copied in the file system.</p> <p>If <b>flash:</b> <i>private-key</i> [<i>STRING</i>] is specified as the <i>DESTINATION-URL</i>, the purpose is to specify the destination private key file to be copied in the file system.</p> <p>If <b>flash:</b> <i>public-key</i> [<i>STRING</i>] is specified as the <i>DESTINATION-URL</i>, the purpose is to specify the destination public key file to be copied in the file system.</p>
<i>LOCATION</i>	(Optional) Specifies the IPv4/IPv6 address of the TFTP server.

## Default

None.

## Command Mode

Privileged EXEC Mode.

## 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. 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 29974 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://10.5.2.101/switch-config.cfg...
Transmission start...
Transmission finished, file length 28999 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 “Config2” file in the NVRAM immediately by using the increment method.

```
Switch#copy flash: Config2 running-config

Source filename [Config2]?
Destination filename running-config? [y/n]: y

Executing script file Config2 .....
Executing done

Switch#
```

This example shows how to download an image file from the TFTP server.

```
Switch#copy tftp: //10.1.1.254/runtime.had flash: Image1

Address of remote host [10.1.1.254]?
Source filename [runtime.had]?
Accessing tftp://10.1.1.254/runtime.had...
Transmission start...
Transmission finished, file length 8713712 bytes.
Please wait, programming flash..... 100 %
Please wait, programming flash for language files .....Done.

Switch#
```

---

## 65-7 show boot

This command is used to display the boot configuration file and the boot image setting.

**show boot**

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### 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:/Image1
  Boot config: /c:/Config1

Switch#
```

## 65-8 show running-config

This command is used to display the commands in the running configuration file.

**show running-config** [effective | all] [interface *INTERFACE-ID* | vlan *VLAN-ID*]

### Parameters

<b>effective</b>	(Optional) Specifies to display command configurations that affected the behavior of the Switch. For example, if STP was disabled, only the <b>disable stp</b> command will be displayed. All other lower layer settings regarding STP will not be displayed. The lower layer settings will only be displayed when the higher layer setting is enabled. Only modified configurations different from the default configuration will be displayed if this option is not selected.
<b>all</b>	(Optional) Specifies to display all command configurations; including commands corresponding with the default parameters. Only modified configurations different from the default configuration will be displayed if this option is not selected. interface <i>INTERFACE-ID</i>
<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interface to be displayed.
<b>vlan</b> <i>VLAN-ID</i>	(Optional) Specifies the VLAN to be displayed.

### Default

None.

### Command Mode

Privileged EXEC Mode.

### Usage Guideline

Use this command to display 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 : 1319 bytes

!-----
!
!           DGS-1250-28XMP Gigabit Ethernet Smart Managed Switch
!
!                   Configuration
!
!                   Firmware: Build 2.03.001
!
!           Copyright(C) 2021 D-Link Corporation. All rights reserved.
!-----

line console
!
line telnet
!
line ssh
!
interface ethernet 1/0/1
!
interface ethernet 1/0/2
!
interface ethernet 1/0/3
!
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

## 65-9 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.

### Usage Guideline

Use this command to display the configuration settings that the system will be initialized with.

## Example

This example shows how to display the content of the startup configuration file.

```
Switch#show startup-config
```

```
!-----!  
!           DGS-1250-28XMP Gigabit Ethernet Smart Managed Switch  
!                   Configuration  
!  
!           Firmware: Build 2.03.001  
!           Copyright(C) 2021 D-Link Corporation. All rights reserved.  
!-----!  
  
line console  
!  
line telnet  
!  
line ssh  
!  
interface ethernet 1/0/1  
!  
interface ethernet 1/0/2  
!  
interface ethernet 1/0/3  
!  
interface ethernet 1/0/4  
!  
interface ethernet 1/0/5  
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All
```

## 66. System Log Commands

### 66-1 clear logging

This command is used to delete log messages in the system logging buffer.

```
clear logging
```

#### Parameters

None.

#### Default

None.

#### Command Mode

Privileged EXEC Mode.

#### Usage Guideline

Use this command to delete 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#
```

### 66-2 logging buffered

This command is used to enable logging of system messages to the local message buffer. Use the **no** form of this command 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

<i>SEVERITY-LEVEL</i>	(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).
<i>SEVERITY-NAME</i>	(Optional) Specifies the severity level of system messages by one of the following names: <b>emergencies</b> , <b>alerts</b> , <b>critical</b> , <b>errors</b> , <b>warnings</b> , <b>notifications</b> , <b>informational</b> , and <b>debugging</b> .

<b>discriminator</b>	(Optional) Specifies to filter the message to be sent to local buffer based on the discriminator.
<b>write-delay</b> <i>SECONDS</i>	(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.

## 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)#
```

## 66-3 logging discriminator

This command is used to create a discriminator that can be further used to filter SYSLOG messages sent to various destinations. Use the **no** form of this command to remove the discriminator.

**logging discriminator** *NAME* [**facility** {**drops** *STRING* | **includes** *STRING*}] [**severity** {**drops** *SEVERITY-LIST* | **includes** *SEVERITY-LIST*}]

**no logging discriminator** *NAME*

## Parameters

<i>NAME</i>	Specifies the name of the discriminator.
<b>facility</b>	(Optional) Specifies a sub-filter based on the facility string.
<i>STRING</i>	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.
<b>includes</b>	Specifies to include the matching message. The unmatched messages are filtered.
<b>drops</b>	Specifies to filter the matching message.

<b>severity</b>	(Optional) Specifies a sub-filter based on severity matching.
<i>SEVERITY-LIST</i>	Specifies a list of severity levels to be filtered or to be included.

## Default

None.

## Command Mode

Global Configuration Mode.

## 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)#
```

## 66-4 logging server

This command is used to create a SYSLOG server host to log the system messages or debug output. Use the **no** form of this command to remove a SYSLOG server host.

**logging server** {*IP-ADDRESS* | *IPV6-ADDRESS*} [**severity** {*SEVERITY-LEVEL* | *SEVERITY-NAME*}] [**facility** *FACILITY-TYPE*] [**discriminator** *NAME*] [**port** *UDP-PORT*]

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

## Parameters

<i>IP-ADDRESS</i>	Specifies the IP address of the SYSLOG server host.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the log server host.
<i>SEVERITY-LEVEL</i>	(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).
<i>SEVERITY-NAME</i>	(Optional) Specifies the severity level of system messages by one of the following names: <b>emergencies</b> , <b>alerts</b> , <b>critical</b> , <b>errors</b> , <b>warnings</b> , <b>notifications</b> , <b>informational</b> , and <b>debugging</b> .
<i>FACILITY-TYPE</i>	(Optional) Specifies the facility type as a decimal value from 0 to 23. If not specified, the default facility is local7 (23).
<b>discriminator</b>	(Optional) Specifies to filter the message to the log server based on discriminator.
<b>port</b> <i>UDP-PORT</i>	(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.

## 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)#
```



## 66-5 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

<b>all</b>	Specifies to display all log entries starting from the latest message.
<i>REF-SEQ</i>	Specifies to start the display from the reference sequence number.
<b>+ NN</b>	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.
<b>- NN</b>	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

User/Privileged EXEC Mode.

### 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#
```

## 66-6 show attack-logging

This command is used to display attack log messages.

---

**show attack-logging [index INDEX]**

## Parameters

---

<b>index</b> <i>INDEX</i>	(Optional) 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

User/Privileged EXEC Mode.

## 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
Attack log messages (total number:0)
Switch#
```

---

## 66-7 clear attack-logging

This command is used to delete the attack log.

**clear attack-logging**

## Parameters

None.

## Default

None.

## Command Mode

Privileged EXEC Mode.

## Usage Guideline

Use this command to delete the attack log messages.

## Example

This example shows how to delete all the attack log messages.

```
Switch# clear attack-logging all  
Switch#
```

---

## 67. Time and SNTP Commands

### 67-1 clock set

This command is used to manually set the system's clock.

**clock set** *HH:MM:SS DAY MONTH YEAR*

#### Parameters

<i>HH:MM:SS</i>	Specifies the current time in hours (24-hour format), minutes and seconds.
<i>DAY</i>	Specifies the current day (by date) in the month.
<i>MONTH</i>	Specifies the current month (by name, jan, feb, mar, apr, and so on).
<i>YEAR</i>	Specifies the current year (no abbreviation).

#### Default

None.

#### Command Mode

Privileged EXEC Mode.

#### Usage Guideline

Generally, if the system is synchronized by a valid outside timing mechanism, such as SNTP, there is no 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, 2021.

```
Switch# clock set 18:00:00 4 jul 2021
Switch#
```

### 67-2 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

<b>recurring</b>	Specifies that summer time should start and end on the specified week day of the specified month.
------------------	---

<b>date</b>	Specifies that summer time should start and end on the specified date of the specified month.
<i>WEEK</i>	Specifies the week of the month (1 to 4 or last).
<i>DAY</i>	Specifies the day of the week (sun, mon, and so on).
<i>DATE</i>	Specifies the date of the month (1 to 31).
<i>MONTH</i>	Specifies the month (by name, jan, feb, mar, apr, and so on).
<i>YEAR</i>	Specifies the start and end years for the summer time data.
<i>HH:MM</i>	Specifies the time (24 hours format) in hours and minutes.
<i>OFFSET</i>	(Optional) Specifies the number of minutes to add during summer time. The default value is 60. The range of this offset is between 30 and 120.

## Default

By default, this option is disabled.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command to automatically switch over to summer time. The command has two forms. One is the recurring form which is used to specify the time through the week and the day of the month. The other form is the date form which is used to specify the date of the month.

In both the date and recurring forms of the command, the first part of the command specifies when summer time begins, and the second part specifies when it ends.

## Example

This example shows how to specify that summer time starts on the first Sunday in June at 2 a.m. and ends on the last Sunday in October at 2 a.m.

```
Switch# configure terminal
Switch(config)# clock summer-time recurring 1 sun jun 2:00 last sun oct 2:00
Switch(config)#
```

## 67-3 clock timezone

This command is used to set the time zone for display purposes. Use the **no** form of this command to revert to the default setting.

```
clock timezone {+ | -} HOURS-OFFSET [MINUTES-OFFSET]
no clock timezone
```

## Parameters

<b>+   -</b>	Specifies that time to be added to the UTC.
<b>-</b>	Specifies that time to be subtracted from the UTC.
<i>HOURS-OFFSET</i>	Specifies the hours difference from UTC.
<i>MINUTES-OFFSET</i>	(Optional) Specifies the minutes difference from UTC.

## Default

By default, this option is set to UTC.

## Command Mode

Global Configuration Mode.

## 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 behind of UTC.

```
Switch# configure terminal
Switch(config)# clock timezone - 8
Switch(config)#
```

---

## 67-4 show clock

This command is used to display the time and date information.

**show clock**

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### 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   : System Clock
Current Time          : 05:56:45, 2000-01-01
Time Zone             : UTC +00:00
Daylight Saving Time  : Disabled

Switch#
```

---

## 67-5 show sntp

This command is used to display information about the SNTP server.

```
show sntp
```

### Parameters

None.

### Default

None.

### Command Mode

User/Privileged EXEC Mode.

### Usage Guideline

Use this command to display information about the SNTP server.

### Example

This example shows how to display SNTP information.

```
Switch# show sntp

SNTP Status           : Enabled
SNTP Poll Interval    : 720 sec

SNTP Server Status:

SNTP Server           Version Last Receive
-----
10.0.0.11             4          00:02:02
10::2
FE80::1111%vlan1
-----

Total Entries:3

Switch#
```

## 67-6 sntp server

This command is used to allow the system clock to be synchronized with an SNTP time server. Use the **no** form of this command to remove a server from the list of SNTP servers.

```
sntp server {IP-ADDRESS | IPV6-ADDRESS}
no sntp server {IP-ADDRESS | IPV6-ADDRESS}
```

### Parameters

---

<i>IP-ADDRESS</i>	Specifies the IP address of the time server which provides the clock synchronization.
-------------------	---

---

---

---

<i>IPV6-ADDRESS</i>	pecifies the IPv6 address of the time server.
---------------------	---

---

---

## Default

None.

## Command Mode

Global Configuration Mode.

## Usage Guideline

SNTP is a compact, client-only version of the NTP. Unlike NTP, SNTP can only receive the time from NTP servers; it cannot be used to provide time services to other systems. SNTP typically provides time within 100 milliseconds of the accurate time, but it does not provide the complex filtering and statistical mechanisms of NTP. In addition, SNTP does not authenticate traffic, although you can configure extended access lists to provide some protection.

Create multiple SNTP servers by enter this command multiple times with different SNTP server IP addresses.

Use the **no** form of this command to delete the SNTP server entry. To delete an entry, specify the information exactly the same as the originally configured setting. The time obtained from the SNTP server refers to the UTC time.

## Example

This example shows how to configure a switch to allow its software clock to be synchronized with the clock by the SNTP server at IP address 192.168.22.44.

```
Switch# configure terminal
Switch(config)# sntp server 192.168.22.44
Switch(config)#
```

---

## 67-7 sntp enable

This command is used to enable the SNTP function. Use the **no** 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.

## Usage Guideline

Use this command 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)#
```

---

## 67-8 sntp interval

This command is used to set the interval for the SNTP client to synchronize its clock with the server. Use the **no** form of this command to revert to the default setting.

**sntp interval** *SECONDS*

**no sntp interval**

## Parameters

---

<i>SECONDS</i>	Specifies the synchronization interval from 30 to 99999 seconds.
----------------	--

---

## Default

By default, this value is 720 seconds.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this command 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)#
```

---

## 68. Time Range Commands

### 68-1 periodic

This command is used to specify the period of time for a time range profile. Use the **no** form of this command to remove the specified period of time.

**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

<b>daily</b> <i>HH:MM to HH:MM</i>	Specifies the time of the day, using the format HH:MM (for example, 18:30).
<b>weekly</b> <i>WEEK-DAY HH:MM to [WEEK-DAY] HH:MM</i>	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.

#### 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 rdtme
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)#
```

### 68-2 show time-range

This command is used to display the time range profile configuration.

**show time-range** [*NAME*]

#### Parameters

<i>NAME</i>	(Optional) Specifies the name of the time-range profile to be displayed.
-------------	--

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

If no parameter is 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: rvertime
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#
```

---

## 68-3 time-range

This command is used to enter the Time-range Configuration Mode to define a time range. Use the **no** form of this command to delete a time range.

**time-range** *NAME*

**no time-range** *NAME*

## Parameters

---

<i>NAME</i>	Specifies the name of the time-range profile to be configured. The maximum length is 32 characters.
-------------	---

---

## Default

None.

## Command Mode

Global Configuration Mode.

## 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)#
```

---

## 69. Traffic Segmentation Commands

### 69-1 show traffic-segmentation forward

This command is used to display the traffic segmentation for ports.

```
show traffic-segmentation forward [interface INTERFACE-ID [, | -]]
```

#### Parameters

<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

#### Default

None.

#### Command Mode

User/Privileged EXEC Mode.

#### Usage Guideline

This command is only available for physical port and port-channel interface configuration.

If no parameter is specified, the traffic segmentation configuration for all ports is displayed.

#### Example

This example shows how to display the configuration of traffic segmentation on port 1.

```
Switch# show traffic-segmentation forward interface eth1/0/1

Interface          Forwarding Domain
-----          -
eth1/0/1          eth1/0/2,1/0/4-1/0/6

Total Entries: 1

Switch#
```

### 69-2 traffic-segmentation forward

This command is used to restrict the Layer 2 packet forwarding domain of packets received by the configured port. Use the **no** form of this command to remove the specification of forwarding domain.

```
traffic-segmentation forward interface INTERFACE-ID [, | -]
```

```
no traffic-segmentation forward interface INTERFACE-ID [, | -]
```

#### Parameters

<i>INTERFACE-ID</i>	Specifies the interfaces to be configured.
---------------------	--

---

---

,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

---

---

## Default

None.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

This command is only available for physical port interface configuration.

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 of this command to 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, 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 port 1 to the range of ports 3 to 6.

```
Switch# configure terminal
Switch(config)#interface eth1/0/1
Switch(config-if)#traffic-segmentation forward interface eth1/0/3-6
Switch(config-if)#
```

## 70. Virtual LAN (VLAN) Commands

### 70-1 acceptable-frame

This command is used to set the acceptable types of frames by a port. Use the **no** form of this command to revert to the default settings.

**acceptable-frame** {tagged-only | untagged-only | admit-all}

**no acceptable-frame**

#### Parameters

<b>tagged-only</b>	Specifies that only tagged frames are admitted.
<b>untagged-only</b>	Specifies that only untagged frames are admitted.
<b>admit-all</b>	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.

#### Usage Guideline

Use this command to set the acceptable types of frames by a port.

#### Example

This example shows how to set the acceptable frame type to **tagged-only** on port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# acceptable-frame tagged-only
Switch(config-if)#
```

### 70-2 ingress-checking

This command is used to enable ingress checking for frames received by a port. Use the **no** form of this command to disable the ingress check.

**ingress-checking**

**no ingress-checking**

#### Parameters

None.

#### Default

By default, this option is enabled.

## Command Mode

Interface Configuration Mode.

## 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 enable ingress checking on port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# ingress-checking
Switch(config-if)#
```

## 70-3 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

<i>VLAN-ID</i>	(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.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.
<b>interface</b> <i>INTERFACE-ID</i>	(Optional) Specifies the port to display the VLAN related setting.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the 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
  Description :
  Tagged Member Ports :
  Untagged Member Ports : eth1/0/1-1/0/28

Total Entries : 1

Switch#
```

This example shows how to display the PVID, ingress checking, and acceptable frame type information for ports 1 to 2.

```
Switch#show vlan interface eth1/0/1-2

eth1/0/1
  VLAN Mode : Hybrid
  Native VLAN : 1
  Hybrid Untagged VLAN : 1
  Hybrid Tagged VLAN :
  Ingress Checking : Enabled
  Acceptable Frame Type : Admit-All

eth1/0/2
  VLAN Mode : Hybrid
  Native VLAN : 1
  Hybrid Untagged VLAN : 1
  Hybrid Tagged VLAN :
  Ingress Checking : Enabled
  Acceptable Frame Type : Admit-All

Switch#
```

## 70-4 switchport access vlan

This command is used to specify the access VLAN for an interface. Use the **no** form of this command to revert to the default setting.

**switchport access vlan** *VLAN-ID*

**no switchport access vlan**

### Parameters

---

<i>VLAN-ID</i>	Specifies the access VLAN of the interface.
----------------	---

---

### Default

By default, this access VLAN is VLAN 1.

## Command Mode

Interface Configuration Mode.

## 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 port 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)#
```

## 70-5 switchport hybrid allowed vlan

This command is used to specify the tagged or untagged VLANs for a hybrid port. Use the **no** form of this command to revert to the default setting.

**switchport hybrid allowed vlan** {[add] {tagged | untagged} | remove} *VLAN-ID* [, | -]

**no switchport hybrid allowed vlan**

### Parameters

<b>add</b>	(Optional) Specifies the port will be added into the specified VLAN(s).
<b>remove</b>	Specifies the port will be removed from the specified VLAN(s).
<b>tagged</b>	Specifies the port as a tagged member of the specified VLAN(s).
<b>untagged</b>	Specifies the port as an untagged member of the specified VLAN(s).
<i>VLAN-ID</i>	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 allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.

### Default

By default, a hybrid port is an untagged member port of VLAN 1.

## Command Mode

Interface Configuration Mode.

## 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 overwrite the previous command. If the new untagged allowed VLAN list overlaps 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 overlaps with the 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 port 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)#
```

## 70-6 switchport hybrid native vlan

This command is used to specify the native VLAN ID of a hybrid port. Use the **no** form of this command to revert to the default setting.

**switchport hybrid native vlan** *VLAN-ID*

**no switchport hybrid native vlan**

### Parameters

---

<i>VLAN-ID</i>	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.

### 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 port 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)#
```

## 70-7 switchport mode

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

```
switchport mode {access | hybrid | trunk}
no switchport mode
```

### Parameters

<b>access</b>	Specifies the port as an access port.
<b>hybrid</b>	Specifies the port as a hybrid port.
<b>trunk</b>	Specifies the port as a trunk port.

### Default

By default, this option is hybrid.

### Command Mode

Interface Configuration Mode.

### Usage Guideline

When a port is set to access mode, this port will be an untagged member of the access VLAN configured for the port. When a port is set to hybrid mode, the port can be an untagged or tagged member of any VLAN configured.

When a port is set to trunk mode, this port is either a tagged or untagged member port of its native VLAN and can be a tagged member of other VLANs configured. The purpose of a trunk port is to support the switch-to-switch connection.

When the switch-port mode is changed, the VLAN related setting associated with previous mode will be lost.

### Example

This example shows how to configure port 1 as a trunk port.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# switchport mode trunk
Switch(config-if)#
```

## 70-8 switchport trunk allowed vlan

This command is used to configure the VLANs that are allowed to receive and send traffic on the specified interface in a tagged format. Use the **no** form of this command to revert to the default setting.

```
switchport trunk allowed vlan {all | [add | remove | except] VLAN-ID [, | -]}
no switchport trunk allowed vlan
```

### Parameters

<b>all</b>	Specifies that all VLANs are allowed on the interface.
<b>add</b>	(Optional) Specifies to add the specified VLAN list to the allowed VLAN list.
<b>remove</b>	(Optional) Specifies to remove the specified VLAN list from the allowed VLAN list.

<b>except</b>	(Optional) Specifies that all VLANs except the VLANs in the exception list are allowed.
<i>VLAN-ID</i>	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 allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.

## Default

By default, all VLANs are allowed.

## Command Mode

Interface Configuration Mode.

## 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 port 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)#
```

## 70-9 switchport trunk native vlan

This command is used to specify the native VLAN ID of a trunk mode interface. Use the **no** form of this command to revert to the default setting.

**switchport trunk native vlan {VLAN-ID | tag}**

**no switchport trunk native vlan [tag]**

## Parameters

<i>VLAN-ID</i>	Specifies the native VLAN for a trunk port.
<b>tag</b>	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.

## 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 port 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)#
```

## 70-10 vlan

This command is used to add VLANs and enter the VLAN configuration mode. Use the **no** form of this command to remove VLANs.

**vlan** *VLAN-ID* [, | -]

**no vlan** *VLAN-ID* [, | -]

## Parameters

<i>VLAN-ID</i>	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.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before or after the hyphen.

## Default

The VLAN ID 1 exists in the system as the default VLAN.

## Command Mode

Global Configuration Mode.

## Usage Guideline

Use this 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)#
```

---

## 70-11 name

This command is used to specify the name of a VLAN. Use the **no** form of this command to revert to the default setting.

**name** *VLAN-NAME*

**no name**

## Parameters

---

<i>VLAN-NAME</i>	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.

## 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)#
```

---

# 71. Voice VLAN Commands

## 71-1 voice vlan

This command is used to enable the global voice VLAN state and configure the voice VLAN. Use the **no** form of this command to disable the voice VLAN state.

**voice vlan** *VLAN-ID*

**no voice vlan**

### Parameters

---

<i>VLAN-ID</i>	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.

### Usage Guideline

Use this command 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 Mode 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 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)#
```

## 71-2 voice vlan aging

This command is used to configure the aging time for aging out the voice VLAN's dynamic member ports. Use the **no** form of this command to revert to the default setting.

**voice vlan aging** *MINUTES*

**no voice vlan aging**

### Parameters

---

<i>MINUTES</i>	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.

## 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)#
```

---

## 71-3 voice vlan enable

This command is used to enable the voice VLAN state of ports. Use the **no** form of this command to disable the voice VLAN's port state.

**voice vlan enable**  
**no voice vlan enable**

## Parameters

None.

## Default

By default, this option is disabled.

## Command Mode

Interface Configuration Mode.

## Usage Guideline

U The command takes effect for access ports or hybrid ports. Use the **voice vlan enable** command to enable the voice VLAN function for ports. oth the **voice vlan** command in the Global Configuration Mode 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 port 1.

```
Switch# configure terminal
Switch(config)# interface eth1/0/1
Switch(config-if)# voice vlan enable
Switch(config-if)#
```

## 71-4 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

<i>MAC-ADDRES</i>	Specifies the OUI MAC address.
<i>MASK</i>	Specifies the OUI MAC address matching bitmask.
<b>description</b> <i>TEXT</i>	(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.

### 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)#
```

## 71-5 voice vlan mode

This command is used to enable the automatic learning of the port as voice VLAN member ports. Use the **no** form of this command to disable the automatic learning.

```
voice vlan mode {manual | auto {tag | untag}}
no voice vlan mode
```

### Parameters

<b>manual</b>	Specifies that voice VLAN membership will be manually configured.
<b>auto</b>	Specifies that voice VLAN membership will be automatically learned.
<b>tag</b>	Specifies to learn voice VLAN tagged members.
<b>untag</b>	Specifies to learn voice VLAN untagged members.

### Default

By default, this option is set to untag and auto.

### Command Mode

Interface Configuration Mode.

### 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 port 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)#
```

## 71-6 voice vlan qos

This command is used to configure the CoS priority for the incoming voice VLAN traffic. Use the **no** form of this command to revert to the default setting.

**voice vlan qos** *COS-VALUE*

**no voice vlan qos**

### Parameters

<i>COS-VALUE</i>	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.

### 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)#
```

## 71-7 show voice vlan

This command is used to display the voice VLAN configuration.

**show voice vlan** [**interface** [*INTERFACE-ID* [, | -]]]

**show voice vlan** {**device** | **lldp-med device**} [**interface** *INTERFACE-ID* [, | -]]

### Parameters

<b>interface</b>	(Optional) Specifies to display voice VLAN information of ports.
<i>INTERFACE-ID</i>	(Optional) Specifies the interface to display.

,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.
<b>device</b>	Specifies to display the voice devices learned by OUI.
<b>lldp-med device</b>	Specifies to display the voice devices learned by LLDP-MED.

## Default

None.

## Command Mode

User/Privileged EXEC Mode.

## Usage Guideline

Use this command to display the voice VLAN configuration.

## 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 1 to 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 1 to 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#
```

## 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
<p>Event Description: 802.1X Authentication failure.</p> <p>Log Message: 802.1X authentication fail [due to &lt;reason&gt;] from (Username: &lt;username&gt;, &lt;interface-id&gt;, MAC: &lt;mac-address&gt;)</p> <p>Parameters Description:</p> <p>reason: The reason for the failed authentication. The possible reason may be:</p> <p>(1) user authentication failure</p> <p>(2) no server(s) responding</p> <p>(3) no servers configured</p> <p>(4) no resources</p> <p>(5) user timeout expired</p> <p>username: The user that is being authenticated.</p> <p>interface-id: The switch interface number.</p> <p>mac-address: The MAC address of the authenticated device.</p>	Critical
<p>Event Description: 802.1X Authentication successful.</p> <p>Log Message: 802.1X authentication success (Username: &lt;username&gt;, &lt;interface-id&gt;, MAC: &lt;mac-address&gt;)</p> <p>Parameters Description:</p> <p>username: The user that is being authenticated.</p> <p>interface-id: The interface name.</p> <p>mac-address: The MAC address of the authenticated device.</p>	Informational

### AAA

Log Description	Severity
<p>Event Description: This log will be generated when AAA global state is enabled or disabled.</p> <p>Log Message: AAA is &lt;status&gt;</p> <p>Parameters Description:</p> <p>status: The status indicates the AAA enabled or disabled.</p>	Informational
<p>Event Description: This log will be generated when login successfully.</p> <p>Log Message: Successful login through &lt;exec-type&gt; [from &lt;client-ip&gt;] authenticated by AAA &lt;aaa-method&gt; &lt;server-ip&gt; (Username: &lt;username&gt;)</p> <p>Parameters Description:</p> <p>exec-type: It indicates the EXEC types. For example, Console, Telnet, SSH, Web, and Web (SSL).</p> <p>client-ip: It indicates the client's IP address if valid through IP protocol.</p> <p>aaa-method: It indicates the authentication method. For example, none, local, and server.</p> <p>server-ip: It indicates the AAA server IP address if authentication method is remote server.</p> <p>Username: It indicates the username for authentication.</p> <p>Note: For console, there will be no client IP information for logging.</p>	Informational

Log Description	Severity
<p>Event Description: This log will be generated when login failure.</p> <p>Log Message: Login failed through &lt;exec-type&gt; [from &lt;client-ip&gt;] authenticated by AAA &lt;aaa-method&gt; &lt;server-ip&gt; (Username: &lt;username&gt;).</p> <p>Parameters Description:</p> <p>exec-type: It indicates the EXEC types. For example, Console, Telnet, SSH, Web, and Web (SSL).</p> <p>client-ip: It indicates the client's IP address if valid through IP protocol.</p> <p>aaa-method: It indicates the authentication method. For example, local.</p> <p>server-ip: It indicates the AAA server IP address if authentication method is remote server.</p> <p>username: It indicates the username for authentication.</p> <p>Note: For console, there will be no client IP information for logging.</p>	Warning
<p>Event Description: This log will be generated when the remote server does not respond to the login authentication request.</p> <p>Log Message: Login failed through &lt;exec-type&gt; &lt;from client-ip&gt; due to AAA server &lt;server-ip&gt; timeout (Username: &lt;username&gt;)</p> <p>Parameters Description:</p> <p>exec-type: It indicates the EXEC types, e.g.: Console, Telnet, SSH, Web, and Web(SSL).</p> <p>client-ip: It indicates the client's IP address if valid through IP protocol.</p> <p>server-ip: It indicates the AAA server IP address if authentication method is remote server.</p> <p>username: It indicates the username for authentication.</p> <p>Note: For console, there will be no client IP information for logging.</p>	Warning
<p>Event Description: This log will be generated when enable privilege successfully.</p> <p>Log Message: Successful enable privilege through &lt;exec-type&gt; &lt;from client-ip&gt; authenticated by AAA &lt;aaa-method&gt; &lt;server-ip&gt; (Username: &lt;username&gt;)</p> <p>Parameters Description:</p> <p>exec-type: It indicates the EXEC types, e.g.: Console, Telnet, SSH, Web, Web(SSL).</p> <p>client-ip: It indicates the client's IP address if valid through IP protocol.</p> <p>aaa-method: It indicates the authentication method, e.g.: local, server.</p> <p>server-ip: It indicates the AAA server IP address if authentication method is remote server.</p> <p>username: It indicates the username for authentication.</p>	Informational
<p>Event Description: This log will be generated when enable privilege failure.</p> <p>Log Message: Enable privilege failed through &lt;exec-type&gt; &lt;from client-ip&gt; authenticated by AAA &lt;aaa-method&gt; &lt;server-ip&gt; (Username: &lt;username&gt;)</p> <p>Parameters Description:</p> <p>exec-type: It indicates the EXEC types, e.g.: Console, Telnet, SSH, Web, Web(SSL).</p> <p>client-ip: It indicates the client's IP address if valid through IP protocol.</p> <p>aaa-method: It indicates the authentication method, e.g.: local, server.</p> <p>server-ip: It indicates the AAA server IP address if authentication method is remote server.</p> <p>username: It indicates the username for authentication.</p>	Warning
<p>Event Description: This log will be generated when the remote server does not respond to the enable password authentication request.</p> <p>Log Message: Enable privilege failed through &lt;exec-type&gt; &lt;from client-ip&gt; due to AAA server &lt;server-ip&gt; timeout (Username: &lt;username&gt;)</p> <p>Parameters Description:</p> <p>exec-type: It indicates the EXEC types, e.g.: Console, Telnet, SSH, Web, Web(SSL).</p> <p>client-ip: It indicates the client's IP address if valid through IP protocol.</p>	Warning



Log Description	Severity
server-ip: It indicates the AAA server IP address if authentication method is remote server.	
username: It indicates the username for authentication.	

## 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: The interface name. mac-address: Surveillance device MAC address.	Informational
Event Description: When an interface that is enabled surveillance, VLAN joins the surveillance VLAN automatically. Log Message: <interface-id> add into surveillance VLAN <vid> Parameters Description: interface-id: The interface name. vid: The 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: The interface name. vid: The VLAN ID.	Informational
Event Description: When an IPC is added in the surveillance VLAN, the log message will be sent. Log Message: ASV: Add IPC(<ipaddr>, MAC: <mac-address>) Parameters Description: ipaddr: Represent the IP address of the IPC.	Informational
Event Description: When an IPC is removed from the surveillance VLAN, the log message will be sent. Log Message: ASV: Remove IPC(<ipaddr>, MAC: <mac-address>) Parameters Description: ipaddr: Represent the IP address of the IPC.	Informational
Event Description: When an NVR is added in the surveillance VLAN, the log message will be sent. Log Message: ASV: Add NVR(<ipaddr>, MAC: <mac-address>) Parameters Description: ipaddr: Represent the IP address of the NVR.	Informational
Event Description: When an NVR is removed from the surveillance VLAN, the log message will be sent. Log Message: ASV: Remove NVR(<ipaddr>, MAC: <mac-address>) Parameters Description: ipaddr: Represent the IP address of the NVR.	Informational
Event Description: When the mode of ASV 2.0 is changed by Web GUI, the log message will be sent. Log Message: ASV: Mode change from <mode> to <mode> Parameters Description:	Informational

Log Description	Severity
mode: Represent the mode of ASV 2.0. The mode can be standard or surveillance.	

## Configuration/Firmware

Log Description	Severity
<p>Event Description: Firmware upgraded successfully.</p> <p>Log Message: Firmware upgraded by &lt;session&gt; successfully (Username: &lt;username&gt;[, IP: &lt;ipaddr&gt;, MAC: &lt;macaddr&gt;], Server IP: &lt;serverIP&gt;, File Name: &lt;pathFile&gt;)</p> <p>Parameters Description:</p> <p>session: The user's session.</p> <p>username: Represent current login user.</p> <p>ipaddr: Represent client IP address.</p> <p>macaddr: Represent client MAC address.</p> <p>serverIP: Server IP address.</p> <p>pathFile: Path and file name on server.</p> <p>Note: For console, there will be no IP and MAC information for logging.</p>	Informational
<p>Event Description: Firmware upgraded unsuccessfully.</p> <p>Log Message: Firmware upgraded by &lt;session&gt; unsuccessfully (Username: &lt;username&gt;[, IP: &lt;ipaddr&gt;, MAC: &lt;macaddr&gt;], Server IP: &lt;serverIP&gt;, File Name: &lt;pathFile&gt;)</p> <p>Parameters Description:</p> <p>session: The user's session.</p> <p>username: Represent current login user.</p> <p>ipaddr: Represent client IP address.</p> <p>macaddr: Represent client MAC address.</p> <p>serverIP: Server IP address.</p> <p>pathFile: Path and file name on server.</p> <p>Note: For console, there will be no IP and MAC information for logging.</p>	Warning
<p>Event Description: Firmware uploaded successfully.</p> <p>Log Message: Firmware uploaded by &lt;session&gt; successfully (Username: &lt;username&gt;[, IP: &lt;ipaddr&gt;, MAC: &lt;macaddr&gt;], Server IP: &lt;serverIP&gt;, File Name: &lt;pathFile&gt;)</p> <p>Parameters Description:</p> <p>session: The user's session.</p> <p>username: Represent current login user.</p> <p>ipaddr: Represent client IP address.</p> <p>macaddr: Represent client MAC address.</p> <p>serverIP: Server IP address.</p> <p>pathFile: Path and file name on server.</p> <p>Note: For console, there will be no IP and MAC information for logging.</p>	Informational
<p>Event Description: Firmware uploaded unsuccessfully.</p> <p>Log Message: Firmware uploaded by &lt;session&gt; unsuccessfully (Username: &lt;username&gt;[, IP: &lt;ipaddr&gt;, MAC: &lt;macaddr&gt;], Server IP: &lt;serverIP&gt;, File Name: &lt;pathFile&gt;)</p> <p>Parameters Description:</p> <p>session: The user's session.</p> <p>username: Represent current login user.</p> <p>ipaddr: Represent client IP address.</p> <p>macaddr: Represent client MAC address.</p> <p>serverIP: Server IP address.</p>	Warning

Log Description	Severity
<p>pathFile: Path and file name on server.</p> <p>Note: For console, there will be no IP and MAC information for logging.</p>	
<p>Event Description: Configuration downloaded successfully.</p> <p>Log Message: Configuration downloaded by &lt;session&gt; successfully. (Username: &lt;username&gt;[, IP: &lt;ipaddr&gt;, MAC: &lt;macaddr&gt;], Server IP: &lt;serverIP&gt;, File Name: &lt;pathFile&gt;)</p> <p>Parameters Description:</p> <p>session: The user's session.</p> <p>username: Represent current login user.</p> <p>ipaddr: Represent client IP address.</p> <p>macaddr: Represent client MAC address.</p> <p>serverIP: Server IP address.</p> <p>pathFile: Path and file name on server.</p> <p>Note: For console, there will be no IP and MAC information for logging.</p>	Informational
<p>Event Description: Configuration downloaded unsuccessfully.</p> <p>Log Message: Configuration downloaded by &lt;session&gt; unsuccessfully. (Username: &lt;username&gt;[, IP: &lt;ipaddr&gt;, MAC: &lt;macaddr&gt;], Server IP: &lt;serverIP&gt;, File Name: &lt;pathFile&gt;)</p> <p>Parameters Description:</p> <p>session: The user's session.</p> <p>username: Represent current login user.</p> <p>ipaddr: Represent client IP address.</p> <p>macaddr: Represent client MAC address.</p> <p>serverIP: Server IP address.</p> <p>pathFile: Path and file name on server.</p> <p>Note: For console, there will be no IP and MAC information for logging.</p>	Warning
<p>Event Description: Configuration uploaded successfully.</p> <p>Log Message: Configuration uploaded by &lt;session&gt; successfully. (Username: &lt;username&gt;[, IP: &lt;ipaddr&gt;, MAC: &lt;macaddr&gt;], Server IP: &lt;serverIP&gt;, File Name: &lt;pathFile&gt;)</p> <p>Parameters Description:</p> <p>session: The user's session.</p> <p>username: Represent current login user.</p> <p>ipaddr: Represent client IP address.</p> <p>macaddr: Represent client MAC address.</p> <p>serverIP: Server IP address.</p> <p>pathFile: Path and file name on server.</p> <p>Note: For console, there will be no IP and MAC information for logging.</p>	Informational
<p>Event Description: Configuration uploaded unsuccessfully.</p> <p>Log Message: Configuration uploaded by &lt;session&gt; unsuccessfully. (Username: &lt;username&gt;[, IP: &lt;ipaddr&gt;, MAC: &lt;macaddr&gt;], Server IP: &lt;serverIP&gt;, File Name: &lt;pathFile&gt;)</p> <p>Parameters Description:</p> <p>session: The user's session.</p> <p>username: Represent current login user.</p> <p>ipaddr: Represent client IP address.</p> <p>macaddr: Represent client MAC address.</p> <p>serverIP: Server IP address.</p> <p>pathFile: Path and file name on server.</p> <p>Note: For console, there will be no IP and MAC information for logging.</p>	Warning
<p>Event Description: Configuration saved to flash by console.</p>	Informational

Log Description	Severity
<p>Log Message: Configuration saved to flash by console (Username: &lt;username&gt;)</p> <p>Parameters Description: username: Represent current login user.</p>	
<p>Event Description: Configuration saved to flash by remote.</p> <p>Log Message: Configuration saved to flash (Username: &lt;username&gt;, IP: &lt;ipaddr&gt;)</p> <p>Parameters Description: username: Represent current login user. ipaddr: Represent client IP address.</p>	Informational
<p>Event Description: Log message uploaded successfully.</p> <p>Log Message: Log message uploaded by &lt;session&gt; successfully. (Username: &lt;username&gt;[, IP: &lt;ipaddr&gt;, MAC: &lt;macaddr&gt;])</p> <p>Parameters Description: session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr: Represent client MAC address. Note: For console, there will be no IP and MAC information for logging.</p>	Informational
<p>Event Description: Log message uploaded unsuccessfully.</p> <p>Log Message: Log message uploaded by &lt;session&gt; unsuccessfully. (Username: &lt;username&gt;[, IP: &lt;ipaddr&gt;, MAC: &lt;macaddr&gt;])</p> <p>Parameters Description: session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr: Represent client MAC address. Note: For console, there will be no IP and MAC information for logging.</p>	Warning
<p>Event Description: Unknown type files downloaded unsuccessfully.</p> <p>Log Message: Downloaded by &lt;session&gt; unsuccessfully. (Username: &lt;username&gt;[, IP: &lt;ipaddr&gt;, MAC: &lt;macaddr&gt;], Server IP: &lt;serverIP&gt;, File Name: &lt;pathFile&gt;)</p> <p>Parameters Description: 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. Note: For console, there will be no IP and MAC information for logging.</p>	Warning

**NOTE:**

1. The user's session indicates Console, Web, SNMP, Telnet, or SSH.
2. If update configuration/firmware through Console, there will be no IP and MAC information for logging.

**DAI**

Log Description	Severity
Event Description: This log will be generated when DAI detect invalid ARP packet.	Warning

Log Description	Severity
<p>Log Message: Illegal ARP &lt;type&gt; packets (IP: &lt;ip-address&gt;, MAC: &lt;mac-address&gt;, VLAN &lt;vlan-id&gt;, on &lt;interface-id&gt;)</p> <p>Parameters Description:</p> <p>type: The type of ARP packet, it indicates that ARP packet is request or ARP response.</p>	
<p>Event Description: This log will be generated when DAI detect valid ARP packet.</p> <p>Log Message: Legal ARP &lt;type&gt; packets (IP: &lt;ip-address&gt;, MAC: &lt;mac-address&gt;, VLAN &lt;vlan-id&gt;, on &lt;interface-id&gt;)</p> <p>Parameters Description:</p> <p>type: The type of ARP packet, it indicates that ARP packet is request or ARP response.</p>	Informational

## DDM

Log Description	Severity
<p>Event Description: This log is generated when the any of SFP parameters exceeds from the predefined threshold.</p> <p>Log Message: Optical transceiver &lt;interface-id&gt; &lt;component&gt; &lt;high-low&gt; &lt;type&gt; threshold exceeded</p> <p>Parameters Description:</p> <p>interface-id: The port interface ID.</p> <p>component: DDM threshold type. It can be one of the following types: temperature, supply voltage, bias current, TX power, or RX power</p> <p>high-low: High or low threshold.</p> <p>violate-type: Warning or alarm.</p>	Warning
<p>Event Description: This log is generated when the any of SFP parameters fall below the corresponding warning threshold.</p> <p>Log Message: Optical transceiver &lt;interface-id&gt; &lt;component&gt; back to normal</p> <p>Parameters Description:</p> <p>interface-id: The port interface ID.</p> <p>component: DDM threshold type. It can be one of the following types: temperature, supply voltage, bias current, TX power, or RX power.</p>	Warning

## DDP

Log Description	Severity
<p>Event Description: This message means that configuration is automatically saved due to setting changes from DDP.</p> <p>Log Message: CONFIG-6-DDPSAVECONFIG: Configuration automatically saved to flash due to configuring from DDP(Username: &lt;username&gt;, IP: &lt;ipaddr&gt;)</p> <p>Parameters Description:</p> <p>username: Represent the user who executed this function.</p> <p>IP: Represent client IP address.</p>	Informational

## DHCPv6 Client

Log Description	Severity
<p>Event Description: DHCPv6 client interface administrator state changed.</p> <p>Log Message: DHCPv6 client on interface &lt;ipif-name&gt; changed state to [enabled   disabled]</p> <p>Parameters Description:</p>	Informational

Log Description	Severity
<p>ipif-name: Name of the DHCPv6 client interface.</p> <p>Event Description: DHCPv6 client obtains an IPv6 address from a DHCPv6 server.</p> <p>Log Message: DHCPv6 client obtains an ipv6 address &lt;ipv6address&gt; on interface &lt;ipif-name&gt;</p> <p>Parameters Description:</p> <p>ipv6address: The IPv6 address obtained from a DHCPv6 server.</p> <p>ipif-name: Name of the DHCPv6 client interface.</p>	Informational
<p>Event Description: The IPv6 address obtained from a DHCPv6 server starts renewing.</p> <p>Log Message: The IPv6 address &lt;ipv6address&gt; on interface &lt;ipif-name&gt; starts renewing</p> <p>Parameters Description:</p> <p>ipv6address: The IPv6 address obtained from a DHCPv6 server.</p> <p>ipif-name: Name of the DHCPv6 client interface.</p>	Informational
<p>Event Description: The IPv6 address obtained from a DHCPv6 server renews success.</p> <p>Log Message: The IPv6 address &lt;ipv6address&gt; on interface &lt;ipif-name&gt; renews success</p> <p>Parameters Description:</p> <p>ipv6address: The IPv6 address obtained from a DHCPv6 server.</p> <p>ipif-name: Name of the DHCPv6 client interface.</p>	Informational
<p>Event Description: The IPv6 address obtained from a DHCPv6 server starts rebinding.</p> <p>Log Message: The IPv6 address &lt;ipv6address&gt; on interface &lt;ipif-name&gt; starts rebinding</p> <p>Parameters Description:</p> <p>ipv6address: The IPv6 address obtained from a DHCPv6 server.</p> <p>ipif-name: Name of the DHCPv6 client interface.</p>	Informational
<p>Event Description: The IPv6 address obtained from a DHCPv6 server rebinds success.</p> <p>Log Message: The IPv6 address &lt;ipv6address&gt; on interface &lt;ipif-name&gt; rebinds success</p> <p>Parameters Description:</p> <p>ipv6address: The IPv6 address obtained from a DHCPv6 server.</p> <p>ipif-name: Name of the DHCPv6 client interface.</p>	Informational
<p>Event Description: The IPv6 address from a DHCPv6 server was deleted.</p> <p>Log Message: The IPv6 address &lt;ipv6address&gt; on interface &lt;ipif-name&gt; was deleted</p> <p>Parameters Description:</p> <p>ipv6address: The IPv6 address obtained from a DHCPv6 server.</p> <p>ipif-name: Name of the DHCPv6 client interface.</p>	Informational

## DHCPv6 Relay

Log Description	Severity
<p>Event Description: DHCPv6 relay on a specify interface's administrator state changed.</p> <p>Log Message: DHCPv6 relay on interface &lt;ipif-name&gt; changed state to [enabled   disabled]</p> <p>Parameters Description:</p> <p>ipif-name: Name of the DHCPv6 relay agent interface.</p>	Informational

## DNS Resolver

Log Description	Severity
<p>Event Description: Duplicate Domain name cache added, leads a dynamic domain name cache be deleted.</p> <p>Log Message: [DNS-RESOLVER(1):]Duplicate Domain name case name: &lt;domain-name&gt;, static IP: &lt;ipaddr&gt;, dynamic IP:&lt;ipaddr&gt;</p> <p>Parameters Description:</p> <p>domain-name: The domain name string.</p> <p>ipaddr: The IP address.</p>	Informational

## DoS Prevention

Log Description	Severity
<p>Event Description: Detect DOS attack.</p> <p>Log Message: &lt;dos-type&gt; is dropped from (IP: &lt;ip-address&gt; Port &lt;interface-id&gt;)</p> <p>Parameters Description:</p> <p>dos-type: DOS attack type.</p> <p>ip-address: IP address.</p> <p>interface-id: Interface name.</p>	Notice

## Interface

Log Description	Severity
<p>Event Description: When port is down.</p> <p>Log Message: Port &lt;port-type&gt;&lt;interface-id&gt; link down</p> <p>Parameters Description:</p> <p>port-type: The port type.</p> <p>interface-id: Interface name.</p>	Informational
<p>Event Description: When port is up.</p> <p>Log Message: Port &lt;port-type&gt;&lt;interface-id&gt; link up, &lt;link-speed&gt;</p> <p>Parameters Description:</p> <p>port-type: The port type.</p> <p>interface-id: The interface name.</p> <p>link-speed: The port link speed.</p>	Informational
<p>Event Description: Port is linked on half-duplex mode.</p> <p>Log Message: ASV: Port &lt;interface-id&gt; Half duplex detected</p> <p>Parameters Description:</p> <p>interface-id: Interface name.</p>	Warning

## IPv6 Duplicate Address

Log Description	Severity
<p>Event Description: This log will be generated when DUT receives Neighbor Solicitation (NS) message with reduplicated address in the DAD duration.</p> <p>Log Message: Duplicate address &lt;ipv6address&gt; on &lt;interface-id&gt; via receiving Neighbor Solicitation Messages</p> <p>Parameters Description:</p> <p>ipv6address: ipv6 address in Neighbor Solicitation Messages</p>	Warning

Log Description	Severity
interface-id: Interface name	
Event Description: This log will be generated when DUT receives Neighbor Advertisement (NA) message with reduplicated address in the DAD duration. Log Message: Duplicate address <ipv6address> on <interface-id> via receiving Neighbor Advertisement Messages Parameters Description: ipv6address: ipv6 address in Neighbor Advertisement Messages interface-id: Interface name	Warning

## 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



Log Description	Severity
<p>Event Description: Record the event when an interface loop recovered.</p> <p>Log Message: &lt;interface-id&gt; VLAN &lt;vlan-id&gt; LBD loop recovered</p> <p>Parameters Description:</p> <p>interface-id: Interface on which loop is detected.</p> <p>vlan-id: VLAN on which loop is detected.</p>	Critical
<p>Event Description: Record the event when the number of VLANs that loop back has occurred exceeds a reserved number.</p> <p>Log Message: Loop VLAN numbers overflow</p>	Critical

## LLDP/LLDP-MED

Log Description	Severity
<p>Event Description: LLDP-MED topology change detected</p> <p>Log Message: LLDP-MED topology change detected (on port &lt;portNum&gt;. chassis id: &lt;chassisType&gt;, &lt;chassisID&gt;, port id: &lt;portType&gt;, &lt;portID&gt;, device class: &lt;deviceClass&gt;)</p> <p>Parameters Description:</p> <p>portNum: The port number.</p> <p>chassisType: The chassis ID subtype.</p> <p>Value list:</p> <ol style="list-style-type: none"> <li>1. chassisComponent(1)</li> <li>2. interfaceAlias(2)</li> <li>3. portComponent(3)</li> <li>4. macAddress(4)</li> <li>5. networkAddress(5)</li> <li>6. interfaceName(6)</li> <li>7. local(7)</li> </ol> <p>chassisID: The chassis ID.</p> <p>portType: The port ID subtype.</p> <p>Value list:</p> <ol style="list-style-type: none"> <li>1. interfaceAlias(1)</li> <li>2. portComponent(2)</li> <li>3. macAddress(3)</li> <li>4. networkAddress(4)</li> <li>5. interfaceName(5)</li> <li>6. agentCircuitId(6)</li> <li>7. local(7)</li> </ol> <p>portID: The port ID.</p> <p>deviceClass: The LLDP-MED device type.</p>	Notice
<p>Event Description: Conflict LLDP-MED device type detected.</p> <p>Log Message: Conflict LLDP-MED device type detected (on port &lt;portNum&gt;, chassis id: &lt;chassisType&gt;, &lt;chassisID&gt;, port id: &lt;portType&gt;, &lt;portID&gt;, device class: &lt;deviceClass&gt;)</p> <p>Parameters Description:</p> <p>portNum: The port number.</p> <p>chassisType: The chassis ID subtype.</p> <p>Value list:</p> <ol style="list-style-type: none"> <li>1. chassisComponent(1)</li> <li>2. interfaceAlias(2)</li> <li>3. portComponent(3)</li> </ol>	Notice

Log Description	Severity
<p>4. macAddress(4)  5. networkAddress(5)  6. interfaceName(6)  7. local(7)  chassisID: The chassis ID.  portType: The 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: The port ID.  deviceClass: The LLDP-MED device type.</p>	
<p>Event Description: Incompatible LLDP-MED TLV set detected.  Log Message: Incompatible LLDP-MED TLV set detected (on port &lt;portNum&gt;, chassis id: &lt;chassisType&gt;, &lt;chassisID&gt;, port id: &lt;portType&gt;, &lt;portID&gt;, device class: &lt;deviceClass&gt;)  Parameters Description:  portNum: The port number.  chassisType: The 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: The chassis ID.  portType: The 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: The port ID.  deviceClass: The LLDP-MED device type.</p>	Notice

## Login/Logout

Log Description	Severity
<p>Event Description: Login through console successfully.  Log Message: Successful login through Console (Username: &lt;username&gt;)</p>	Informational

Log Description	Severity
Parameters Description: username: Represent current login user.	
Event Description: Login through console unsuccessfully. Log Message: Login failed through Console (Username: <username>) Parameters Description: username: Represent current login user.	Warning
Event Description: Console session timed out. Log Message: Console session timed out (Username: <username>) Parameters Description: username: Represent current login user.	Informational
Event Description: Logout through console. Log Message: Logout through Console (Username: <username>) Parameters Description: 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>) Parameters Description: username: Represent current login user. ipaddr: Represent client IP address.	Informational
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: The SSH session timed out. Log Message: SSH session timed out (Username: <username>, IP: <ipaddr>) Parameters Description: username: Represent current login user.	Informational

Log Description	Severity
ipaddr: Represent client IP address.	
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 an 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
<p>Event Description: Used to record the event that Spanning Tree Protocol is enabled.</p> <p>Log Message: Spanning Tree Protocol is enabled</p>	Informational
<p>Event Description: Used to record the event that Spanning Tree Protocol is disabled.</p> <p>Log Message: Spanning Tree Protocol is disabled</p>	Informational
<p>Event Description: Used to record MSTP instance topology change event.</p> <p>Log Message: Topology changed (Instance: &lt;Instance-id&gt;, &lt;interface-id&gt;, MAC:&lt;macaddr&gt;)</p> <p>Parameters Description:</p> <p>Instance-id: The MST instance ID. Instance 0 represents for default instance, CIST.</p> <p>interface-id: The port number that detect or receive topology change information.</p> <p>macaddr: The system of bridge MAC address.</p>	Notice
<p>Event Description: Used to record MSTP instance new root bridge selected.</p> <p>Log Message: [CIST   CIST Region   MSTI Region] New Root bridge selected ([Instance: &lt;Instance-id&gt;] MAC: &lt;macaddr&gt; Priority:&lt;priority&gt;)</p> <p>Parameters Description:</p> <p>Instance-id: The MST instance ID. Instance 0 represents for default instance, CIST.</p> <p>macaddr: The system of bridge MAC address.</p> <p>priority: The bridge priority value must be divisible by 4096.</p>	Informational
<p>Event Description: Used to record MSTP instance new root port selected.</p> <p>Log Message: New root port selected (Instance:&lt;Instance-id&gt;, &lt;interface-id&gt;)</p> <p>Parameters Description:</p> <p>Instance-id: The MST instance ID. Instance 0 represents for default instance, CIST.</p> <p>interface-id: The port number that detect or receive topology change information.</p>	Notice
<p>Event Description: Used to record MSTP instance port state change event.</p> <p>Log Message: Spanning Tree port status change (Instance:&lt;Instance-id&gt;, &lt;interface-id&gt;) &lt;old-status&gt; -&gt; &lt;new-status&gt;</p> <p>Parameters Description:</p> <p>Instance-id: The MST instance ID. Instance 0 represents for default instance, CIST.</p> <p>interface-id: The port number that detect or receive topology change information.</p> <p>old-status: The old status.</p> <p>new-status: The new status.</p> <p>The port of STP state. The value may be Disable, Discarding, Learning, or Forwarding.</p>	Notice
<p>Event Description: Used to record MSTP instance port role change event.</p> <p>Log Message: Spanning Tree port role change (Instance:&lt;Instance-id&gt;, &lt;interface-id&gt;) &lt;old-role&gt; -&gt; &lt;new-role&gt;</p> <p>Parameters Description:</p> <p>Instance-id: The MST instance ID. Instance 0 represents for default instance, CIST.</p> <p>Interface-id: The port number that detect or receive topology change information.</p> <p>old-role: The old role.</p> <p>new-role: The new role.</p> <p>The port role of STP. The value may be DisabledPort, AlternatePort, BackupPort, RootPort, DesignatedPort, or MasterPort.</p>	Informational
<p>Event Description: Use to record action to create an MST instance.</p> <p>Log Message: Spanning Tree instance created (Instance:&lt;Instance-id&gt;)</p> <p>Parameters Description:</p> <p>Instance-id: The MST instance ID. Instance 0 represents for default instance, CIST.</p>	Informational
<p>Event Description: Use to record action to delete an MST instance.</p> <p>Log Message: Spanning Tree instance deleted (Instance:&lt;Instance-id&gt;)</p>	Informational

Log Description	Severity
Parameters Description: Instance-id: The MST instance ID. Instance 0 represents for default instance, CIST.	
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: Used to record the configuration name and revision level changed in the MST Configuration Identification. Log Message: Spanning Tree MST configuration ID name and revision level change (name: <name> revision level <revision-level>) 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 (instance: <Instance-id> add vlan <startvlanid> [- <endvlanid>]) Parameters Description: Instance-id: The 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: 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: The MST instance ID. Instance 0 represents for default instance, CIST. startvlanid: The start VID of delete VLAN range. endvlanid: The end VID of delete 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: The MST instance ID. Instance 0 represents for default instance, CIST. Interface-id: The port number that detect the event.	Informational

## Peripheral

Log Description	Severity
Event Description: Fan Recovered. Log Message: <fan-descr> back to normal Parameters Description: fan-descr: The FAN ID and position.	Critical
Event Description: Fan Failed. Log Message: <fan-descr> failed Parameters Description: fan-descr: The FAN ID and position.	Critical
Event Description: Temperature sensor enters alarm state. Log Message: <thermal-sensor-descr> detects abnormal temperature <degree>	Critical

Log Description	Severity
Parameters Description: thermal-sensor-descr: The sensor ID and position. degree: The current temperature.	
Event Description: Temperature recovers to normal. Log Message: <thermal-sensor-descr> temperature back to normal Parameters Description: thermal-sensor-descr: The sensor ID and position.	Critical
Event Description: Power failed. Log Message: <power-descr> failed Parameters Description: power-descr: The power position and ID.	Critical
Event Description: Power is recovered. Log Message: <power-descr> back to normal Parameters Description: power-descr: The power position and ID.	Critical
Event Description: Press the factory reset button. Log Message: Factory reset button pressed	Critical

## PoE

Log Description	Severity
Event Description: Total power usage threshold is exceeded. Log Message: Usage threshold <percentage> is exceeded Parameters Description: percentage: The usage threshold.	Warning
Event Description: Total power usage threshold is recovered. Log Message: Usage threshold <percentage> is recovered Parameters Description: percentage: The usage threshold.	Warning
Event Description: PD doesn't reply the ping request. Log Message: ASV: PD alive check failed. (Port: <portNum>, PD: <ipaddr>) Parameters Description: portNum: The port number. ipaddr: The IP address of PD.	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 ID.	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 exhausted mode. Log Message: Safeguard Engine enters EXHAUSTED mode	Warning
Event Description: The host enters the normal mode. Log Message: Safeguard Engine enters NORMAL mode	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: The SSH server is enabled. Log Message: SSH server is enabled	Informational
Event Description: The SSH server is disabled. Log Message: SSH server is disabled	Informational

## 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. interface-id: The interface ID on which a storm is cleared.	Informational
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.	Warning



Log Description	Severity
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).	

## System

Log Description	Severity
Event Description: This log will be generated when system warm start. Log Message: System warm start	Critical
Event Description: This log will be generated when system cold start. Log Message: System cold start	Critical
Event Description: This log will be generated when system start up. Log Message: System started up	Critical

## Telnet

Log Description	Severity
Event Description: Successful login through Telnet. Log Message: Successful login through Telnet (Username: <username>, IP: <ipaddr>) Parameters Description: ipaddr: The IP address of Telnet client. username: The username that used to login Telnet server.	Informational
Event Description: Login failed through Telnet. Log Message: Login failed through Telnet (Username: <username>, IP: <ipaddr>) Parameters Description: ipaddr: The IP address of Telnet client. username: The username that used to login Telnet server.	Warning
Event Description: Logout through Telnet. Log Message: Logout through Telnet (Username: <username>, IP: <ipaddr>) Parameters Description: ipaddr: The IP address of Telnet client. username: The username that used to login Telnet server.	Informational
Event Description: Telnet session timed out. Log Message: Telnet session timed out (Username: <username>, IP: <ipaddr>) Parameters Description: ipaddr: The IP address of Telnet client. username: The username that used to login Telnet server.	Informational

## 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.	Informational

Log Description	Severity
mac-address: Voice device MAC address.	
Event Description: When an interface that is in auto voice VLAN mode joins the voice VLAN. Log Message: <interface-id> add into voice VLAN <vid> Parameters Description: interface-id: The interface name. vid: The 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: The interface name. vid: The 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 username 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 username 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: <username>, IP: <ipaddr>) Parameters Description: username: The username 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: <username>, IP: <ipaddr>) Parameters Description: username: The username that used to login HTTP server. ipaddr: The IP address of HTTP client.	Informational
Event Description: Successful login through Web (SSL). Log Message: Successful login through Web (SSL) (Username: <username>, IP: <ipaddr>) Parameters Description: username: The username that used to login SSL server. ipaddr: The IP address of SSL client.	Informational
Event Description: Login failed through Web (SSL). Log Message: Login failed through Web (SSL) (Username: <username>, IP: <ipaddr>) Parameters Description: username: The username that used to login SSL server.	Warning

Log Description	Severity
ipaddr: The IP address of SSL client.	
Event Description: Web (SSL) session timed out. Log Message: Web (SSL) session timed out (Username: <username>, IP: <ipaddr>) Parameters Description: username: The username that used to login SSL server. ipaddr: The IP address of SSL client.	Informational
Event Description: Logout through Web (SSL). Log Message: Logout through Web (SSL) (Username: <username>, IP: <ipaddr>) Parameters Description: username: The username that used to login SSL server. ipaddr: The IP address of SSL client.	Informational

## Appendix B - Trap Entries

The following table lists the trap log entries and their corresponding meanings that will appear in the Switch.

### 802.1X

Trap Name	Description	OID
dDot1xExtLoggedSuccess	This trap is sent when a host has successfully logged in (passed 802.1X authentication). Binding objects: (1) ifIndex (2) dnaSessionClientMacAddress (3) dnaSessionAuthVlan (4) dnaSessionAuthUserName	1.3.6.1.4.1.171 .11.165.1000.3 0.0.1
dDot1xExtLoggedFail	This trap is sent when a host failed to pass IEEE 802.1X authentication (login failed). Binding objects: (1) ifIndex (2) dnaSessionClientMacAddress (3) dnaSessionAuthVlan (4) dnaSessionAuthUserName (5) dDot1xExtNotifyFailReason	1.3.6.1.4.1.171 .11.165.1000.3 0.0.2

### Authentication Fail

Trap Name	Description	OID
authenticationFailure	This 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

### DDM

Trap Name	Description	OID
swDdmAlarmTrap	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	1.3.6.1.4.1.171 .11.165.1000.7 2.0.1
swDdmWarningTrap	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	1.3.6.1.4.1.171 .11.165.1000.7 2.0.2

Trap Name	Description	OID
	(4) dDdmNotifyInfoThresholdExceedOrRecover	

## 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	1.3.6.1.4.1.171 .11.165.1000.1 33.0.1

## DoS Prevention

Trap Name	Description	OID
dDosPreveAttackDetected Packet	This trap is sent when detect DOS attack. Binding objects: (1) dDoSPrevCtrlAttackType (2) dDosPrevNotiInfoDropIpAddr (3) dDosPrevNotiInfoDropPortNumber	1.3.6.1.4.1.171 .11.165.1000.5 9.0.2

## ErrDisable

Trap Name	Description	OID
dErrDisNotifyPortDisabled Assert	This trap is sent when a port enters into error-disabled state. Binding objects: (1) dErrDisNotifyInfoPortIfIndex (2) dErrDisNotifyInfoReasonID	1.3.6.1.4.1.171 .11.165.1000.4 5.0.1
dErrDisNotifyPortDisabled Clear	The trap is sent when a port loop restarts after the interval time. Binding objects: (1) dErrDisNotifyInfoPortIfIndex (2) dErrDisNotifyInfoReasonID	1.3.6.1.4.1.171 .11.165.1000.4 5.0.2

## 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	1.3.6.1.4.1.171 .11.165.1000.1 65.0.1

**Gratuitous ARP Trap**

Trap Name	Description	OID
agentGratuitousARPTrap	This trap is sent when IP address conflicted. Binding objects: (1) ipaddr (2) macaddr (3) portNumber (4) agentGratuitousARPInterfaceName	1.3.6.1.4.1.171 .11.165.1000.7 5.0.1

**IMPB**

Trap Name	Description	OID
dImpbViolationTrap	This notification is generated when IP-MAC-Port binding address violation is detected. Binding objects: (1) ifIndex (2) dImpbViolationIpAddrType (3) dImpbViolationIpAddress (4) dImpbViolationMacAddress	1.3.6.1.4.1.171 .11.165.1000.2 2.0.1

**LACP**

Trap Name	Description	OID
linkUp	This 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 (but not into the notPresent state). This other state is indicated by the included value of ifOperStatus. Binding objects: (1) ifIndex (2) ifAdminStatus (3) ifOperStatus	1.3.6.1.6.3.1.1. 5.4
linkDown	This 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) ifAdminStatus (3) ifOperStatus	1.3.6.1.6.3.1.1. 5.3

**LBD**

Trap Name	Description	OID
dLbdLoopOccurred	This trap is sent when an interface loop occurs. Binding objects: (1) dLbdNotifyInfolIndex	1.3.6.1.4.1.171 .11.165.1000.4 6.0.1

Trap Name	Description	OID
dLbdLoopRestart	This trap is sent when an interface loop restarts after the interval time. Binding objects: (1) dLbdNotifyInfoIndex	1.3.6.1.4.1.171 .11.165.1000.4 6.0.2
dLbdVlanLoopOccurred	This trap is sent when an interface with a VID loop occurs. Binding objects: (1) dLbdNotifyInfoIndex (2) dLbdNotifyInfoVlanId	1.3.6.1.4.1.171 .11.165.1000.4 6.0.3
dLbdVlanLoopRestart	This trap is sent when an interface loop with a VID restarts after the interval time. Binding objects: (1) dLbdNotifyInfoIndex (2) dLbdNotifyInfoVlanId	1.3.6.1.4.1.171 .11.165.1000.4 6.0.4

## LLDP

Trap Name	Description	OID
IldpRemTablesChange	This notification is sent when the value of IldpStatsRemTableLastChangeTime changes. It can be utilized by an NMS to trigger LLDP remote systems table maintenance polls. Binding objects: (1) IldpStatsRemTablesInserts (2) IldpStatsRemTablesDeletes (3) IldpStatsRemTablesDrops (4) IldpStatsRemTablesAgeouts	1.0.8802.1.1.2. 0.0.1
IldpXMedTopologyChange Detected	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) IldpRemChassisIdSubtype (2) IldpRemChassisId (3) IldpXMedRemDeviceClass	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 .11.165.1000.1 53.0.1
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 .11.165.1000.1 53.0.2

Trap Name	Description	OID
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 .11.165.1000.1 53.0.3

## MAC Notification

Trap Name	Description	OID
dL2FdbMacNotification	This trap indicate the MAC addresses variation in the address table. Binding objects: (1) dL2FdbMacChangeNotifyInfo	1.3.6.1.4.1.171 .11.165.1000.3 .0.1
dL2FdbMacNotificationWithVID	This trap indicate the MAC addresses variation in the address table. Binding objects: (1) dL2FdbMacChangeNotifyInfoWithVID	1.3.6.1.4.1.171 .11.165.1000.3 .0.2

## MSTP

Trap Name	Description	OID
newRoot	This trap indicates that the sending agent has become the new root of the Spanning Tree; the trap is sent by a bridge soon after its election as the new root. For example, upon expiration of the Topology Change Timer, immediately subsequent to its election. Implementation of this trap is optional.	1.3.6.1.2.1.17. 0.1
topologyChange	This 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 of this trap is optional.	1.3.6.1.2.1.17. 0.2

## PD Alive

Trap Name	Description	OID
dPoelfPdAliveFailOccurNotification	This trap indicates if the PD reply the ping request. At least 500 ms must elapse between notifications being emitted by the same object instance. Binding objects: (1) pethMainPseGroupIndex (2) pethPsePortIndex (3) dPoelfPdAliveCfgPdIpType (4) dPoelfPdAliveCfgPdIpAddr	1.3.6.1.4.1.171 .14.24.0.4



## Peripheral

Trap Name	Description	OID
dEntityExtFanStatusChg	Fan status change notification. Binding objects: (1) dEntityExtEnvFanIndex (2) dEntityExtEnvFanStatus	1.3.6.1.4.1.171 .11.165.1000.5 .0.1
dEntityExtThermalStatusChg	Temperature status change notification. Binding objects: (1) dEntityExtEnvTempIndex (2) dEntityExtEnvTempStatus	1.3.6.1.4.1.171 .11.165.1000.5 .0.2
dEntityExtFactoryResetButton	Press the factory reset button.	1.3.6.1.4.1.171 .11.165.1000.5 .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 ms must elapse between notifications being emitted by the same object instance. Binding objects: (1) pethMainPseConsumptionPower	1.3.6.1.2.1.105 .0.2
pethMainPowerUsageOffNotification	This trap indicates PSE Threshold usage indication is off; the usage power is below the threshold. At least 500 ms must elapse between notifications being emitted by the same object instance. Binding objects: (1) pethMainPseConsumptionPower	1.3.6.1.2.1.105 .0.3
dPoelfPowerDeniedNotification	This notification indicates if PSE state diagram enters the state POWER_DENIED. At least 500 ms must elapse between notifications being emitted by the same object instance. Binding objects: (1) pethPsePortPowerDeniedCounter	1.3.6.1.4.1.171 .11.165.1000.2 4.0.1
dPoelfPowerOverLoadNotification	This trap indicates if PSE state diagram enters the state ERROR_DELAY_OVER. At least 500 ms must elapse between notifications being emitted by the same object instance. Binding objects: (1) pethPsePortOverLoadCounter	1.3.6.1.4.1.171 .11.165.1000.2 4.0.2
dPoelfPowerShortCircuitNotification	This trap indicates if PSE state diagram enters the state ERROR_DELAY_SHORT. At least 500 ms must elapse between notifications being emitted by the same object instance. Binding objects: (1) pethPsePortShortCounter	1.3.6.1.4.1.171 .11.165.1000.2 4.0.3

## Port

Trap Name	Description	OID
linkUp	This notification is generated when the port link is up. Binding objects: (1) ifIndex	1.3.6.1.6.3.1.1. 5.4

Trap Name	Description	OID
	(2) ifAdminStatus (3) ifOperStatus	
linkDown	This notification is generated when the port link is down. Binding objects: (1) ifIndex (2) ifAdminStatus (3) ifOperStatus	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) dPortSecIfLastMacAddress	1.3.6.1.4.1.171 .11.165.1000.8 .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 .11.165.1000.1 9.1.1.0.1

Trap Name	Description	OID
dSafeguardChgToNormal	This trap indicates system change operation mode from exhausted to normal. Binding objects: (1) dSafeguardEngineCurrentMode	1.3.6.1.4.1.171 .11.165.1000.1 9.1.1.0.2

## Start

Trap Name	Description	OID
coldStart	This 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	This 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 .11.165.1000.2 5.0.1
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 .11.165.1000.2 5.0.2

## 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 .11.165.1000.1 4.0.1
dsfDownloadImage	The notification is sent when the user downloads image file successfully.	1.3.6.1.4.1.171 .11.165.1000.1 4.0.2
dsfUploadCfg	The notification is sent when the user uploads configuration file successfully.	1.3.6.1.4.1.171 .11.165.1000.1 4.0.3
dsfDownloadCfg	The notification is sent when the user downloads configuration file successfully.	1.3.6.1.4.1.171 .11.165.1000.1 4.0.4
dsfSaveCfg	The notification is sent when the user saves configuration file successfully.	1.3.6.1.4.1.171 .11.165.1000.1 4.0.5

## Appendix C - RADIUS Attributes Assignment

The RADIUS Attributes Assignment on the Switch is used in the following modules: Console, Telnet, SSH, Web, 802.1X and MAC-based Access Control.

The description that follows explains the following RADIUS Attributes Assignment types:

- Privilege Level
- VLAN

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 privilege level.

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 **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.

```

0           1           2           3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-----+-----+-----+-----+
| Type  | Length | Tag  | String...
+-----+-----+-----+-----+

```

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, or MAC-based Access Control 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.

## 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 **Appendix C - RADIUS Attributes Assignment** on page 585.

IETF standard RADIUS attributes are defined in the RFC 2865 Remote Authentication Dial-In User Service (RADIUS), RFC 2866 RADIUS Accounting, and RFC 2868 RADIUS Attributes for Tunnel Protocol Support, and RFC 2869 RADIUS Extensions.

The following table lists the IETF **RADIUS Authentication Attributes** supported by the D-Link Switch.

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