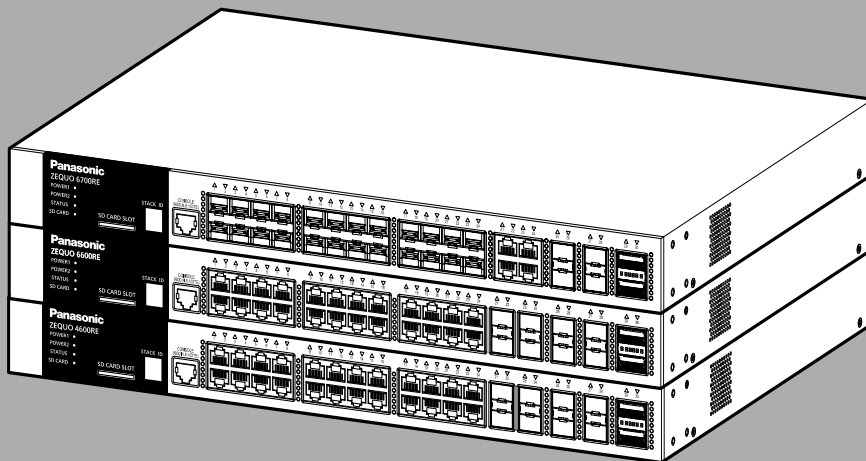




ZEQUO RE Series

CLI Reference

Model Number: PN36243E/PN36241E
PN36341L



The target model for this CLI reference is as follows.

Model name	Model number	Firmware version
ZEQUO 6700RE	PN36243E	2.0.1.01 and above
ZEQUO 6600RE	PN36241E	2.0.1.01 and above
ZEQUO 4600RE	PN36241L	2.0.1.01 and above

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1 Getting Started

1.1 Introduction

This manual's command descriptions are based on the software release **2.0.0.01**. The commands listed here are the subset of commands that are supported by the ZEQUO6600RE/ZEQUO6700RE Gigabit Ethernet Switch.

1.1.1 Intended Readers

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 the primary management interface to the ZEQUO6600RE/ZEQUO6700RE 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.

1.1.2 Typographic Conventions

Convention	Description
Boldface Font	This convention is used to place emphasis on keywords. It also indicates commands and command options. 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 values or arguments in the separated list can be chosen.
<code>Courier Font</code>	This convention is used to represent a Command Line Interface (CLI) example. All examples used in this manual are based on the ZEQUO6600RE switch in the Series.

1.1.3 Notes and Cautions

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



CAUTION

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

1.1.4 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.
- **Command Default Level** - The user privilege level in which the command can be issued.
- **Usage Guideline** - If necessary, a detailed description of the command and its various utilization scenarios is given here.
- **Example(s)** - Each command is accompanied by a practical example of the command being issued in a suitable scenario.

1.1.5 Command Modes

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

The command-line interface has five pre-defined privilege levels:

- **Basic User** - Privilege Level 1. This user account level has the lowest priority of the user accounts. The purpose of this type of user account level is for basic system checking.

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

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

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

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

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

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

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

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

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

The available command modes and privilege levels are described below:

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

User EXEC Mode at Basic User Level

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

Privileged EXEC Mode at Operator Level

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

Privileged EXEC Mode at Administrator Level

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

Global Configuration Mode

The primary purpose of the global configuration mode is to apply global settings to the entire switch. The global configuration mode can be accessed through operator or administrator level user accounts. However, security related settings are not accessible through operator user accounts. 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, the user must be logged in with the corresponding account level and use the **configure terminal** command in the privileged EXEC mode.

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)#
```

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

```
ZEQUOxxxxRE(config)# exit
ZEQUOxxxxRE#
```

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

Interface Configuration Mode

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

VLAN Interface Configuration Mode

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

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

```
ZEQUO6x00RE(config)# interface vlan 1
ZEQUO6x00RE(config-if)#
```

1.1.6 Creating a User Account

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

Observe the following example.

```
ZEQUOxxxxRE# enable
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# username admin password admin
ZEQUOxxxxRE(config)# username admin privilege 15
ZEQUOxxxxRE(config)# line console
ZEQUOxxxxRE(config-line)# login local
ZEQUOxxxxRE(config-line)#
```

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

- Starting in the User EXEC Mode, we enter the **enable** command to access the Privileged EXEC Mode.
- After accessing the Privileged EXEC Mode, 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 admin password admin** command creates a user account with the username of admin and a password of admin.
- The **username admin privilege 15** command assigns a privilege level value of 15 to the user account admin.
- The **line console** command allows us to access the console interface's Line Configuration Mode.
- The **login local** command tells the Switch that users need to enter locally configured login credentials to access the console interface.

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

```
ZEQUOxxxxRE# copy running-config startup-config  
  
Destination filename startup-config? [y/n]: y  
  
Saving all configurations to NV-RAM..... Done.  
  
ZEQUOxxxxRE#
```

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.

```
ZEQUOxxxxRE Gigabit Ethernet Switch  
  
Command Line Interface  
Firmware: Build V2.0.0.01  
Serial Number: xxxxxxxxxxxx  
  
User Access Verification  
  
Username:admin  
Password:*****  
  
ZEQUOxxxxRE#
```

1.1.7 Interface Notation

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

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

```
ZEQUOxxxxRE# configure terminal  
ZEQUOxxxxRE(config)# interface gil/0/1  
ZEQUOxxxxRE(config-if)# speed 1000  
ZEQUOxxxxRE(config-if)#
```

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

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

The Interface Unit's ID is the ID of the stacking unit without the physical stack. If stacking is disabled or this unit is a stand-alone unit, then this parameter is irrelevant. The Open Slot's ID is the ID of the module plugged into the open module slot of the Switch. The Switch doesn't support any open modules slots, thus this parameter will always be zero for this switch series. Lastly, the Port's ID is the physical port number of the port being configured. In summary, the above example will configure the stacked switch with the ID of 1, with the open slot ID of 0, and the physical port number 1.

1.1.8 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.

```
ZEQUOxxxxRE# show v
Ambiguous command
ZEQUOxxxxRE#
```

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

```
ZEQUOxxxxRE# show
Incomplete command
ZEQUOxxxxRE#
```

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

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

1.1.9 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.

1.1.10 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.

```

ZEQUOxxxxRE#show running-config | begin # DEVICE
# DEVICE
configure terminal
end

# AAA

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

ZEQUOxxxxRE#

```

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

```

ZEQUOxxxxRE#show running-config | include # DEVICE
# DEVICE

ZEQUOxxxxRE#

```

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

```

ZEQUOxxxxRE#show running-config | exclude # DEVICE
Building configuration...

```

```

!-----
!
!                               ZEQUOxxxxRE Gigabit Ethernet Switch
!                               Configuration
!
!                               Firmware: Build V2.0.0.01
!                               Copyright(C) 2017 Panasonic. All rights reserved.
!-----

stack
!
line console
!
line telnet
!
line ssh
!
vlan 1
!
interface GigabitEthernet1/0/1
!
--More--

```

2 Management

2.1 Basic CLI Commands

2.1.1 help

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

Syntax

- help

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.
Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

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

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

- To list the keywords and arguments associated with a command, enter a question mark (?) in place of a keyword or argument on the command line. This form of help is called the **command syntax** help, because it lists the keywords or arguments that apply based on the command, keywords, and arguments already entered.

Example

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

```
ZEQUOxxxxRE#help
```

The switch CLI provides advanced help feature.

- Help is available when you are ready to enter a command argument (e.g. 'show ?') and want to know each possible available options.
- 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.
- 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 '?'.

```
ZEQUOxxxxRE#
```

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.

```
ZEQUOxxxxRE#re?
reboot  rename  renew  replace
reset   restart
```

```
ZEQUOxxxxRE#re
```

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

```
ZEQUOxxxxRE#enable ?
<1-15>  <privilege 1-15>
<cr>
```

```
ZEQUOxxxxRE#enable
```

2.1.2 enable

This command is used to change the privilege level of the active CLI login session.

Syntax

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

Parameters

Parameters	description
<i>PRIVILEGE-LEVEL</i>	(Optional) Specifies the privilege level. The range is from 1 to 15. If not specified, privilege level 15 will be used.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If the privileged level requires a password, enter it in the field provided. Only three attempts are allowed. Failure to access this level returns the user to the current level.

Example

This example shows how to change the privilege level of the active CLI login session to privilege level 15.

```
ZEQUOxxxxRE# enable 15
password:*****
ZEQUOxxxxRE#
```

2.1.3 disable

This command is used to change the privilege level of the active CLI login session to a lower privilege level.

Syntax

- `disable` [*PRIVILEGE-LEVEL*]

Parameters

Parameters	description
<i>PRIVILEGE-LEVEL</i>	(Optional) Specifies the privilege level. If not specified, privilege level 1 will be used.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to change the privilege level of the active CLI login session to a lower privilege level. When using this command to enter a privilege level that requires password, there is no need to enter the password.

Example

This example shows how to change the privilege level of the active CLI login session to privilege level 1.

```
ZEQUOxxxxRE# show privilege

Current privilege level is 15

ZEQUOxxxxRE# disable 1
ZEQUOxxxxRE> show privilege

Current privilege level is 1

ZEQUOxxxxRE>
```

2.1.4 configure terminal

This command is used to enter the Global Configuration Mode.

Syntax

- configure terminal

Parameters

None.

Default

None

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enter the Global Configuration Mode.

Example

This example shows how to enter the Global Configuration Mode.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)#
```

2.1.5 login (EXEC)

This command is used to configure a login username.

Syntax

- login

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

This example shows how to login with username "user1".

```
ZEQUOxxxxRE> login
```

```
Username: manager
```

```
Password: manager
```

```
ZEQUOxxxxRE>
```

2.1.6 login (Line)

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

Syntax

- login [local]
- no login

Parameters

Parameters	description
local	(Optional) Specifies that the line login method will be local.

Default

By default, Username and Password are set manager and manager 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.

Command Default Level

Level: 15.

Usage Guideline

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

- When login is disabled, the user can enter the line at Level 1.
- When the **by password** option is selected, after inputting the same password as the **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 enter the Line Configuration Mode and to create a password for the line user. This password only takes effect once the corresponding line is set to login.

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

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

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

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

```
ZEQUOxxxxRE#login

Password:*****

ZEQUOxxxxRE>
```

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

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

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

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

2.1.7 logout

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

Syntax

- logout

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level:1.

Usage Guideline

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

Example

This example shows how to log out.

```
ZEQUOxxxxRE# logout
```

2.1.8 end

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

Syntax

- end

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.
Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

Executing this command will return access to the highest mode in the CLI hierarchy.

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/1
ZEQUOxxxxRE(config-if)#end
ZEQUOxxxxRE#
```

2.1.9 exit

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

Syntax

- exit

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.
Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/1
ZEQUOxxxxRE(config-if)#exit
ZEQUOxxxxRE(config)#
```

2.1.10 show history

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

Syntax

- show history

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

The function key instructions below display how to navigate the commands in the history buffer.

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

Example

This example shows how to display the command buffer history.

```
ZEQUOxxxxRE# show history

help
history

ZEQUOxxxxRE#
```

2.1.11 show environment

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

Syntax

- show environment [fan | power | temperature]

Parameters

Parameters	description
fan	(Optional) Specifies to display the detailed fan status.
power	(Optional) Specifies to display the detailed power status.
temperature	(Optional) Specifies to display the detailed temperature status.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE#show environment

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

Detail Fan Status:
-----
Unit 1:
Back Fan  1 : Speed Low
Back Fan  2 : Speed Low
Fan High Temperature Threshold(Celsius)      :    36
Fan Low Temperature Threshold(Celsius)        :    33

Detail Power Status:
Unit      Power Module      Power Status
-----
1          Power 1          In-operation
1          Power 2          Empty

ZEQUOxxxxRE#
```

2.1.12 show unit

This command is used to display information about system units.

Syntax

- `show unit [UNIT-ID]`

Parameters

Parameters	description
<i>UNIT-ID</i>	(Optional) Specify the unit to display.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE#show unit

Unit: 1
Model Descr: 24P 10/100/1000 with 4P Combo 4P 10G SFP+ & 2P 40G QSFP+
Product Name: ZEQUO xxxxRE
Product Number: PNxxxxxx
Serial-Number: xxxxxxxxxxxx
Status: OK
Up Time: 0DT0H44M49S
DRAM      524288 K total,    217030 K used,    307258 K free
FLASH     122368 K total,    47112 K used,     75256 K free

ZEQUOxxxxRE#
```

2.1.13 show cpu utilization

This command is used to display the CPU utilization information.

Syntax

- show cpu utilization

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

This example shows how to display the CPU utilization information.

```
ZEQUOxxxxRE#show cpu utilization
```

```
CPU Utilization
```

```
Five seconds - 35 %           One minute - 33 %           Five minutes - 33 %
```

```
ZEQUOxxxxRE#
```

2.1.14 show version

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

Syntax

- show version

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

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.

```
ZEQUOxxxxRE#show version

System MAC Address: 00-50-40-xx-xx-xx

Unit ID      Module Name      Versions
-----
1            ZEQUOxxxxRE      H/W:A1
                                   Bootloader:V1.0.0.06
                                   Runtime:V2.0.0.01

ZEQUOxxxxRE#
```

2.1.15 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 settings.

Syntax

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

Parameters

Parameters	description
unit <i>UNIT-ID</i>	Specifies the unit ID.
thermal <i>THERMAL-ID</i>	Specifies the thermal sensor's ID.

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

Default

By default, the normal range is the same as the operation range.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# environment temperature threshold unit 1 thermal 1 high 100 low
20
ZEQUOxxxxRE(config)#
```

2.1.16 show memory utilization

This command is used to display the memory utilization information.

Syntax

- show memory utilization

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the system's memory utilization information.

Example

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

```
ZZEQUOxxxxRE#show memory utilization
```

```
Unit: 1
```

```
DRAM      524288 K total,    217038 K used,    307250 K free  
FLASH     122368 K total,    47112 K used,     75256 K free
```

```
ZEQUOxxxxRE#
```

2.1.17 show privilege

This command is used to display the current privilege level.

Syntax

- show privilege

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the current privilege level.

Example

This example shows how to display the current privilege level.

```
ZEQUOxxxxRE#show privilege
```

```
Current privilege level is 15
```

```
ZEQUOxxxxRE#
```

2.2 Access Management Commands

2.2.1 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.

Syntax

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

Parameters

Parameters	description
<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.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

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

2.2.2 prompt

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

Syntax

- prompt *STRING*
- no prompt

Parameters

Parameters	description
<i>STRING</i>	Specifies a string to define the customized prompt. The prompt will be based on the specified characters or the following control characters. The space character in the string is ignored. %h – encode the Product name. %s – space %% – encode the % symbol

Default

By default, the string encodes the Product name (ZEQUOxxxxRE).

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to customize the CLI prompt. If the user selects to encode the Product name as the prompt, only the first 15 characters are encoded. The prompt can only display up to 15 characters. The privileged level character will appear as the last character of the prompt.

The character is defined as follows.

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

Example

This example shows how to change the prompt to "BRANCH A" using administrator.

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

2.2.3 enable password

This command is used to setup enable password to enter different privileged levels and use the **no** to return the password to the empty string.

Syntax

- **enable password** [*level PRIVILEGE-LEVEL*] [**0** | **7**] *PASSWORD*
- **no enable password** [*level PRIVILEGE-LEVEL*]

Parameters

Parameters	description
level <i>PRIVILEGE-LEVEL</i>	(Optional) Specifies the privilege level for the user. The privilege level is between 1 and 15. If this argument is not specified in the command or the no form of the command, the privilege level defaults to 15 (traditional enable privileges).
0	(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.

Parameters	description
7	(Optional) Specifies the encrypted password based on SHA-1. The password length is fixed at 35 bytes. It is case-sensitive. The password is encrypted. If the password syntax is not specified, the syntax is plain text.
<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.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

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

2.2.4 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.

Syntax

- ip http server
- no ip http server

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

This example shows how to enable the HTTP server.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip http server
ZEQUOxxxxRE(config)#
```

2.2.5 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.

Syntax

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

Parameters

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

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command enables the HTTPS server function and uses the specified SSL service policy for HTTPS. When no optional 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.

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

2.2.6 ip http access-class

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

Syntax

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

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip access-list http-filter
ZEQUOxxxxRE(config-ip-acl)# permit 226.1.1.1 0.0.0.0
ZEQUOxxxxRE(config-ip-acl)# exit
ZEQUOxxxxRE(config)# ip http access-class http-filter
ZEQUOxxxxRE(config)#
```

2.2.7 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.

Syntax

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

- no ip http service-port

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

This example shows how to configure the HTTP TCP port number to 8080.

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

2.2.8 ip http timeout-policy idle

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

Syntax

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

Parameters

Parameters	description
<i>INT</i>	Specifies the idle timeout value. The valid range is from 60 to 36000 seconds.

Default

By default, this value is 180 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command configures the idle timeout value of the HTTP server connection.

Example

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

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

2.2.9 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.

Syntax

- ip telnet server
- no ip telnet server

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

This example shows how to enable the Telnet server.

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

2.2.10 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.

Syntax

- **ip telnet service-port** *TCP-PORT*
- **no ip telnet service-port**

Parameters

Parameters	description
<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 value is 23.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command configures the TCP port number for Telnet access.

Example

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

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

2.2.11 line

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

Syntax

- line { console | telnet | ssh }

Parameters

Parameters	description
console	Specifies the local console terminal line.
telnet	Specifies the Telnet terminal line.
ssh	Specifies the SSH terminal line.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

2.2.12 service user-account encryption

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

Syntax

- service user-account encryption
- no service user-account encryption

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

The information of the user account is saved in the running configuration file, and can be applied to the system later.

When this command is enabled, the password is saved in the encrypted form. When this command is disabled and the password is specified in the plain text form, the password is saved in the plain text form. However, if the password is specified in the encrypted form or if the password has been converted to the encrypted form by the last enable password encryption command, the password will still be in the encrypted form. It cannot be reverted to the plaintext.

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

Example

This example shows how to enable the password encryption function .

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#service user-account encryption
ZEQUOxxxxRE(config)#
```

2.2.13 show terminal

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

Syntax

- show terminal

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE#show terminal
Terminal Settings:
  Length: 24 lines
  width: 80 columns
  Default Length: 24 lines
  Default Width: 80 columns
  Baud Rate: 9600 bps
```

```
ZEQUOxxxxRE#
```

2.2.14 show ip http server

This command is used to display information about the HTTP server's status.

Syntax

- show ip http server

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display information about the HTTP server's status.

Example

This example shows how to display information about the HTTP server's status.

```
ZEQUOxxxxRE#show ip http server  
  
ip http server state : enable  
ZEQUOxxxxRE#
```

2.2.15 show ip http secure-server

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

Syntax

- show ip http secure-server

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE#show ip http secure-server  
  
ip http secure-server state : Disabled  
ZEQUOxxxxRE#
```

2.2.16 show users

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

Syntax

- show users

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

This example shows how to display all session information.

```

ZEQUOxxxxRE#show users
ID      Type      User-Name      Privilege Login-Time      IP address
-----
0       * console Anonymous      15       2M24S
1       telnet  Anonymous      1        45S              10.90.90.20

19      web      Anonymous      15       4S              10.90.90.20

Total Entries: 3

ZEQUOxxxxRE#

```

2.2.17 telnet

This command is used to login another device that supports Telnet.

Syntax

- **telnet** [*IP-ADDRESS* | *IPV6-ADDRESS* | *Domain Name*] [*TCP-PORT*]

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IPv4 address of the host.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the host.
<i>Domain Name</i>	Specifies the Telnet destination host name.
<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

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This is the Telnet client function and can be used to communicate with another device using the Telnet feature.

Multiple Telnet sessions can be opened on the Switch system and each open Telnet session can have its own Telnet client software supported at the same time

Example

This example shows how to Telnet to the IP address 10.90.90.91 using the default port 23. The IP address, 10.90.90.91 is the ZEQUOxxxxRE management interface which allows a user to login.

```
ZEQUOxxxxRE# telnet 10.90.90.91
```

```
ZEQUOxxxxRE
Command Line Interface
```

```
Product Number: PNxxxxxx
Firmware Version: V2.0.0.01
MAC Address: 00:50:40:xx:xx:xx
Serial Number: xxxxxxxxxxxx
```

```
UserName:
```

This example shows how to Telnet through port 23 to 10.90.90.91 and the connection failed. Try using port 3500 instead to login into the management interface.

```
ZEQUOxxxxRE#telnet 10.90.90.91
```

```
ERROR: Could not open a connection to host on server port 23.
```

```
ZEQUOxxxxRE# telnet 10.90.90.91 3500
```

```
ZEQUOxxxxRE
Command Line Interface
```

```
Product Number: PNxxxxxx
Firmware Version: V2.0.0.01
MAC Address: 00:50:40:xx:xx:xx
Serial Number: xxxxxxxxxxxx
```

```
UserName:
```

2.2.18 terminal length

The command is used to configure the number of lines displayed on the screen. The **terminal length** command will only affect the current session. The **terminal default length** 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.

Syntax

- **terminal length** *NUMBER*
- **no terminal length**
- **terminal length default** *NUMBER*
- **no terminal length default**

Parameters

Parameters	description
<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

Use the User/Privileged EXEC Mode for the **terminal length** command.
Use the Global Configuration Mode for the **terminal length default** command.

Command Default Level

Level: 1 (for the **terminal length** command).
Level: 12 (for the **terminal length default** command).

Usage Guideline

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

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

Output from a single command that overflows a single display screen is followed by the **More** prompt. At the **More** prompt, press CTRL+C, q, or ESC to interrupt the output and return to the prompt. Press the Spacebar or n to display an additional screen of output, or press ENTER 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.

```
ZEQUOxxxxRE# terminal length 60
ZEQUOxxxxRE#
```

2.2.19 terminal speed

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

Syntax

- **terminal speed** *BPS*
- **no terminal speed**

Parameters

Parameters	description
<i>BPS</i>	Specifies the console rate in bits per second (bps). Valid values are 9600, 38400, 19200, 115200

Default

By default, this value is 9600.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

2.2.20 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.

Syntax

- session-timeout *MINUTES*
- no session-timeout

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

2.2.21 username

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

Syntax

- **username** *NAME* [**privilege** *LEVEL*] [**nopassword** | **password** [0 | 7] *PASSWORD*]
- **no username** [*NAME*]

Parameters

Parameters	description
<i>NAME</i>	Specifies the user name with a maximum of 32 characters.
privilege <i>LEVEL</i>	(Optional) Specifies the privilege level for each user. The privilege level must be between 1 and 15.
nopassword	(Optional) Specifies that there will be no password associated with this account.
password	(Optional) Specifies the password for the user.

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

Default

By default, no username-based authentication system is established.
If not specified, use 1.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

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

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

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

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

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

Example

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

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

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

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

2.2.22 password

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

Syntax

- password [0 | 7] *PASSWORD*
- no password

Parameters

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

Default

None.

Command Mode

Line Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

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

2.2.23 clear line

This command is used to disconnect a connection session.

Syntax

- clear line *LINE-ID*

Parameters

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

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

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.

```
ZEQUOxxxxRE# clear line 1
ZEQUOxxxxRE#
```

2.2.24 do

This command is used to execute commands originally in the User/Privileged EXEC mode in the global configuration mode or other configuration modes.

Syntax

- **do** *COMMAND*

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

This example shows how to execute the show running-config command in the global configuration mode.

```
ZEQUOxxxxRE(config)#do show running-config
Building configuration...
```

```
Current configuration : 1612 bytes
```

```
!-----
!                               ZEQUOxxxxRE Gigabit Ethernet Switch
!                               Configuration
!
!                               Firmware: Build V2.0.0.01
!                               Copyright(C) 2017 Panasonic. All rights reserved.
!-----

line console
!
line telnet
!
line ssh
!
interface GigabitEthernet1/0/1
!
interface GigabitEthernet1/0/2
!
interface GigabitEthernet1/0/3
!
--More--
```

2.3 SSH (Secure Shell) Commands

2.3.1 crypto key generate

This command is used to generate the RSA or DSA key pair.

Syntax

- `crypto key generate { rsa [modulus MODULUS-SIZE] | dsa }`

Parameters

Parameters	description
rsa	Specifies to generate the RSA key pair.
modulus <i>MODULUS-SIZE</i>	(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.
dsa	Specifies to generate the DSA key pair. The DSA key size is fixed as 1024 bit.

Default

Key pair is assigned by default.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command is used to generate the RSA or DSA key pair.

Example

This example shows how to create an RSA key.

```
ZEQUOxxxxRE#crypto key generate rsa
```

```
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.
```

```
ZEQUOxxxxRE#
```

2.3.2 crypto key zeroize

This command is used to delete the RSA or DSA key pair.

Syntax

- `crypto key zeroize {rsa | dsa}`

Parameters

Parameters	description
rsa	Specifies to delete the RSA key pair.
dsa	Specifies to delete the DSA key pair.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command deletes the public key pair of the SSH Server. If both RSA and DSA key pairs are deleted, the SSH server will not be in service.

Example

This example shows how to delete the RSA key.

```
ZEQUOxxxxRE# crypto key zeroize rsa
```

```
Do you really want to remove the key? (y/n) [n]: y
```

```
ZEQUOxxxxRE#
```

2.3.3 ip ssh timeout

This command is used to configure the SSH control parameters on the Switch. Use the **no** form of this command to revert to the default setting.

Syntax

- **ip ssh** {timeout *SECONDS* | authentication-retries *NUMBER*}
- **no ip ssh** {timeout | authentication-retries}

Parameters

Parameters	description
timeout <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.
authentication-retries <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.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the SSH server parameters on the Switch. The authentication retry number specifies the maximum number of retry attempts before the session is closed.

Example

This example shows how to configure the SSH timeout value to 160 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip ssh timeout 160
ZEQUOxxxxRE(config)#
```

This example shows how to configure the SSH authentication retries value to 2 times. The connection fails after 2 retry attempt fails.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip ssh authentication-retries 2
ZEQUOxxxxRE(config)#
```

2.3.4 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.

Syntax

- ip ssh server
- no ip ssh server

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable the SSH server function.

Example

This example shows how to enable the SSH server function.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip ssh server
ZEQUOxxxxRE(config)#
```

2.3.5 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.

Syntax

- **ip ssh service-port** *TCP-PORT*
- **no ip ssh service-port**

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

This command configures the TCP port number for SSH server.

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip ssh service-port 3000
ZEQUOxxxxRE(config)#
```

2.3.6 show crypto key mypubkey

This command is used to display the RSA or DSA public key pairs.

Syntax

- show crypto key mypubkey {rsa | dsa}

Parameters

Parameters	description
rsa	Specifies to display information regarding the RSA public key.
dsa	Specifies to display information regarding the DSA public key.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to display the RSA or DSA public key pairs.

Example

This example shows how to display the information regarding the RSA public key.

```
ZEQUOxxxxRE# show crypto key mypubkey rsa

% Key pair was generated at: 09:48:40, 2017-11-29
Key Size: 768 bits
Key Data:
AAAAB3Nz aC1yc2EA AAADAQAB AAAAQwCN 6IRFHCBf jsHvYjQG iCL0p2kz 2v38ULC8
kAKra/Ze mG7IW3eC 8STcrkr5 s7l9H/bh jG/oqkwj SlUJSGqR e/sj6Ws=

ZEQUOxxxxRE#
```

2.3.7 show ip ssh

This command is used to display the user SSH configuration settings.

Syntax

- show ip ssh

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to the SSH configuration settings.

Example

This example shows how to display the SSH configuration settings.

```
ZEQUOxxxxRE# show ip ssh

IP SSH server          : Enabled
IP SSH service port    : 22
SSH server mode        : V2
Authentication timeout  : 120 secs
Authentication retries  : 3 times

ZEQUOxxxxRE#
```

2.3.8 show ssh

This command is used to display the status of SSH server connections.

Syntax

- show ssh

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the SSH connections' status on the Switch.

Example

This example shows how to display SSH connections' information.

```
ZEQUOxxxxRE# show ssh

SID Ver.  Cipher                      Userid                      Client IP Address
-----
0   V2   3des-cbc/sha1-96                   zhang3                     192.168.0.100
1   V2   3des-cbc/hmac-sha1                lee4567890123456          2000::243

Total Entries: 2

ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
SID	A unique number that identifies the SSH session.
Ver	Indicates the SSH version of this session.
Cipher	The cryptographic / Hashed Message Authentication Code (HMAC) algorithm that the SSH client is using.
Userid	The login username of the session.
Client IP Address	The client IP address for this established SSH session.

2.3.9 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.

Syntax

- ssh user** *NAME* authentication-method {password | publickey *URL* | hostbased *URL* host-name *HOSTNAME* [*IP-ADDRESS* | *IPV6-ADDRESS*]}
- no ssh user** *NAME* authentication-method

Parameters

Parameters	description
<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.
password	Specifies to use the password authentication method for this user account. This is the default authentication method.

Parameters	description
publickey <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.
hostbased <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.
host-name <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.

Command Default Level

Level: 15.

Usage Guideline

The administrator can use this command to specify authentication method for a user. The user name must be a user created by the **username** command. By default, the authentication method is password. The system will prompt the user to input the password.

To authenticate a user via SSH public key authentication, copy the user's public key file to file system. When the user tries to log into the Switch via an SSH client (using the SSH public key method), the SSH client will automatically transmit the public key and signature with the private key to the Switch. If both the public key and signature are correct, the user is authenticated and login into the Switch is allowed.

- 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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ssh user user1 authentication-method publickey c:/user1.pub
ZEQUOxxxxRE(config)#
```

2.4 IP Utility Commands

2.4.1 ping

This command is used to diagnose basic network connectivity.

Syntax

- ping {[ip] *IP-ADDRESS* | [ipv6] *IPV6-ADDRESS* | *HOST-NAME*} [count *TIMES*] [timeout *SECONDS*] [source { *IP-ADDRESS* | *IPV6-ADDRESS*}]

Parameters

Parameters	description
ip	(Optional) Specifies to use the IPv4 address.
<i>IP-ADDRESS</i>	Specifies the IPv4 address of the destination host.
ipv6	(Optional) Specifies to use the 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.
count <i>TIMES</i>	(Optional) Specifies to stop after sending the specified number of echo request packets.
timeout <i>SECONDS</i>	(Optional) Specifies response timeout value, in seconds.
source { <i>IP-ADDRESS</i> <i>IPV6-ADDRESS</i> }	(Optional) 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.
frequency <i>SECONDS</i>	(Optional) Specifies the frequency time for ping.

Default

The **count** value is disabled. The ping will continue until the user terminates the process.

The **timeout** value is 1 second.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to verify the reachability, reliability, and delay of the path to the destination host. If neither the **count** or **timeout** value is specified, the only way to stop the ping is by pressing Ctrl-C.

Example

This example shows how to ping the host with IP address 172.50.71.123.

```
ZEQUOxxxxRE#ping 172.50.71.123 count 5
```

```
Reply from 172.50.71.123, time<10ms
Reply from 172.50.71.123, time<10ms
Reply from 172.50.71.123, time<10ms
Reply from 172.50.71.123, time<10ms
Reply from 172.50.71.123, time<10ms
```

```
Ping Statistics for 172.50.71.123
Packets: Sent =5, Received =5, Lost =0
```

```
ZEQUOxxxxRE#
```

This example shows how to ping the host with IPv6 address 2001:238:f8a:77:7c10:41c0:6ddd:ecab.

```
ZEQUOxxxxRE#ping 2001:238:f8a:77:7c10:41c0:6ddd:ecab count 3
```

```
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:EACB
Packets: Sent =3, Received =3, Lost =0
```

```
ZEQUOxxxxRE#
```

2.4.2 ping access-class

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

Syntax

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

Parameters

Parameters	description
<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.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command specifies an access list to restrict the access via ping.

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip access-list ping-filter
ZEQUOxxxxRE(config-ip-acl)# permit 226.1.1.1 0.0.0.0
ZEQUOxxxxRE(config-ip-acl)# exit
ZEQUOxxxxRE(config)# ping access-class ping-filter
ZEQUOxxxxRE(config)#
```

2.4.3 traceroute

This command is used to display a hop-by-hop path from the Switch through an IP network to a specific destination host.

Syntax

- traceroute** {[ip] *IP-ADDRESS* | [ipv6] *IPV6-ADDRESS* | *HOST-NAME*} [probe *NUMBER*] [timeout *SECONDS*] [max-ttl *TTL*] [port *DEST-PORT*]

Parameters

Parameters	description
ip	(Optional) Specifies to use the IPv4 address.
<i>IP-ADDRESS</i>	Specifies the IPv4 address of the destination host.
ipv6	(Optional) Specifies to use the 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.
probe <i>NUMBER</i>	(Optional) Specifies the number of datagrams to send. The allowed range is from 1 to 1000.
timeout <i>SECONDS</i>	(Optional) Specifies the response timeout value, in seconds.
max-ttl <i>TTL</i>	(Optional) Specifies the maximum TTL value for outgoing UDP datagrams. The maximum allowed range is from 1 to 255.
port <i>DEST-PORT</i>	(Optional) Specifies the base UDP destination port number used in outgoing datagrams. This value is incremented each time a datagram is sent. The allowed range for the destination port is from 1 to 65535. Use this option in the unlikely event that the destination host is listening to a port in the default trace-route port range.

Default

The maximum TTL value is 30.

The timeout period is 5 seconds.

The destination base UDP port number is 33434.

The query number for each TTL is 3.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

To interrupt this command after the command has been issued, press Ctrl-C.

This command uses the TTL field in the IP header to cause routers and servers to generate specific return messages. A **traceroute** starts by sending a UDP datagram to the destination host with the TTL field set to 1. If a router finds a TTL value of 1 or 0, it drops the datagram and sends back an ICMP time-exceeded message to the sender. The **traceroute** facility determines the address of the first hop by examining the source address field of the ICMP time-exceeded message. To identify the next hop, **traceroute** again sends a UDP packet, but this time with a TTL value of 2. The first router decrements the TTL field by 1 and send the datagram to the next router. The second router sees a TTL value of 1, discards the datagram, and returns the time-exceeded message to the source. This process continues until the TTL is incremented to a value large enough for the datagram to reach the destination host (or until the maximum TTL is reached). To determine when a datagram has reached its destination, **traceroute** sets the UDP destination port in the datagram to a very large value that the destination host is unlikely to be using. When a host receives a datagram with an unrecognized port number, it sends an ICMP port unreachable error to the source. This message indicates to the **traceroute** facility that it has reached the destination.

Example

This example shows how to trace-route the host 172.50.71.123.

```
ZEQUOxxxxRE# traceroute 172.50.71.123

<10 ms  172.50.71.123

Trace complete.
ZEQUOxxxxRE#
```

This example shows how to trace-route to the host 172.50.71.123, but the router does not reply.

```
ZEQUOxxxxRE# traceroute 172.50.71.123

*      Request timed out.
*      Request timed out.
ZEQUOxxxxRE#
```

This example shows how to trace-route to the host 172.50.71.123, but the router replies that the destination is unreachable.

```
ZEQUOxxxxRE# traceroute 172.50.71.123

<10 ms  Network Unreachable

ZEQUOxxxxRE#
```

This example shows how to trace-route to the host with the IPv6 address 2001:238:f8a:77:7c10:41c0:6ddd:ecab.

```
ZEQUOxxxxRE# traceroute 2001:238:f8a:77:7c10:41c0:6ddd:ecab
<10 ms  2001:238:f8a:77:7c10:41c0:6ddd:ecab
```

```
Trace complete.
ZEQUOxxxxRE#
```

2.5 File System Commands

2.5.1 cd

This command is used to change the current directory.

Syntax

- `cd [DIRECTORY-URL]`

Parameters

Parameters	description
<i>DIRECTORY-URL</i>	(Optional) Specifies the URL of the directory. If not specified, the current directory will be shown.

Default

The default current directory is the root directory on the file system of the local FLASH.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If the URL is not specified, then the current directory is not changed.

Example

This example shows how to change the current directory to the directory “d” on file system.

```
ZEQUOxxxxRE#dir

Directory of /c:
1  -rw      12785484 Jan 15 2017 01:41:56 runtime.had
2  -rw          35856 Jan 20 2017 04:58:06 config.cfg
3  -rw      12799156 Jan 20 2017 04:57:18 firmware.had
4  -rw      12481700 Jan 15 2017 23:57:11 fw5.had
5  -rw      12791928 Jan 05 2017 23:09:30 backup.had
6  d--              0 Jan 23 2017 03:49:07 system

125304832 bytes total (70426624 bytes free)
```

```
ZEQUOxxxxRE#cd d:
ZEQUOxxxxRE#
```

This example shows how to display the current directory.

```
ZEQUOxxxxRE#cd
Current directory is /c:
ZEQUOxxxxRE#
```

2.5.2 delete

This command is used to delete a file.

Syntax

- delete *FILE-URL*

Parameters

Parameters	description
<i>FILE-URL</i>	Specifies the name of the file to be deleted.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

The firmware image or the configuration file that is specified as the boot-up file cannot be deleted.

Example

This example shows how to delete the file named “test.txt” from file system on the local flash.

```
ZEQUOxxxxRE# delete c:/test.txt
```

```
Delete test.txt? (y/n) [n] y  
File is deleted
```

```
ZEQUOxxxxRE#
```

2.5.3 dir

This command is used to display the information for a file or the listing of files in the specified path name.

Syntax

- `dir [URL]`

Parameters

Parameters	description
<i>URL</i>	(Optional) Specifies the name of the file or directory to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If URL is not 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.

```
ZEQUOxxxxRE#dir /

Directory of /
1   d--                0 Jan 23 2017 03:49:07   c:

0 bytes total (0 bytes free)

ZEQUOxxxxRE#
```

2.5.4 format

This command is used to format the external storage device.

Syntax

- format /*DEVICEPATH*: [fat32 | fat16]

Parameters

Parameters	description
<i>DEVICEPATH</i>	External storage device path.
fat32	(Optional) Specifies to format to the FAT32 file system.
fat16	(Optional) Specifies to format to the FAT16 file system.

Default

By default, the format is FAT32.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Only the external storage can be formatted. The selected storage will be formatted to FAT32 file system by default.

Example

This example shows how to format an external Compact Flash card.

```
ZEQUOxxxxRE# format /d:
```

```
All sectors will be erased, proceed? (y/n) [n] y
Enter volume id (up to 11 characters):Profiles
Format completed.
```

```
ZEQUOxxxxRE#
```

2.5.5 mkdir

This command is used to create a directory under the current directory.

Syntax

- **mkdir** *DIRECTORY-NAME*

Parameters

Parameters	description
<i>DIRECTORY-NAME</i>	Specifies the name of the directory.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to make a directory in the current directory.

Example

This example shows how to create a directory named "newdir" under the current directory.

```
ZEQUOxxxxRE# mkdir newdir  
ZEQUOxxxxRE#
```

2.5.6 more

This command is used to display the contents of a file.

Syntax

- **more** *FILE-URL*

Parameters

Parameters	description
<i>FILE-URL</i>	Specifies the URL for the file to be displayed.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display the contents of a file in the file system. The command is usually used to display text files. If the content of a file contains non-standard printable characters, the display will feature unreadable characters or even blank spaces.

Example

This example shows how to display the contents of file “config.cfg”.

```
ZEQUOxxxxRE#more config.cfg
```

```
!-----  
!  
!           ZEQUOxxxxRE Gigabit Ethernet Switch  
!           Configuration  
!  
!           Firmware: Build V2.0.0.01  
!           Copyright (C) 2017 Panasonic. All rights reserved.  
!-----  
  
stack self-unit-priority 32  
no stack self-unit-id  
no stack  
!  
# AAA START  
# AAA END  
!  
# COMMAND LEVEL START  
# COMMAND LEVEL END  
# LEVEL START  
# LEVEL END  
# ACCOUNT START  
# ACCOUNT END  
!  
--More--
```

2.5.7 rename

This command is used to rename a file.

Syntax

- **rename** *FILE-PATH1* *FILE-PATH2*

Parameters

Parameters	description
<i>FILE-PATH1</i>	Specifies the path for the file to be renamed.
<i>FILE-PATH2</i>	Specifies the path after file renaming.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

A file can be renamed to a file located either within the same directory or to another directory.

Example

This example shows how to rename file called "doc.1" to "test.txt".

```
ZEQUOxxxxRE# rename /c:/doc.1 /c:/test.txt
```

```
Rename file doc.1 to test.txt? (y/n) [n] y
```

```
ZEQUOxxxxRE#
```

2.5.8 rmdir

This command is used to remove a directory in the file system.

Syntax

- **rmdir** *DIRECTORY-NAME*

Parameters

Parameters	description
<i>DIRECTORY-NAME</i>	Specifies the name of the directory.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to remove a directory in the working directory.

Example

This example shows how to remove a directory called "newdir" under the current directory.

```
ZEQUOxxxxRE# rmdir newdir

Remove directory newdir? (y/n) [n] y
The directory is removed

ZEQUOxxxxRE#
```

2.5.9 show storage media-info

This command is used to display the storage media's information.

Syntax

- show storage media-info [unit *UNIT-ID*]

Parameters

Parameters	description
unit <i>UNIT-ID</i>	(Optional) Specifies the unit ID in the stacking system. If not specified, all units are displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the information of the storage media available on the system.

Example

This example shows how to display the information of the storage media on all units.

```
ZEQUOxxxxRE# show storage media-info
```

Unit	Drive	Media-Type	Size	FS-Type	Label
1	c:	FLASH	119M	FFS	
2	d:	SD Card	256M	FAT32	test

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Media-Type	FLASH: This represents the storage in the Switch. SD Card: This represents removable storage devices.

2.6 System Log Commands

2.6.1 clear logging

This command is used to delete log messages in the system logging buffer.

Syntax

- clear logging

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command deletes all the log messages in the system logging buffer.

Example

This example shows how to delete all the log messages in the logging buffer.

```
ZEQUOxxxxRE# clear logging
Clear logging? (y/n) [n] y
ZEQUOxxxxRE#
```

2.6.2 logging on

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

Syntax

- logging on
- no logging on

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

To enable the logging of system messages, use the **logging on** command in the global configuration mode. This command sends debug or error messages to a logging process, which logs messages to designated locations asynchronously to the processes that generated the messages. To disable the logging process, use the **no** form of this command.

The logging process controls the distribution of logging messages to the various destinations, such as the logging buffer, terminal lines, or the syslog server. System logging messages are also known as system error messages. Logging can be turned on and off for these destinations individually using the **logging buffered**, **logging server**, and logging global configuration commands. However, if the **logging on** command is disabled, no messages will be sent to these destinations. If the **logging on** command is enabled, the logging buffered will be enabled at the same time.

Example

This example shows how to enable the logging of system messages.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# logging on
WARNING: The command takes effect and the logging buffered is enabled at the same
time.
ZEQUOxxxxRE(config)#
```

2.6.3 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.

Syntax

- **logging buffered** [severity { *SEVERITY-LEVEL* | *SEVERITY-NAME* }] [discriminator *NAME*] [write-delay { *SECONDS* | infinite }]
- **no logging buffered**
- **default logging buffered**

Parameters

Parameters	description
<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. The corresponding severity levels are listed together with their respective severity names: emergencies (0), alerts (1), critical (2), errors (3), warnings (4), notifications (5), informational (6), debugging (7). If not specified, the default severity level is warnings (4).
<i>SEVERITY-NAME</i>	(Optional) Specifies the severity level name of system messages. The corresponding severity levels are listed together with their respective severity names: emergencies (0), alerts (1), critical (2), errors (3), warnings (4), notifications (5), informational (6), debugging (7).
discriminator	(Optional) Specifies to filter the message to be sent to local buffer based on the discriminator.
write-delay <i>SECONDS</i>	(Optional) Specifies to delay periodical writing of the logging buffer to the FLASH by the amount of seconds specified.

Default

By default, the severity level is warning (4).

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The system messages can be logged to the local message buffer or to other destinations. Messages must enter the local message buffer first before it can be further dispatched to other destinations.

This command does not take effect if the specified discriminator does not exist. Thus the default setting of the command is applied.

Specify the severity level of the messages in order to restrict the system messages that are logged in the logging buffer (thus reducing the number of messages logged). The messages which are at the specified severity level or higher will be logged to the message buffer. When the logging buffer is full, the oldest log entries will be removed to create the space needed for the new messages that are logged.

The content of the logging buffer will be saved to the FLASH memory periodically such that the message can be restored on reboot. The interval for periodically writing the logging buffer to FLASH can be specified. The content of the logged messages in the FLASH will be reloaded into the logging buffer on reboot.

Example

This example shows how to enable the logging of messages to the logging buffer and restrict logging of messages with a security level of errors or higher.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# logging buffered severity errors
ZEQUOxxxxRE(config)#
```

2.6.4 logging console

This command is used to enable the logging of system messages to the local console. Use the **no** form of this command to disable the logging of messages to the local console and revert to the default setting.

Syntax

- **logging console** [severity { *SEVERITY-LEVEL* | *SEVERITY-NAME* }] [*discriminator NAME*]
- **no logging console**

Parameters

Parameters	description
<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. The corresponding severity levels are listed together with their respective severity names: emergencies (0), alerts (1), critical (2), errors (3), warnings (4), notifications (5), informational (6), debugging (7). If not specified, the default severity level is warnings (4).
<i>SEVERITY-NAME</i>	(Optional) Specifies the severity level name of system messages. The corresponding severity levels are listed together with their respective severity names: emergencies (0), alerts (1), critical (2), errors (3), warnings (4), notifications (5), informational (6), debugging (7).
<i>discriminator</i>	(Optional) Specifies to filter the message to be sent to the local console based on the discriminator.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The system messages can be logged to the local message buffer, local console or other destinations. Messages must enter the local message buffer first before it can further be dispatched to the console.

This command does not take effect if the specified discriminator does not exist. Thus the default setting of the command is applied.

Specify the severity level of the messages in order to restrict the system messages that are logged to the console. The messages which are at the specified severity level or higher will be dispatched to the local console.

Example

This example shows how to enable the logging of messages to the local console and restrict the logging of messages with a security level of errors or higher.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# logging console severity errors
ZEQUOxxxxRE(config)#
```

2.6.5 logging discriminator

This command is used to create a discriminator that can be further used to filter SYSLOG messages sent to various destinations.

Syntax

- logging discriminator *NAME* [facility { drops *STRING* | includes *STRING* }] [severity { drops *SEVERITY-LIST* | includes *SEVERITY-LIST* }]
- no discriminator *NAME*

Parameters

Parameters	description
<i>NAME</i>	Specifies the name of the discriminator.
facility	(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.
includes	Specifies to include the matching message. The unmatched messages are filtered.
drops	Specifies to filter the matching message.
severity	(Optional) Specifies a sub-filter based on severity matching.
<i>SEVERITY-LIST</i>	Specifies a list of severity levels to be filtered or to be included.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

An existing discriminator can be configured. The later setting will overwrite the previous setting. Associate a discriminator with the logging buffered and the logging server command.

Example

This example shows how to create a discriminator named "buffer-filter" which specifies two sub-filters, one based on the severity level and the other based on the facility.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# logging discriminator buffer-filter facility includes STP
severity includes 1-4,6
ZEQUOxxxxRE(config)#
```

2.6.6 logging server

This command is used to create a SYSLOG server host to log the system messages or debug output. Use the **no** command to remove a SYSLOG server host.

Syntax

- **logging server** { *IP-ADDRESS* | *IPV6-ADDRESS* } [**severity** { *SEVERITY-LEVEL* | *SEVERITY-NAME* }] [**facility** { *FACILITY-NUM* | *FACILITY-NAME* }] [**discriminator** *NAME*] [**port** *UDP-PORT*]
- **no logging server** { *IP-ADDRESS* | *IPV6-ADDRESS* }

Parameters

Parameters	description
<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.

Parameters	description
<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. The corresponding severity levels are listed together with their respective severity names: emergencies (0), alerts (1), critical (2), errors (3), warnings (4), notifications (5), informational (6), debugging (7). If not specified, the default severity level is warnings (4).
<i>SEVERITY-NAME</i>	(Optional) Specifies the severity level name of system messages. The corresponding severity levels are listed together with their respective severity names: emergencies (0), alerts (1), critical (2), errors (3), warnings (4), notifications (5), informational (6), debugging (7).
<i>FACILITY-NUM</i>	(Optional) Specifies a decimal value from 0 to 23 to represent the facility. If not specified, the default facility is local7 (23). See the usage guideline for more information.
<i>FACILITY-NAME</i>	(Optional) Specifies a facility name to represent the facility. If not specified, the default facility is local7 (23). See the usage guideline for more information.
discriminator <i>NAME</i>	(Optional) Specifies to filter the message to the log server based on discriminator.
port <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.

Command Default Level

Level: 12.

Usage Guideline

System messages can be logged to the local message buffer, local console or remote hosts. Messages must enter the local message buffer first before it can be further dispatched to logging server.

The following is a table for the facility.

Facility Number	Facility Name	Facility Description
0	kern	Kernel messages.
1	user	User-level messages.
2	mail	Mail system.
3	daemon	System daemons.
4	auth1	Security/authorization messages.
5	syslog	Messages generated internally by the SYSLOG.
6	lpr	Line printer sub-system.
7	news	Network news sub-system.
8	uucp	UUCP sub-system.
9	clock1	Clock daemon.
10	auth2	Security/authorization messages.
11	ftp	FTP daemon.
12	ntp	NTP subsystem.
13	logaudit	Log audit.
14	logalert	Log alert.
15	clock2	Clock daemon (note 2).
16	local0	Local use 0 (local0).
17	local1	Local use 1 (local1).
18	local2	Local use 2 (local2).
19	local3	Local use 3 (local3).
20	local4	Local use 4 (local4).
21	local5	Local use 5 (local5).
22	local6	Local use 6 (local6).
23	local7	Local use 7 (local7).

NOTE

When using the link aggregation on your device, if the system logs and SNMP traps regarding the link status of the physical port cannot be normally transmitted to the SYSLOG server or SNMP server, you may be able to solve issue by using **logtrap linkchange delay** command.

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.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# logging server 20.3.3.3 severity warnings
ZEQUOxxxxRE(config)#

```

2.6.7 logging smtp

This command is used to enable the logging of system messages to email recipients. Use the **no** command to disable the logging of messages to email recipients and revert to the default setting.

Syntax

- **logging smtp** [**severity** { *SEVERITY-LEVEL* | *SEVERITY-NAME* }] [**discriminator** *NAME*]
- **no logging smtp**

Parameters

Parameters	description
<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. The corresponding severity levels are listed together with their respective severity names: emergencies (0), alerts (1), critical (2), errors (3), warnings (4), notifications (5), informational (6), debugging (7). If not specified, the default severity level is warnings (4).
<i>SEVERITY-NAME</i>	(Optional) Specifies the severity level name of system messages. The corresponding severity levels are listed together with their respective severity names: emergencies (0), alerts (1), critical (2), errors (3), warnings (4), notifications (5), informational (6), debugging (7).
discriminator <i>NAME</i>	(Optional) Specifies to filter the message to email recipients based on the discriminator.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The system messages can also be logged to email recipients. This command does not take effect if the specified discriminator does not exist. Thus the default setting of the command is applied. Messages must enter the local message buffer first before it can be further dispatched to email recipients.

Specify the severity level of the messages in order to restrict the system messages that are logged. The messages which are at the specified severity level or higher will be logged to the email recipients.

Example

This example shows how to enable the logging of system messages with a severity higher than warnings to email recipients.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# logging smtp severity warnings
ZEQUOxxxxRE(config)#
```

2.6.8 logging source-interface

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

Syntax

- logging source-interface *INTERFACE-ID*
- no logging source-interface

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interface whose IP address will be used as the source address of the SYSLOG packet.

Default

By default, the IP address of the closest interface will be used.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the interface whose IP address will be used as the source address of the SYSLOG packet.

Only Loopback, MGMT and VLAN interfaces are supported in this command.

Example

This example shows how to configure VLAN 100 as the source interface for SYSLOG packets.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# logging source-interface vlan100
ZEQUOxxxxRE(config)#
```

2.6.9 show logging

This command is used to display the system messages logged in the local message buffer.

Syntax

- show logging [all | [*REF-SEQ*] [+ *NN* | - *NN*]]

Parameters

Parameters	description
all	(Optional) Specifies to display all log entries starting from the latest message.
<i>REF-SEQ</i>	(Optional) Specifies to start the display from the reference sequence number.
+ <i>NN</i>	(Optional) 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.

Parameters	description
- <i>NN</i>	(Optional) 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.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the system messages logged in the local message buffer.

Each message logged in the message buffer is associated with a sequence number. As a message is logged, a sequence number starting from 1 is allocated. The sequence number will roll back to 1 when it reaches 100000.

When the user specifies to display a number of messages following the reference sequence number, the oldest messages are displayed prior to the newer messages. When the user specifies to display a number of messages prior to the reference sequence number, the newer messages are displayed prior to the later messages.

If the command is issued without options, the system will display up to 200 entries starting from the latest message.

Example

This example shows how to display the messages in the local message buffer.

```
ZEQUOxxxxRE# show logging
```

```
Total number of buffered messages: 2
```

```
#2 2017-03-25 16:37:36 Unit 1, Successful login through Console (Username: Anonymous)
```

```
#1 2017-03-25 16:35:54 INFO(6) Port Gi1/0/1 link up, 1000Mbps FULL duplex
```

```
ZEQUOxxxxRE#
```

2.6.10 show attack-logging

This command is used to display attack log messages.

Syntax

- show attack-logging unit *UNIT-ID* [index *INDEX*]

Parameters

Parameters	description
<i>UNIT-ID</i>	Specifies the unit on which the attack log messages will be displayed.
index <i>INDEX</i>	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.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the attack log messages. The attack log message refers to log messages driven by modules such as DOS and the port-security module. This type of log message may generate a large amount of messages and quickly cause the system to run out of system log storage. Therefore, for this type of log messages only the first log that is generated each minute can be stored in the system log, with the rest of them being stored in a separate table named attack log.

Example

This example shows how to display the first attack log entry.

```
ZEQUOxxxxRE# show attack-logging unit 1
Attack log messages:
1 2017-03-24 15:00:14 CRIT(2) Land attack is blocked from (IP: 10.72.24.1 Port: 7)
ZEQUOxxxxRE#
```

2.6.11 clear attack-logging

This command is used to delete the attack log.

Syntax

- clear attack-logging {unit *UNIT-ID* | all}

Parameters

Parameters	description
unit <i>UNIT-ID</i>	Specifies the unit on which the attack log messages will be cleared.
all	Specifies to clear all attack log entries.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command used to delete the attack log messages.

Example

This example shows how to delete all the attack log messages.

```
ZEQUOxxxxRE# clear attack-logging all
ZEQUOxxxxRE#
```

2.6.12 logtrap linkchange delay

You can use this command to enable the system log and delaying SNMP trap issuance, which are related with the link status of the physical port. To disable the system log and delaying SNMP trap issuance, use no form of this command.

Syntax

- **logtrap linkchange delay** *DELAY-TIME*
- **no logtrap linkchange delay**

Parameters

Parameter	Description
<i>DELAY-TIME</i>	This parameter configures the time to delay the system logs and SNMP traps issuance, which are related with the link status of the physical port. The range is from 1 to 30 (seconds).

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode

Command Default Level

Level: 12.

Usage Guideline

You can configure the delay time until the system log and SNMP traps regarding the link status (link up/link down) of the physical port are issued. When changing the link status of the physical port of your hardware, the system log and SNMP traps are issued after the time set on this function passes. After changing the link status of the physical port, if the change of the link status recurs within the configuration time, the system logs and SNMP traps configured are collectively issued, after the configuration time passes from the last status change.

If the status change previously mentioned recurs, the maximum number that can issue the information of the status change for the system log and SNMP traps is up to 128, respectively.

When using the link aggregation on your device, if the system logs and SNMP traps regarding the link status of the physical port cannot be normally transmitted to the SYSLOG server or SNMP server, you may be able to solve issue by using this function.

The recommendation value is five (5) seconds when using this function.

Example

The following example describes how to set the delay time to 5 seconds; the delay time indicates the time needed until the system log and SNMP traps regarding the link status of the physical port are issued.

```
ZEQUOxxxxRE# logtrap linkchange delay 5
```

```
Success
```

```
ZEQUOxxxxRE(config)#
```

2.6.13 show logtrap linkchange

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

Syntax

- show logtrap linkchange

Parameters

None.

Default

None.

Command Mode

User Mode/Privileged Mode

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the configuration of the delay time until the system logs and SNMP traps regarding the link status (link up/link down) of the physical port are issued.

If the configuration is enabled, the delay time configured is displayed.

Example

The following example describes how to display the configuration of the delay time until the system logs and SNMP traps regarding the link status of the physical port are issued.

```
ZEQUOxxxxRE# show logtrap linkchange
```

```
Logtrap linkchange delay is enabled  
Delay time is 5s
```

```
ZEQUOxxxxRE#
```

2.7 System File Management Commands

2.7.1 boot config

This command is used to specify the file that will be used as the configuration file for the next boot.

Syntax

- `boot config FILE-PATH`

Parameters

Parameters	description
<i>FILE-PATH</i>	Specifies the FILE-PATH of the file to be used as the startup configuration file.

Default

By default, the *config.cfg* file is used.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

The command is used to specify the startup configuration file. The default startup configuration file is *config.cfg*. If there is no valid configuration file, the device will be configured to the default state.

Example

This example shows how to configure the file 'switch-config.cfg' as the startup configuration file.

```
ZEQUO6600RE# configure terminal
ZEQUOxxxxRE(config)# boot config c:/switch-config.cfg
ZEQUOxxxxRE(config)#
```

2.7.2 boot image

This command is used to specify the file that will be used as the image file for the next boot.

Syntax

- **boot image** [**check**] *FILE-PATH*

Parameters

Parameters	description
check	(Optional) Specifies to display the firmware information for the specified file. This information includes the version number and model description.
<i>FILE-PATH</i>	Specifies the FILE-PATH of the file to be used as the boot image file.

Default

By default, there is one image file as the boot image.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

When using the **boot image** command, the associated specified boot image file will be the startup boot image file for the next reboot. Use this command to assign a file as the next-boot image file. The system will check the model and checksum to determine whether the file is a valid image file.

The purpose of the **check** parameter is for checking the file information to let the user understand whether the specified file is suitable to be a boot image or not. The setting of the **boot image** command will immediately be stored in the NVRAM, which is a space separated from the start-up configuration. The backup image is decided automatically and is the newest valid image other than the boot-up one.

Example

This example shows how to specify that the Switch should use the image file named 'pnxxxxxx_v10000.rom' as the boot image file for the next startup.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# boot image c:/pnxxxxxx_v10000.rom
ZEQUOxxxxRE(config)#
```

This example shows how to check a specified image file called "c:/pnxxxxxx_v10000.rom". The checksum of the image file has been verified is okay and the information of the image file is displayed.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#boot image check c:/pnxxxxxx_v10000.rom
```

```
-----
Image information
-----
Version: 1.0.0.00
Description: Panasonic Gigabit Ethernet Switch
```

```
ZEQUOxxxxRE(config)#
```

This example shows how to checks a specified image file called "pnxxxxxx_v10000_wrong.rom". The checksum of the image file has been verified wrong and an error message is displayed.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# boot image check pnxxxxxx_v10000_wrong.rom
ERROR: Invalid firmware image.
ZEQUOxxxxRE(config)#
```

2.7.3 clear running-config

This command is used to clear the system's running configuration.

Syntax

- clear running-config

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to clear the system's configuration retained in DRAM. The configuration data will revert to the default settings. Before using this command, save a backup of the configuration using the **copy** command or upload the configuration profile to the TFTP server.

This command will clear the system's configuration settings, including IP parameters, but not the stacking information. Thus, all the existing remote connections will be disconnected. After this command was applied, the user needs to setup the IP address via the local console.

Example

This example shows how to clear the system's running configuration.

```
ZEQUOxxxxRE#clear running-config
```

```
This command will clear the system's configuration to the factory
default settings, including the IP address.
Clear running configuration? (y/n) [n] y
```

```
ZEQUOxxxxRE#
```

2.7.4 reset system

This command is used to reset the system, clear the system's configuration, then save and reboot the Switch.

Syntax

- **reset system**

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to clear the system's configuration, including stacking information. The configuration data will revert to the default settings and then save it to the start-up configuration file and then reboot switch. Before using this command, save a backup of the configuration using the **copy** command or upload the configuration profile to the TFTP server.

Example

This example shows how to reset the system to the factory default settings.

```
ZEQUOxxxxRE#reset system
```

```
This command will clear the system's configuration to the factory
default settings, including the IP address and stacking settings.
Clear system configuration, save, reboot? (y/n) [n] y
```

```
Saving configurations and logs to NV-RAM..... Done
```

```
Please wait, the switch is rebooting...
```

2.7.5 replace running-config

This command is used to replace the current running configuration with the indicated configuration file.

Syntax

- **replace running-config** { {tftp: //location/filename | rcp: //username@location/filename | ftp: //username:password@location:tcpport/filename} | local: *FILENAME*} [**force**]

Parameters

Parameters	description
tftp:	Specifies that the configuration file is from the TFTP server.
<i>//location/filename</i>	Specifies the URL of the configuration file on the TFTP server.
rtp:	Specifies that the configuration file is from the RCP server.
<i>//username@location/filename</i>	Specifies the URL of the configuration file on the RCP server.
ftp:	Specifies that the configuration file is from the FTP server.
<i>//username:password@location:tcpport/filename</i>	Specifies the URL of the configuration file on the FTP server.
local:	Specifies that the configuration file is from the NVRAM of the device.
<i>FILENAME</i>	Specifies the name of the configuration file stored in the NVRAM.
force	(Optional) Specifies to execute the command immediately with no confirmation needed.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command is used to execute the indicated configuration file to replace the current running configuration. The current running configuration will be cleared before applying the indicated configuration.

NOTE

The command will replace the current running configuration with the contents of the specified configuration file. So the specified configuration file is assumed to be a complete configuration, not a partial configuration.

Before using the **replace running-config** 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.

```
ZEQUOxxxxRE#replace running-config 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
```

```
ZEQUOxxxxRE#
```

This example shows how to download the “config.cfg” from the RCP server and replace the current running configuration with it.

```
ZEQUOxxxxRE#replace running-config rcp: //User@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 rcp://10.0.0.66/config.cfg...
Transmission start...
Transmission finished, file length 45422 bytes.
Executing script file config.cfg .....
Executing done
```

```
ZEQUOxxxxRE#
```

This example shows how to download the “config.cfg” from the FTP server and replace the current running configuration with it. Execute the command immediately without confirmation.

```
ZEQUOxxxxRE#replace running-config ftp: //User:123@10.0.0.66:80/config.cfg force
```

```
Accessing ftp: //10.0.0.66/config.cfg...
Transmission start...
Transmission finished, file length 45422 bytes.
Executing script file config.cfg .....
Executing done
```

```
ZEQUOxxxxRE#
```

This example shows how to replace the current running configuration with the specified configuration file "config.cfg" stored in the NVRAM of the device. Execute the command immediately without confirmation.

```
ZEQUOxxxxRE#replace running-config local: config.cfg force
```

```
Executing script file config.cfg .....  
Executing done
```

```
ZEQUOxxxxRE#
```

2.7.6 copy

This command is used to copy a file to another file.

Syntax

- **copy** *SOURCE-URL DESTINATION-URL*
- **copy** *SOURCE-URL* { **tftp**: [*//LOCATION/DESTINATION-URL*] | **ftp**: [*//USER-NAME:PASSWORD@LOCATION:TCP-PORT/DESTINATION-URL*] | **rcp**: [*//USER-NAME@LOCATION/DESTINATION-URL*]}
- **copy** { **tftp**: [*//LOCATION/SOURCE-URL*] | **ftp**: [*//USER-NAME:PASSWORD@LOCATION:TCP-PORT/SOURCE-URL*] | **rcp**: [*//USER-NAME@LOCATION/SOURCE-URL*]} *DESTINATION-URL*

Parameters

Parameters	description
<i>SOURCE-URL</i>	Specifies the source URL for the source file to be copied. One special form of the URL is represented by the following keywords. If startup-config is specified as the <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. If running-config 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. If local: [PATH-FILE-NAME] is specified as the <i>SOURCE-URL</i>, the purpose is to specify the source file to be copied in the file system. If log is specified as the <i>SOURCE-URL</i>, the system log can be retrieved to the TFTP server or saved as the file in the file system. If attack-log UNIT-ID is specified as the <i>SOURCE-URL</i>, the purpose is to upload one unit's attack log.
<i>DESTINATION-URL</i>	Specifies the destination URL for the copied file. One special form of the URL is represented by the following keywords. If running-config is specified as the <i>DESTINATION-URL</i>, the purpose is to apply a configuration to the running configuration. If startup-config 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 boot config command. If local: [PATH-FILE-NAME] is specified as the <i>DESTINATION-URL</i>, the purpose is to specify the copied file in the file system. If the input relative path is specified, the file will be downloaded to all units in stack and stored in the current path of each unit. If the input absolute path is specified, the file will be downloaded to the place which of the absolute path indicates. If there is no unit information in the absolute path, the master unit will be assigned.
<i>LOCATION</i>	Specifies the IPv4 address the TFTP/FTP/RCP server, or IPv6 address of the TFTP/FTP server.
<i>USER-NAME</i>	Specifies the user name on the FTP/RCP server.
<i>PASSWORD</i>	Specifies the password for the user.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to copy a file to another file in the file system. Use this command to download or upload the configuration file or the image file. Use this command to upload the system log to the TFTP server. To upload the running configuration or save the running configuration to the startup configuration, specify **running-config** as the *SOURCE-URL*. To save the running configuration to the startup configuration, specify **startup-config** as the *DESTINATION-URL*.

As the destination is the startup configuration, the source file is directly copied to the file specified in the **boot config** command. Thus the original startup configuration file will be overwritten.

To apply a configuration file to the running configuration, specify **running-config** as the *DESTINATION-URL* for the **copy** command and the configuration file will be executed immediately by using the increment method. That means that the specified configuration will merge with the current running configuration. The running configuration will not be cleared before applying of the specified configuration.

As the specified source is the system log and the specified destination is a URL, the current system log will be copied to the specified URL.

To represent a file in the remote TFTP server, the URL must be prefixed with "tftp: //".

To download the firmware image, the user should use the **copy tftp: //** command to download the file from the TFTP server to a file in the file system. Then, use the **boot image** command to specify it as the boot image file.

Example

This example shows how to configure the Switch's running configuration by using the increment method using the configuration called "switch-config.cfg" that is download from the TFTP server 10.1.1.254.

```
ZEQUOxxxxRE# copy tftp: //10.1.1.254/switch-config.cfg running-config
```

```
Address of remote host []? 10.1.1.254
Source filename []? switch-config.cfg
Destination filename running-config? [y/n]: y
```

```
Accessing tftp://10.1.1.254/switch-config.cfg...
Transmission start...
Transmission finished, file length 45421 bytes.
Executing script file switch-config.cfg .....
Executing done
```

```
ZEQUOxxxxRE#
```

This example shows how to upload the running configuration to the TFTP server for storage.

```
ZEQUOxxxxRE# copy running-config tftp: //10.1.1.254/switch-config.cfg
```

```
Address of remote host []? 10.1.1.254
Destination filename []? switch-config.cfg
Accessing tftp://10.1.1.254/switch-config.cfg...
Transmission start...
Transmission finished, file length 45421 bytes.
```

```
ZEQUOxxxxRE#
```

This example shows how to save the system's running configuration into the FLASH memory and uses it as the next boot configuration.

```
ZEQUOxxxxRE# copy running-config startup-config
```

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

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

```
ZEQUOxxxxRE#
```

This example shows how to execute the "switch-config.cfg" file in the NVRAM immediately by using the increment method.

```
ZEQUOxxxxRE# copy local: switch-config.cfg running-config
```

```
Source filename [switch-config.cfg]?
Destination filename running-config? [y/n]: y
```

```
Executing script file switch-config.cfg .....
Executing done
```

```
ZEQUOxxxxRE#
```

This example shows how to download an image file from the TFTP server to all units in the stack.

```
ZEQUOxxxxRE# copy tftp: //10.1.1.254/pnxxxxxx_v10000.rom flash: pnxxxxxx_v10000.rom

Address of remote host [10.1.1.254]?
Source filename [pnxxxxxx_v10000.rom]?
Destination filename [pnxxxxxx_v10000.rom]?
Accessing tftp://10.1.1.254/pnxxxxxx_v10000.rom...
Transmission start...
Transmission finished, file length 8315060 bytes.
Transmission to slave start..... Done.
Transmission to slave finished, file length 8315060 bytes.
Please wait, programming flash..... Done.
Wait slave programming flash complete...
Done.

ZEQUOxxxxRE#
```

2.7.7 show boot

This command is used to display the boot configuration file and the boot image setting.

Syntax

- show boot [unit *UNIT-ID*]

Parameters

Parameters	description
<i>UNIT-ID</i>	(Optional) Specifies the unit to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the boot configuration file and the boot image setting.

Example

This example shows how to display system boot information.

```
ZEQUOxxxxRE#show boot

Unit 1
  *1st Bootup Firmware      : /d:/sd_runtime.rom
  *1st Bootup Configuration : /d:/sd_config.cfg
    *Can not change 1st Bootup File

  2nd Bootup Firmware      : /c:/pnxxxxxxx_v20001.rom
  2nd Bootup Configuration : /c:/config.cfg

  Actual Bootup Firmware   : /c:/pnxxxxxxx_v20001.rom
  Actual Bootup Configuration : /c:/config.cfg

  SD card: d drive, FLASH: c drive

ZEQUOxxxxRE#
```

2.7.8 show running-config

This command is used to display the commands in the running configuration file.

Syntax

- show running-config

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command displays the current running system configuration.

Example

This example shows how to display the content of the running configuration file.

```
ZEQUOxxxxRE#show running-config
Building configuration...

Current configuration : 5598 bytes

!-----
!
!                       ZEQUOxxxxRE Gigabit Ethernet Switch
!                       Configuration
!
!                       Firmware: Build V2.0.0.01
!                       Copyright(C) 2017 Panasonic. All rights reserved.
!-----

stack
!
line console
!
line telnet
!
line ssh
!
vlan 1
!
interface GigabitEthernet1/0/1
!
--More--
```

2.7.9 show startup-config

This command is used to display the content of the startup configuration file.

Syntax

- show startup-config

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command displays the configuration settings that the system will be initialized with.

Example

This example shows how to display the content of the startup configuration file.

```
ZEQUOxxxxRE#show startup-config

!-----
!
!                      ZEQUOxxxxRE Gigabit Ethernet Switch
!                      Configuration
!
!                      Firmware: Build V2.0.0.01
!                      Copyright (C) 2017 Panasonic. All rights reserved.
!-----

stack self-unit-priority 32
no stack self-unit-id
stack
!
# AAA START
# AAA END
!
# COMMAND LEVEL START
# COMMAND LEVEL END
# LEVEL START
# LEVEL END
# ACCOUNT START
# ACCOUNT END
!
ip http server
--More--
```

2.8 Time and Simple Network Time Protocol (SNTP) Commands

2.8.1 clock set

This command is used to manually set the system's clock.

Syntax

- `clock set HH:MM:SS DAY MONTH YEAR`

Parameters

Parameters	description
<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, January, Jan, February, Feb, and so on).
<i>YEAR</i>	Specifies the current year (no abbreviation).

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Generally, if the system is synchronized by a valid outside timing mechanism, such as SNTP, there is 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, 2013.

```
ZEQUOxxxxRE# clock set 18:00:00 4 jul 2017
ZEQUOxxxxRE#
```

2.8.2 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.

Syntax

- **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

Parameters	description
recurring	Specifies that summer time should start and end on the specified week day of the specified month.
date	Specifies that summer time should start and end on the specified date of the specified month.
<i>WEEK</i>	Specifies the week of the month (1 to 4 or last).

Parameters	description
<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 current month. (by name, January, Jan, February, Feb, 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 30, 60, 90 and 120.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to automatically switch over to summer time. The command has two forms. One is the recurring form which is used to specify the time through the week and the day of the month. The other form is the date form which is used to specify the date of the month.

In both the date and recurring forms of the command, the first part of the command specifies when summer time begins, and the second part specifies when it ends.

Example

This example shows how to specify that summer time starts on the first Sunday in April at 2 a.m. and ends on the last Sunday in October at 2 a.m.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# clock summer-time recurring 1 sun apr 2:00 last sun oct 2:00
ZEQUOxxxxRE(config)#
```

2.8.3 clock timezone

This command is used to set the time zone for display purposes. Use the **no** form of this command to set the time to the Coordinated Universal Time (UTC).

Syntax

- `clock timezone {+ | -} HOURS-OFFSET [MINUTES-OFFSET]`
- `no clock timezone`

Parameters

Parameters	description
<code>+</code>	Specifies that time to be added to UTC.
<code>-</code>	Specifies that time to be subtracted from UTC.
<code>HOURS-OFFSET</code>	Specifies the difference in hours from UTC.
<code>MINUTES-OFFSET</code>	(Optional) Specifies the difference in minutes from UTC.

Default

By default, this option is set to UTC.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The time obtained by the SNTP server refers to the UTC time. The local time will be calculated based on UTC time, time zone, and the daylight saving configuration.

Example

This example shows how to set the time zone to the Pacific Standard Time (PST), which is 8 hours ahead of UTC.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# clock timezone - 8
ZEQUOxxxxRE(config)#
```

2.8.4 show clock

This command is used to display the time and date information.

Syntax

- show clock

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command also indicates the clock's source. The clock source can be "No Time Source" or "SNTP".

Example

This example shows how to display the current time.

```
ZEQUOxxxxRE#show clock
```

```
Current Time Source   : System Clock
Current Time          : 05:56:45, 2017-01-30
Time Zone             : UTC +00:00
Daylight Saving Time  : Disabled
```

```
ZEQUOxxxxRE#
```

2.8.5 show sntp

This command is used to display information about the SNTP server.

Syntax

- show sntp

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display information about the SNTP server.

Example

This example shows how to display SNTP information.

```
ZEQUOxxxxRE#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::1111vlan1		

```
Total Entries:3
```

```
ZEQUOxxxxRE#
```

2.8.6 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.

Syntax

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

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IP address of the time server which provides the clock synchronization.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the time server.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

SNTP is a compact, client-only version of the NTP. Unlike NTP, SNTP can only receive the time from NTP servers; it cannot be used to provide time services to other systems. SNTP typically provides time within 100 milliseconds of the accurate time, but it does not provide the complex filtering and statistical mechanisms of NTP. In addition, SNTP does not authenticate traffic, although you can configure extended access lists to provide some protection. Enter this command once for each NTP server. Configure the system with either this command or the **sntp broadcast client global configuration** command in order to enable SNTP. Create multiple SNTP servers by enter this command multiple times with different SNTP server IP addresses.

Use the **no** command to delete the SNTP server entry. To delete an entry, specify the information exactly the same as the originally configured setting. The time obtained from the SNTP server refers to the UTC time.

Example

This example shows how to configure a switch to allow its software clock to be synchronized with the clock by the SNTP server at IP address 192.168.22.44.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# sntp server 192.168.22.44
ZEQUOxxxxRE(config)#
```

2.8.7 sntp enable

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

Syntax

- **sntp enable**
- **no sntp enable**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enable or disable the SNTP function.

Example

This example shows how to enable the SNTP function.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# sntp enable
ZEQUOxxxxRE(config)#
```

2.8.8 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.

Syntax

- **sntp interval** *SECONDS*
- **no sntp interval**

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

This command is used to set the polling interval.

Example

This example shows how to configure the interval to 100 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# sntp interval 100
ZEQUOxxxxRE(config)#
```

2.9 Time Range Commands

2.9.1 periodic

This command is used to specify the period of time for a time range profile. This command is used in the time-range configuration mode. Use the **no** form of this command to remove the specified period of time.

Syntax

- **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

Parameters	description
daily <i>HH:MM to HH:MM</i>	Specifies the time of the day, using the format HH:MM (for example, 18:30).
weekly <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.

Command Default Level

Level: 12.

Usage Guideline

A new period can be partially overlapped with an older one. If a new period's starting and ending time is respectively the same as a previous period, an error message will be displayed and the new period will not be allowed. When specifying a period to remove, it must be the same period originally added and cannot be a partial range of a period or multiple periods configured. Otherwise, an error message will be displayed.

Example

This example shows how to create a time-range that include daily 09:00 to 12:00, 00:00 Saturday to 00:00 Monday and delete the period for daily 09:00 to 12:00.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# time-range rdttime
ZEQUOxxxxRE(config-time-range)# periodic daily 9:00 to 12:00
ZEQUOxxxxRE(config-time-range)# periodic weekly saturday 00:00 to monday 00:00
ZEQUOxxxxRE(config-time-range)# no periodic daily 9:00 to 12:00
ZEQUOxxxxRE(config-time-range)#
```

2.9.2 show time-range

This command is used to display the time range profile configuration.

Syntax

- show time-range [*NAME*]

Parameters

Parameters	description
<i>NAME</i>	(Optional) Specifies the name of the time-range profile to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If no optional parameter is specified, all configured time-range profiles will be displayed.

Example

This example shows how to display all the configured time ranges.

```
ZEQUOxxxxRE#show time-range

Time Range Profile: lunchtime
Daily 12:00 to 13:00

Time Range Profile: rdttime
Weekly Saturday 00:00 to Monday 00:00
Daily 09:00 to 12:00

Total Entries :2

ZEQUOxxxxRE#
```

2.9.3 time-range

This command is used to define a time-range profile and enter the time range configuration mode. Use the **no** form of this command to delete a time range.

Syntax

- **time-range** *NAME*
- **no time-range** *NAME*

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enter the time range configuration mode before using the **periodic** command to specify a time period. When a time-range is created without any time interval (periodic) setting, it implies that there is not any active period for the time-range and will not be displayed when issuing the **show time-range** command.

Example

This example shows how to enter the time range configuration mode for the time-range profile, named "rdtime".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# time-range rdtime
ZEQUOxxxxRE(config-time-range)#
```

2.10 Reboot Commands

2.10.1 reboot

This command is used to reboot the Switch.

Syntax

- reboot [force_agree]

Parameters

Parameters	description
force_agree	(Optional) Specifies to restart the Switch without confirmation.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command is used to reboot the Switch.

Example

This example shows how to reboot the Switch.

```
ZEQUOxxxxRE# reboot force_agree
```

```
Please wait, the switch is rebooting...
```


2.11 Cable Diagnostics Commands

2.11.1 test cable-diagnostics

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

Syntax

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

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	Specifies the interface ID.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space before and after the comma.
-	(Optional) Specifies a range of interfaces. No space before and after the hyphen.

Default

None.

Command Mode

EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

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

Example

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

```
ZEQUOxxxxRE# test cable-diagnostics interface gil/0/1  
ZEQUOxxxxRE#
```

2.11.2 show cable-diagnostics

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

Syntax

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

Parameters

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

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE#test cable-diagnostics interface gi1/0/1
ZEQUOxxxxRE#show cable-diagnostics interface gi1/0/1
```

Port	Type	Link Status	Test Result	Cable Length (M)
Gi1/0/1	1000BASE-T	Link Down	OK	2

```
ZEQUOxxxxRE#
```

2.11.3 clear cable-diagnostics

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

Syntax

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

Parameters

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

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE#clear cable-diagnostics interface gil/0/1
Clear cable-diagnostics for interfaces? (y/n) y
ZEQUOxxxxRE#
```

2.12 Digital Diagnostics Monitoring (DDM) Commands

2.12.1 show interfaces transceiver

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

Syntax

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

Parameters

Parameters	description
<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.
detail	(Optional) Specifies to display more detailed information.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the current SFP/SFP+ module operating transceiver monitoring parameters values for specified ports.

Example

This example shows how to display current operating parameters for all ports valid for transceiver monitoring.

```
ZEQUOxxxxRE#show interfaces transceiver
```

```
++ : high alarm, + : high warning, - : low warning, -- : low alarm
mA: milliamperes, mW: milliwatts
```

```
Transceiver Monitoring traps: None
```

port	Temperature (Celsius)	Voltage (V)	Bias Current (mA)	TX Power (mW/dbm)	RX Power (mW/dbm)
Gil/0/21	33.247	3.294	8.049	0.572 -2.430	0.000 -
Gil/0/22	35.551	3.269	7.974	0.601 -2.210	0.001 -29.089

```
Total Entries: 2
```

```
ZEQUOxxxxRE#
```

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

```
ZEQUOxxxxRE#show interfaces transceiver detail
```

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

```
Gil/0/21
```

```
Transceiver Monitoring is enabled
Transceiver Monitoring shutdown action: None
```

	Current	High-Alarm	High-Warning	Low-Warning	Low-Alarm
Temperature (C)	33.172	78.000	73.000	-8.000	-13.000
Voltage (V)	3.293	3.700	3.600	3.000	2.900
Bias Current (mA)	8.059	11.800	10.800	5.000	4.000
TX Power (mW)	0.572	0.832	0.661	0.316	0.251
(dbm)	-2.430	-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

```
Gil/0/22
```

```
Transceiver Monitoring is enabled
Transceiver Monitoring shutdown action: None
```

	Current	High-Alarm	High-Warning	Low-Warning	Low-Alarm
Temperature (C)	35.422	78.000	73.000	-8.000	-13.000

```
--More--
```

2.12.2 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.

Syntax

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

Parameters

Parameters	description
alarm	(Optional) Specifies to enable or disable the sending of alarm level notifications.
warning	(Optional) Specifies to enable or disable the sending of warning level notifications.

Default

By default, this feature is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If no optional parameter is specified, it will enable or disable all transceiver-monitoring SNMP notifications.

Example

This example shows how to enable the sending of warning level notifications.

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

2.12.3 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.

Syntax

- `transceiver-monitoring action shutdown { alarm | warning }`
- `no transceiver-monitoring action shutdown`

Parameters

Parameters	description
alarm	Specifies to shut down a port when alarm events occur.
warning	Specifies to shut down a port when warning events occur.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port interface configuration. The configuration can select to shut down a port on an alarm event or warning event or not to shut down on either of them. When the monitoring function is enabled, an alarm event occurs when the parameters, being monitored, go higher than the high alarm threshold or go lower than the low alarm threshold. A warning event occurs when the parameters being monitored go higher than the high warning threshold or go lower than the low warning threshold. The port shutdown feature is controlled by the Error Disable module without a recover timer. Users can manually recover the port by using the **shutdown** command and then the **no shutdown** command.

Example

This example shows how to configure the shutdown gi1/0/1 when an alarm event is detected.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gi1/0/1
ZEQUOxxxxRE(config-if)# transceiver-monitoring action shutdown alarm
ZEQUOxxxxRE(config-if)#
```

2.12.4 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.

Syntax

- transceiver-monitoring bias-current *INTERFACE-ID* {high | low} {alarm | warning} *VALUE*
- no transceiver-monitoring bias-current *INTERFACE-ID* {high | low} {alarm | warning}

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interface to modify.
high	Specifies the high threshold, when the operating parameter rises above this value. It indicates an abnormal status.
low	Specifies the low threshold, when the operating parameter falls below this value, It indicates an abnormal status.
alarm	Specifies the threshold for high alarm or low alarm conditions.
warning	Specifies the threshold for high warning or low warning conditions.
<i>VALUE</i>	Specifies the value of the threshold. This value is from 0 to 131 mA.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This configuration is only suitable for SFP+ port interfaces with optical modules with transceiver-monitoring.

This command configures the bias-current thresholds on the specified ports. The value will be stored both in the system and in the SFP/SFP+ transceivers and be converted to the 16-bit format and then rewritten into the SFP/SFP+ module.

If the SFP/SFP+ module being configured does not support the threshold change, the user-configured threshold is stored in the system and the displayed value will be the user-configured threshold. If no user-configured threshold exists, the displayed value will always reflect the factory preset value defined by vendors.

The **no** form of this command has the effect to clear the configured threshold stored in the system. It does not change the threshold stored in the SFP/SFP+ transceivers. Use the **no** form of the command to prevent threshold values on newly inserted SFP/SFP+ transceivers from being altered.

Example

This example shows how to configure the bias current high warning threshold as 10.237 on gi1/0/21.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# transceiver-monitoring bias-current gi1/0/21 high warning 10.237
```

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

```
ZEQUOxxxxRE(config)#
```

2.12.5 transceiver-monitoring enable

This command is used to enable the optical transceiver monitoring function for an SFP+ port. Use the **no** form of this command to remove disable optical transceiver monitoring.

Syntax

- transceiver-monitoring enable
- no transceiver-monitoring enable

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for the physical port interface configuration. A user can use this command to enable or disable optical transceiver monitoring functions for an SFP+ port. When the monitoring function is enabled, an alarm event occurs when the parameters being monitored go higher than the high alarm threshold or go lower than the low alarm threshold. A warning event occurs when the parameters being monitored go higher than the high warning threshold or go lower than the low warning threshold. When an SFP/SFP+ with transceiver monitoring capability is plugged into a port but the transceiver monitoring function of the port is disabled, the system will not detect the SFP/SFP+ transceiver's abnormal status but the user can still check the current status by showing the interface transceiver command.

Example

This example shows how to enable transceiver monitoring on gi1/0/21.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gi1/0/21
ZEQUOxxxxRE(config-if)# transceiver-monitoring enable
ZEQUOxxxxRE(config-if)#
```

2.12.6 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.

Syntax

- 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

Parameters	description
<i>INTERFACE ID</i>	Specifies the interface to modify.
high	Specifies that when the operating parameter rises above the highest threshold, it indicates an abnormal status
low	Specifies that when the operating parameter falls below the low threshold this value, it indicates an abnormal status.
alarm	Specifies to configure the high and low threshold value condition.
warning	Specifies to configure the high and low warning threshold conditions.
mwatt <i>VALUE</i>	Specifies the power threshold value in milliwatts. This value must be between 0 and 6.5535.
dbm <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.

Command Default Level

Level: 12.

Usage Guideline

Only SFP+ port interfaces with optical modules, with transceiver monitoring capability, are valid for this configuration.

This command configures the RX power thresholds on the specified port. This value will be stored both in the system and in the SFP/SFP+ transceivers and be converted to the 16-bit format and then written into the SFP/SFP+ module.

If the SFP/SFP+ module configured does not support the threshold change, the user-configured threshold is just stored in the system and the displayed value will be the user-configured threshold. If there is no user-configured threshold, the displayed value will always reflect the factory preset value defined by the vendor. The **no** form of this command has the effect to clear the configured threshold stored in system. It does not change the threshold stored in the SFP/SFP+ transceivers. Use **no** form of the command to prevent threshold values in newly inserted SFP/SFP+ transceivers from being altered.

Example

This example shows how to configure the RX power low warning threshold as 0.135 mW on GigabitEthernet 1/0/21.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# transceiver-monitoring rx-power gi1/0/21 low warning mwatt 0.135
ZEQUOxxxxRE(config)#
```

2.12.7 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.

Syntax

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

Parameters

Parameters	description
<i>INTERFACE ID</i>	Specifies the interface to modify.
high	Specifies that when the operating parameter rises above this high threshold value, it indicates an abnormal status.
low	Specifies that when the operating parameter falls below this low threshold value, it indicates an abnormal status.
alarm	Specifies to configure the high and low threshold value condition.
warning	Specifies to configure the high and low warning threshold conditions.
<i>VALUE</i>	Specifies the threshold value. This value must be between -128 and 127.996 °C.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only SFP+ 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 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 GigabitEthernet 1/0/21.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# transceiver-monitoring temperature gil/0/21 high alarm 127.994

WARNING: A closer value of 127.992 is chosen according to the transceiver-monitoring
precision definition

ZEQUOxxxxRE(config)#
```

2.12.8 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.

Syntax

- 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

Parameters	description
<i>INTERFACE ID</i>	Specifies the interface to modify.
high	Specifies the interface to modify.
low	Specifies that when the operating parameter rises above this high threshold value, it indicates an abnormal status.
alarm	Specifies that when the operating parameter falls below this low threshold value, it indicates an abnormal status.
warning	Specifies to configure the high and low warning threshold conditions.
mwatt <i>VALUE</i>	Specifies the power threshold value in milliwatts. This value must be between 0 and 6.5535.
dbm <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.

Command Default Level

Level: 12.

Usage Guideline

Only SFP+ port interfaces with optical modules, with transceiver monitoring capability, are valid for this configuration.

This command configures the TX power thresholds on the specified port. This value will be stored both in the system and in the SFP/SFP+ transceivers and be converted to the 16-bit format and then written into the SFP/SFP+ module.

If the SFP/SFP+ module configured does not support the threshold change, the user-configured threshold is just stored in the system and the displayed value will be the user-configured threshold. If there is no user-configured threshold, the displayed value will always reflect the factory preset value defined by the vendor. The **no** form of this command has the effect to clear the configured threshold stored in system. It does not change the threshold stored in the SFP/SFP+ transceivers. Use 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 GigabitEthernet 1/0/21.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# transceiver-monitoring tx-power gi1/0/21 low warning mwatt 0.181
ZEQUOxxxxRE(config)#
```

2.12.9 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.

Syntax

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

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interface to modify.
high	Specifies that when the operating parameter rises above the highest threshold, it indicates an abnormal status.
low	Specifies that when the operating parameter falls below this low threshold value, it indicates an abnormal status.
alarm	Specifies to configure the high and low threshold value condition.
warning	Specifies to configure the high and low warning threshold conditions.
<i>VALUE</i>	Specifies the threshold value. This value must be between 0 and 6.5535 Volt.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only SFP+ port interfaces with optical modules, with transceiver monitoring capability, are valid for this configuration.

This command configures the voltage thresholds on the specified port. 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 GigabitEthernet 1/0/21.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# transceiver-monitoring voltage gil/0/21 low alarm 0.005
ZEQUOxxxxRE(config)#
```

2.13 Command Logging Commands

2.13.1 command logging enable

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

Syntax

- command logging enable
- no command logging enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

NOTE

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

Example

This example shows how to enable the command logging function.

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

2.14 Debug Commands

2.14.1 debug enable

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

Syntax

- debug enable
- no debug enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to enable the debug message output option.

Example

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

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#debug enable
ZEQUOxxxxRE(config)#no debug enable
ZEQUOxxxxRE(config)#
```

2.14.2 debug output

This command is used to specify the output for the debug messages of individual modules. Use the **no** form of this command to disable the function.

Syntax

- debug output {module *MODULE-LIST* | all} {buffer | console}
- no debug output {module *MODULE-LIST* | all}

Parameters

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

Default

The default debug output is buffer.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE# debug output all buffer
ZEQUOxxxxRE#
```

2.14.3 debug reboot on-error

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

Syntax

- debug reboot on-error
- no debug reboot on-error

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

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

2.14.4 debug copy

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

Syntax

- `debug copy SOURCE-URL DESTINATION-URL`
- `debug copy SOURCE-URL { tftp: //LOCATION/DESTINATION-URL | ftp: //USER-NAME:PASSWORD@LOCATION:TCP-PORT/DESTINATION-URL | rcp: //USER-NAME@LOCATION/DESTINATION-URL }`

Parameters

Parameters	description
<i>SOURCE-URL</i>	Specifies the source URL for the source file to be copied. It must be one of the following keywords. buffer: Specifies to copy the debug buffer information. error-log: Specifies to copy the error log information. tech-support: Specifies to copy the technical support information.
<i>LOCATION</i>	Specifies the IPv4 or IPv6 address of the TFTP/FTP server, or the IPv4 address of the RCP server.
<i>USER-NAME</i>	Specifies the user name on the FTP/RCP server.
<i>PASSWORD</i>	Specifies the password for the user.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

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

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

ZEQUOxxxxRE#
```

2.14.5 debug clear buffer

This command is used to clear the debug buffer.

Syntax

- debug clear buffer

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to clear the debug buffer information.

Example

This example shows how to clear the debug buffer information.

```
ZEQUOxxxxRE# debug clear buffer
Clear debug-buffer? (y/n) [n] y
ZEQUOxxxxRE#
```

2.14.6 debug clear error-log

This command is used to clear the error log information.

Syntax

- debug clear error-log

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to clear the error log information.

Example

This example shows how to clear the error log information.

```
ZEQUOxxxxRE# debug clear error-log
Clear error-log? (y/n) [n] y
ZEQUOxxxxRE#
```

2.14.7 debug show buffer

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

Syntax

- debug show buffer [utilization]

Parameters

Parameters	description
utilization	(Optional) Specifies to display the utilization of the debug buffer.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display the content of the debug buffer or utilization information of the debug buffer. If no optional parameter is specified, this will display the content in the buffer.

Example

This example shows how to display the debug buffer information.

```
ZEQUOxxxxRE# debug show buffer  
  
Debug buffer is empty  
ZEQUOxxxxRE#
```

This example shows how to display the debug buffer utilization.

```
ZEQUOxxxxRE# debug show buffer utilization

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

ZEQUOxxxxRE#
```

2.14.8 debug show output

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

Syntax

- debug show output

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display the information about the debug status and message output of the modules.

Example

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

```
ZEQUOxxxxRE#debug show output
```

```
Debug Global State : Disabled
```

Module name	Output	Enabled
-----	-----	-----
MSTP	buffer	No
OSPFV2	buffer	No
VRRP	buffer	No

```
ZEQUOxxxxRE#
```

2.14.9 debug show error-log

This command is used to display error log information.

Syntax

- debug show error-log

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

This example shows how to display error log information.

```
ZEQUOxxxxRE# debug show error-log
# Error level:EXCEPTINO (0)
# Firmware version: V2.0.0.01
# Clock: 7957900 ms
# Characters lost: 0
# UTC 2017/05/05 12:14:42
```

The task been terminated because it triggered an exception that raised the signal 4.

```
Exception type: Branch through zero
Current Program Status Register: 0x60000013
Task: 0x62FAC968 "DEBUG"
File/line: excArchLib.c/1631
Registers:
  R0=00000000  R1=00000003  R2=00000001  R3=00000000
  R4=00000000  R5=00000003  R6=62F9E9C0  R7=67025924
  R8=00000006  R9=00000003  R10=00000006  R11=67025A2C
  R12=67025838  SP=67025858  LR=614C1188  PC=00000000
CPSR=60000013  TTBR=6501C04A
Back Trace:
->613669D0
->61E21D0C
->614BEEE4
->614BEE84
->614BED88
->614BE748
->614C1184
->00000000
...
ZEQUOxxxxRE#
```

2.14.10 debug show tech-support

This command is used to display the information required by technical support personnel.

Syntax

- debug show tech-support

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE#debug show tech-support

#-----
#                               ZEQUOxxxxRE Gigabit Ethernet Switch
#                               Technical Support Information
#
#                               Firmware: Build V2.0.0.01
#                               Copyright(C) 2017  Panasonic. All rights reserved.
#-----

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

[SYS 2017-6-6 20:05:57]

Boot Time           : 6 Jun 2017  18:38:48
RTC Time            : 2017/06/06 11:05:57
Boot PROM Version   : Build V1.0.0.06
Firmware Version    : Build V1.0.0.00
Hardware Version    : A1
Serial number       : 73S53010056
MAC Address         : 00-50-40-3C-77-81
MAC Address Number  : 31

Five seconds - 20 %      One minute - 20 %      Five minutes - 20 %
--More--
```

2.14.11 debug show cpu utilization

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

Syntax

- debug show cpu utilization

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display the information about CPU and task utilization

Example

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

```
ZEQUOxxxxRE#debug show cpu utilization
```

```
Five seconds - 22 %           One minute - 20 %           Five minutes - 20 %
```

Process Name	5Sec	1Min	5Min
tIdleTask0	78 %	80 %	80 %
bcmCNTR.0	9 %	8 %	9 %
bcmL2X.0	7 %	5 %	5 %
DDM_TIC	0 %	0 %	0 %
MAUMIB_TASK	0 %	0 %	0 %
socdmadesc.0	0 %	0 %	0 %
bcmIbodSync.0	0 %	0 %	0 %
SYS_Ctr	0 %	0 %	0 %
bcmRX	0 %	0 %	0 %
CTP	0 %	0 %	0 %
FAN Pooling	0 %	0 %	0 %
CNT_TASK	0 %	0 %	0 %
hisr1	0 %	0 %	0 %
radius_reader	0 %	0 %	0 %
OS_TIMER	0 %	0 %	0 %
GBIC_Pooling	0 %	0 %	0 %
LED_TASK	0 %	0 %	0 %
cpuprotect	0 %	0 %	0 %
--More--			

3 Interface

3.1 Interface Commands

3.1.1 clear counters

This command is used to clear counters for the specified interfaces.

Syntax

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

Parameters

Parameters	description
all	Specifies to clear counters for all interfaces.
interface <i>INTERFACE-ID</i>	Specifies the interfaces to be configured. The interfaces can be physical ports, the OOB management port, port-channels or Layer 2 VLAN 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

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear counters for a physical port interface.

Example

This example shows how to clear the counters of gi1/0/1.

```
ZEQUOxxxxRE# clear counters interface gi1/0/1
ZEQUOxxxxRE#
```

3.1.2 description

This command is used to add a description to an interface. Use the **no** form of this command to delete the description.

Syntax

- description *STRING*
- no description

Parameters

Parameters	description
<i>STRING</i>	Specifies a description for an interface with a maximum of 64 characters.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The specified description corresponds to the MIB object “ifAlias” defined in the RFC 2233.

Example

This example shows how to add the description "Physical Port 10" to interface GigabitEthernet 1/0/10.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/10
ZEQUOxxxxRE(config-if)# description Physical Port 10
ZEQUOxxxxRE(config-if)#
```

3.1.3 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.

Syntax

- **interface** *INTERFACE-ID*
- **no interface** *INTERFACE-ID*

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the ID of the interface. The interface ID is formed by interface type and interface number with no spaces in between.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enter the interface configuration mode for a specific interface. The interface ID is formed by the interface type and interface number with no spaces in between.

The following keywords can be used for the supported interface types:

- **Ethernet** - Specifies the physical Ethernet switch port with all different media.
- **L2vlan** - Specifies the IEEE 802.1Q Layer 2 Virtual LAN interface.
- **Loopback** - Specifies the software only interface which always stays in the up status.
- **Null** - Specifies the null interface.
- **Port-channel** - Specifies the aggregated port-channel interface.
- **Vlan** - Specifies the VLAN 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 port does not exist. The physical port interface cannot be removed by the **no** command.

Use the **interface Vlan** command to create Layer 3 interfaces. Use the **vlan** command in the global configuration mode to create a VLAN before creating Layer 3 interfaces. Use the **no interface Vlan** command to remove a Layer 3 interface.

The port-channel interface is automatically created when the **channel-group** command is configured for the physical port interface. A port-channel interface will be automatically removed when no physical port interface has the **channel-group** command configured for it. Use the **no interface Port-channel** command to remove a port-channel.

For a null interface, the null0 interface is supported and can't be removed.

For a loopback interface, the **interface** command is used to create the interface or modify the interface setting. Use the **no** form of the command to remove the interface.

L2vlan and **L2vc** interface modes are only used to add descriptions to existed L2 VLANs and L2 virtual circuits. Commands **interface l2vlan** and **interface l2vc** do not create new interfaces, neither will the no forms of these commands removed existing interfaces.

Example

This example shows how to enter the interface configuration mode for the GigabitEthernet 1/0/5.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/5
ZEQUOxxxxRE(config-if)#
```

This example shows how to enter the interface configuration mode for VLAN 100.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan100
ZEQUOxxxxRE(config-if)#
```

This example shows how to enter the interface configuration mode for port-channel 3.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface port-channel3
ZEQUOxxxxRE(config-if)#
```

This example shows how to add a loopback interface 2 and then enter its interface configuration mode.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface loopback2
Switch (config-if)#
```

This example shows how to remove loopback interface 2.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# no interface loopback2
Switch (config)#
```

3.1.4 interface range

This command is used to enter the interface range configuration mode for multiple interfaces.

Syntax

- `interface range` *INTERFACE-ID* [, | -]

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the ID of the interface. The interface ID is formed by interface type and interface number with no spaces in between.
,	(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.

Command Default Level

Level: 12.

Usage Guideline

This command enters the interface configuration mode for the specified range of interfaces. Commands configured in the interface range mode, applies to interfaces in the range.

Example

This example shows how to enter the interface configuration mode for the range of ports 2/0/1 to 2/0/5: and port 3/0/3.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface range GigabitEthernet 2/0/1-5, 3/0/3
ZEQUOxxxxRE(config-if-range) #
```

3.1.5 show counters

This command is used to display interface information.

Syntax

- show counters [interface *INTERFACE-ID*]

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	(Optional) Specifies that the interface can be a physical port, port channel or VLAN interfaces. If no interface is specified, counters of all interfaces will be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the statistic counters for an interface.
The following items provide detail information about the display parameters of this command:

- **max-rcv-frame-size:** The maximum Ethernet frame size which is defined in **Jumbo Frame Commands**. The range is from 64 to 12288 bytes.

Example

This example shows how to display the counters for GigabitEthernet1/0/1.

```
ZEQUOxxxxRE#show counters interface gil/0/1

Gil/0/1 counters
rxHCTotalPkts           : 67004
txHCTotalPkts           : 63918
rxHCUnicastPkts         : 66026
txHCUnicastPkts         : 46199
rxHCMulticastPkts       : 383
txHCMulticastPkts       : 9848
rxHCBroadcastPkts       : 595
txHCBroadcastPkts       : 7871
rxHCOctets              : 14339916
txHCOctets              : 13420831
rxHCPkt64Octets         : 45325
rxHCPkt65to127Octets    : 1058
rxHCPkt128to255Octets   : 0
rxHCPkt256to511Octets   : 4705
rxHCPkt512to1023Octets  : 15916
rxHCPkt1024to1518Octets : 0
rxHCPkt1519to1522Octets : 0
rxHCPkt1519to2047Octets : 0
rxHCPkt2048to4095Octets : 0
rxHCPkt4096to9216Octets : 0
```

```

txHCPkt64Octets           : 6347
txHCPkt65to127Octets      : 21566
txHCPkt128to255Octets     : 27683
txHCPkt256to511Octets     : 5822
txHCPkt512to1023Octets    : 270
txHCPkt1024to1518Octets   : 2230
txHCPkt1519to1522Octets   : 0
txHCPkt1519to2047Octets   : 0
txHCPkt2048to4095Octets   : 0
txHCPkt4096to9216Octets   : 0

rxCRCErrors               : 0
rxUndersizedPkts          : 0
rxOversizedPkts           : 0
rxFragmentPkts            : 0
rxjabbers                 : 0
rxSymbolErrors             : 0

txCollisions               : 0
ifInErrors                 : 0
ifOutErrors                : 0
ifInDiscards               : 0
ifOutDiscards              : 0
txCRC                      : 0

dot3StatsSingleColFrames   : 0
dot3StatsMultiColFrames    : 0
dot3StatsDeferredTransmissions : 0
dot3StatsLateCollisions    : 0
dot3StatsExcessiveCollisions : 0
dot3StatsFrameTooLongs     : 0

linkChange                 : 1

ZEQUOxxxxRE#

```

Display Parameters

Parameters	description
rxHCTotalPkts	Receive Packet Counter. Incremented for each packet received (includes bad packets, all Unicast, Broadcast, Multicast Packets, and MAC control packets).
txHCTotalPkts	Transmit Packet Counter. Incremented for each packet transmitted (including bad packets, all Unicast, Broadcast, Multicast packets and MAC control packets).
rxHCUnicastPkts	Receive Unicast Packet Counter. Incremented for each good unicast packet received.
txHCUnicastPkts	Transmit Unicast Packet Counter. Incremented for each good unicast packet transmitted.
rxHCMulticastPkts	Receive Multicast Packet Counter. Incremented for each good Multicast packet received. (Excluding MAC control packets).

Parameters	description
txHCMulticastPkts	Transmit Multicast Packet Counter. Incremented for each good Multicast packet transmitted. (Excluding MAC control frames).
rxHCBroadcastPkts	Receive Broadcast Packet Counter. Incremented for each good Broadcast packet received.
txHCBroadcastPkts	Transmit Broadcast Packet Counter. Incremented for each good Broadcast packet transmitted.
rxHCOctets	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.
txHCOctets	Transmit Byte Counter. Incremented for the bytes of packets transmitted. (Excluding framing bits but including FCS bytes).
rxHCPkt64Octets	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).
rxHCPkt65to127Octets	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).
rxHCPkt128to255Octets	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).
rxHCPkt256to511Octets	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).
rxHCPkt512to1023Octets	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).
rxHCPkt1024to1518Octets	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).
rxHCPkt1519to1522Octets	Receive 1519 to 1522 Byte Good VLAN Frame Counter. Incremented for each good VLAN (excludes FCS, Symbol, Truncated error) frame received which is 1519 to 1522 bytes in length inclusive (excluding framing bits but including FCS bytes). Counts both single and double tag frames.

Parameters	description
rxHCPkt1519to2047Octets	Receive 1519 to 2047 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame received which is 1519 to 2047 bytes in length inclusive (excluding framing bits but including FCS bytes).
rxHCPkt2048to4095Octets	Receive 2048 to 4095 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame received which is 2048 to 4095 bytes in length inclusive (excluding framing bits but including FCS bytes).
rxHCPkt4096to9216Octets	Receive 4096 to 9216 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame received which is 4096 to 9216 bytes in length inclusive (excluding framing bits but including FCS bytes).
rxHCPkt9217to16383Octets	Receive 9217 to 16383 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame received which is 9217 to 16383 bytes in length inclusive (excluding framing bits but including FCS bytes).
txHCPkt64Octets	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).
txHCPkt65to127Octets	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).
txHCPkt128to255Octets	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).
txHCPkt256to511Octets	Transmit 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).
txHCPkt512to1023Octets	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).
txHCPkt1024to1518Octets	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).

Parameters	description
txHCPkt1519to1522Octets	Transmit 1519 to 1522 Byte Good VLAN Frame Counter. Incremented for each good VLAN (excludes FCS and TX errors) frame transmitted which is 1519 to 1522 bytes in length inclusive (excluding framing bits but including FCS bytes).
txHCPkt1519to2047Octets	Transmit 1519 to 2047 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame transmitted which is 1519 to 2047 bytes in length inclusive (excluding framing bits but including FCS bytes).
txHCPkt2048to4095Octets	Transmit 2048 to 4095 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame transmitted which is 2048 to 4095 bytes in length inclusive (excluding framing bits but including FCS bytes).
txHCPkt4096to9216Octets	Transmit 4096 to 9216 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame transmitted which is 4096 to 9216 bytes in length inclusive (excluding framing bits but including FCS bytes).
txHCPkt9217to16383Octets	Transmit 9217 to 16383 Byte Frame Counter. Incremented for each good or bad (includes FCS, Symbol, Len/Type error) frame transmitted which is 9217 to 16383 bytes in length inclusive (excluding framing bits but including FCS bytes).
rxCRCErrors	Receive 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).
rxUndersizedPkts	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).
rxOversizedPkts	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). Note: Whether oversized frame could be counted is ASIC dependent. For ZEQUO series, only when the max-rcv-frame-size is not less than 1518, increased for each untagged packet received which is larger than max-rcv-frame-size and lower than max-rcv-frame-size+4 in length (including the FCS bits and excluding the frame header) and have valid FCS value.
rxFragmentPkts	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).

Parameters	description
rxJabbers	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). Note: Whether rxJabbers could be counted is ASIC dependent. For ZEQUO series, only when the max-rcv-frame-size is not less than 1518, increased for each untagged packet received which is larger than max-rcv-frame-size and lower than max-rcv-frame-size+4 in length (including the FCS bits and excluding the frame header) 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).
rxSymbolErrors	Receive Code Error Frame Counter. Incremented for the count of times where there was an invalid data symbol when a valid carrier was present.
txCollisions	Transmit Total Collision Counter. Incremented by the total number of collisions experienced during the transmission.
ifInErrors	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 dot3StatsInternalReceiveError.
ifOutErrors	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.
ifInDiscards	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.
ifOutDiscards	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.
txCRC	Transmit FCS Error Packet Counter. Incremented for each frame transmitted which does not pass the FCS check.
dot3StatsSingleColFrames	Transmit Single Collision Frame Counter. 10/100 mode only—incremented for each frame transmitted which experienced exactly one collision during transmission.

Parameters	description
dot3StatsMultiColFrames	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.
dot3StatsDeferredTransmissions	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.
dot3StatsLateCollisions	Transmit Late Collision Frame Counter. 10/100 mode only—incremented for each frame transmitted which experienced a late collision during a transmission attempt.
dot3StatsExcessiveCollisions	Transmit Excessive Collision Frame Counter. 10/100 mode only—incremented for each frame transmitted for which transmission fails due to excessive collisions.
dot3StatsFrameTooLongs	Receive Frame Too Long Counter. Incremented for each frame received which exceeds the max-rcv-frame-size.

3.1.6 show interfaces

This command is used to display the interface information.

Syntax

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

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies that the interface can be a physical port, VLAN, loopback interface, or other.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If no interface was specified, all existing interfaces will be displayed.

Example

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

```
ZEQUOxxxxRE#show interfaces vlan 1
```

```
vlan1 is enabled, Link status is up
  Interface type: VLAN
  MAC address: 00-50-40-xx-xx-xx
```

```
ZEQUOxxxxRE#
```

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

```
ZEQUOxxxxRE# show interfaces loopback1
```

```
loopback1 is enabled, link status is up
Interface type: Loopback
```

```
ZEQUOxxxxRE#
```

This example shows how to display the NULL interface information for interface null0.

```
ZEQUOxxxxRE# show interfaces null0
```

```
Null0 is enabled, link status is up
Interface type: Null
```

```
ZEQUOxxxxRE#
```

This example shows how to display the interface information for GigabitEthernet 1/0/1.

```
ZEQUOxxxxRE#show interfaces gil/0/1

Gil/0/1 is enabled link status is up
  Interface type: 1000BASE-T
  Interface description:
  MAC Address: 00-50-40-xx-xx-xx
  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: 1518 bytes
  RX rate: 0 bits/sec, TX rate: 0 bits/sec
  RX bytes: 66544, TX bytes: 462219
  RX rate: 0 packets/sec, TX rate: 0 packets/sec
  RX packets: 509, TX packets: 3217
  RX multicast: 44, RX broadcast: 428
  RX CRC error: 0, RX undersize: 0
  RX oversize: 0, RX fragment: 0
  RX jabber: 0, RX dropped Pkts: 0
  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

ZEQUOxxxxRE#
```

3.1.7 show interfaces counters

This command is used to display counters on specified interfaces.

Syntax

- show interfaces [*INTERFACE-ID* [, | -]] counters [errors | history { 15_minute [slot 1-5] | 1_day [slot 1-2]}}

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies that the interface can be a physical port or VLAN interfaces. If no interface is specified, the counters on 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.
errors	(Optional) Specifies to display the error counters.

Parameters	description
history	(Optional) Specifies to display the history counters. If this parameter is specified, the historical statistics counters will not be displayed.
15_minute	(Optional) Specifies to display the 15-minute-based statistics count.
1_day	(Optional) Specifies to display the daily-based statistics count.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command allows the user to display general, error or historical statistics counters for the specified or all interfaces.

Example

This example shows how to display switch port RX counters on GigabitEthernet1/0/1 to 1/0/2.

```
ZEQUOxxxxRE#show interfaces gil/0/1-2 counters
```

Port	InOctets / InUcastPkts	InMcastPkts / InBcastPkts

Gil/0/1	42651	43
	71	474
Gil/0/2	0	0
	0	0
Port	OutOctets / OutUcastPkts	OutMcastPkts / OutBcastPkts

Gil/0/1	29789	0
	61	0
Gil/0/2	0	0
	0	0

Total Entries:2

```
ZEQUOxxxxRE#
```

This example shows how to display switch ports error counters.

```
ZEQUOxxxxRE#show interfaces gil/0/1,1/0/3 counters errors
```

Port	Undersize / Rcv-Err / Xmit-Err	Fcs-Err / InDiscard / OutDiscard

Gil/0/1	0	0
	0	100
	0	0
Gil/0/3	0	0
	0	0
	0	0
Port	Single-Col / Multi-Col / DeferredTx	Excess-Col / Late-Col / Symbol-Err

Gil/0/1	0	0
	0	0
	0	0
Gil/0/3	0	0
	0	0
	0	0

Total Entries:2

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
UnderSize	refer to the item "rxUndersizedPkts" in Display Parameters in the show counters command.
Rcv-Err	refer to the item "ifInErrors" in Display Parameters in the show counters command.
Xmit-Err	refer to the item "ifOutErrors" in Display Parameters in the show counters command.
Fcs-Err	refer to the item "dot3StatsFCSErrors" in Display Parameters in the show counters command.
InDiscard	refer to the item "ifInDiscards" in Display Parameters in the show counters command.
OutDiscard	refer to the item "ifOutDiscards" in Display Parameters in the show counters command.
Single-Col	refer to the item "dot3StatsSingleColFrames" in Display Parameters in the show counters command.
Multi-Col	refer to the item "dot3StatsMultiColFrames" in Display Parameters in the show counters command.
DeferredTx	refer to the item "txDelayExceededDiscards" in Display Parameters in the show counters command.
Excess-Col	refer to the item "dot3StatsExcessiveCollisions" in Display Parameters in the show counters command.
Late-Col	refer to the item "dot3StatsLateCollisions" in Display Parameters in the show counters command.
Symbol-Err	refer to the item "rxSymbolErrors" in Display Parameters in the show counters command.

3.1.8 show interfaces status

This command is used to display the Switch's port connection status.

Syntax

- show interfaces [*INTERFACE-ID* [, | -]] status

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface ID. If no interface is specified, the connection status of all switch ports will be displayed.

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

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the Switch's port connection status.

Example

This example shows how to display the Switch's port connection status.

```
ZEQUOxxxxRE#show interfaces status
```

Port	Status	VLAN	Duplex	Speed	Type
Gi1/0/1	connected	1	a-full	a-100	1000BASE-T
Gi1/0/2	not-connected	1	auto	auto	1000BASE-T
Gi1/0/3	not-connected	1	auto	auto	1000BASE-T
Gi1/0/4	not-connected	1	auto	auto	1000BASE-T
Gi1/0/5	not-connected	1	auto	auto	1000BASE-T
Gi1/0/6	not-connected	1	auto	auto	1000BASE-T
Gi1/0/7	not-connected	1	auto	auto	1000BASE-T
Gi1/0/8	not-connected	1	auto	auto	1000BASE-T
Gi1/0/9	not-connected	1	auto	auto	1000BASE-T
Gi1/0/10	not-connected	1	auto	auto	1000BASE-T
Gi1/0/11	not-connected	1	auto	auto	1000BASE-T
Gi1/0/12	not-connected	1	auto	auto	1000BASE-T
Gi1/0/13	not-connected	1	auto	auto	1000BASE-T
Gi1/0/14	not-connected	1	auto	auto	1000BASE-T
Gi1/0/15	not-connected	1	auto	auto	1000BASE-T
Gi1/0/16	not-connected	1	auto	auto	1000BASE-T
Gi1/0/17	not-connected	1	auto	auto	1000BASE-T
Gi1/0/18	not-connected	1	auto	auto	1000BASE-T
Gi1/0/19	not-connected	1	auto	auto	1000BASE-T
Gi1/0/20	not-connected	1	auto	auto	1000BASE-T
Gi1/0/21(c)	not-connected	1	auto	auto	1000BASE-T
Gi1/0/21(f)	not-connected	1	auto	auto	1000BASE-T
Gi1/0/22(c)	not-connected	1	auto	auto	1000BASE-T
Gi1/0/22(f)	not-connected	1	auto	auto	1000BASE-T
Gi1/0/23(c)	not-connected	1	auto	auto	1000BASE-T
Gi1/0/23(f)	not-connected	1	auto	auto	1000BASE-T
Gi1/0/24(c)	not-connected	1	auto	auto	1000BASE-T
Gi1/0/24(f)	not-connected	1	auto	auto	1000BASE-T
Gi1/0/25	not-connected	1	auto	auto	10GBASE-R
Gi1/0/26	not-connected	1	auto	auto	10GBASE-R
Gi1/0/27	not-connected	1	auto	auto	10GBASE-R
Gi1/0/28	not-connected	1	auto	auto	10GBASE-R

Total Entries: 28

```
ZEQUOxxxxRE#
```

3.1.9 show interfaces utilization

This command is used to display the Switch's port utilization.

Syntax

- show interfaces [*INTERFACE-ID* [, | -]] utilization [history { 15_minute [slot 1-5] | 1_day [slot 1-2] }]

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface ID. 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.
utilization	(Optional) Specifies to display the utilization information.
history	(Optional) Specifies to display the historical interfaces utilization information. If this parameter is specified, the historical utilization for interfaces will not be displayed.
15_minute	(Optional) Specifies to display the 15-minute-based statistics count.
1_day	(Optional) Specifies to display the daily-based statistics count.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

The command allows the user not only to view the utilization for all interfaces or specified interfaces, but also to view the Switch historical CPU and Memory utilization.

A particular rate statistics of a port-channel is the sum of all physical member port interface rate for that port-channel. For example, physical port interfaces, GigabitEthernet1/0/1 to GigabitEthernet1/0/4, belong to the same port-channel, the RX rate (packets per second) of each port is 100, 200, 200, 100. As a result, the CRC error packets of the port-channel is 600 packets per second.

For the historical utilization statistics, there are two kinds of statistics offered, 15-minute based and 1-day based. For statistics based on 15-minute, slot 1 represents the time from 15 minutes ago until now, slot 2 represents the time from 30 minutes ago until 15 minutes ago and so on. For statistics based on 1-day, the slot 1 represents the time from 24 hours ago until now and slot 2 represents the time from 48 hours ago until 24 hours ago.

Example

This example shows how to display the Switch's port utilization.

```
ZEQUOxxxxRE#show interfaces utilization
```

Port	TX packets/sec	RX packets/sec	Utilization
-----	-----	-----	-----
Gi1/0/1	0	0	0
Gi1/0/2	0	0	0
Gi1/0/3	0	0	0
Gi1/0/4	0	0	0
Gi1/0/5	0	0	0
Gi1/0/6	0	0	0
Gi1/0/7	0	0	0
Gi1/0/8	0	0	0
Gi1/0/9	0	0	0
Gi1/0/10	0	0	0
Gi1/0/11	0	0	0
Gi1/0/12	0	0	0
Gi1/0/13	0	0	0
Gi1/0/14	0	0	0
Gi1/0/15	0	0	0
Gi1/0/16	0	0	0
Gi1/0/17	0	0	0
Gi1/0/18	0	0	0
Gi1/0/19	0	0	0
Gi1/0/20	0	0	0
Gi1/0/21	0	0	0
--More--			

3.1.10 show interfaces fiber_module

This command is used to display fiber module status information.

Syntax

- show interfaces [*INTERFACE-ID* [, | -]] fiber_module

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface ID. If no interface is specified, the fiber module status information on all fiber module interfaces will be displayed.

Parameters	description
,	(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.
fiber_module	Specifies to display fiber module status information.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays fiber module status information.

Example

This example shows how to display fiber module status information.

```
ZEQUOxxxxRE#show interfaces gil1/0/21 fiber_module
```

```
Gil1/0/21
  Interface Type: 1000BASE-X
  Laser Identifier: SFP
  Connector Type: LC
  Ethernet Compliance Code: 1000BASE-SX
  Encoding: 8B/10B
  Vendor Name: Panasonic
  Vendor OUI: 00:50:40
  Vendor PN: xxxxxx
  Vendor Rev: 0000
  Vendor SN: xxxxxxxxxxxx
  Date Code: xxxxxx
  Received Power Measurements Type: Average Power
  Compatibility: Multi-Mode,1300Mbd, 850nm
  Transfer Distance:
    50/125 um OM2 fiber: 550m
    62.5/125 um OM1 fiber: 300m
```

```
ZEQUOxxxxRE#
```

3.1.11 show interfaces auto-negotiation

This command is used to display detailed auto-negotiation information of physical port interfaces.

Syntax

- **show interfaces** [*INTERFACE-ID* [, | -]] **auto-negotiation**

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface ID. 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.
auto-negotiation	Specifies to display detailed auto-negotiation information.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the auto-negotiation information.

Example

This example shows how to display auto-negotiation information.

```
ZEQUOxxxxRE#show interfaces gil/0/1 auto-negotiation

Gil/0/1
Auto Negotiation: Enabled

Remote Signaling: Not detected
Configure Status: Complete
Capability Bits: 10M_Full, 100M_Full, 1000M_Full
Capability Advertised Bits: 10M_Full, 100M_Full, 1000M_Full
Capability Received Bits: 10M_Half, 10M_Full, 100M_Half, 100M_Full, 1000M_Half, 1000M_Full
RemoteFaultAdvertised: Disabled
RemoteFaultReceived: NoError

ZEQUOxxxxRE#
```

3.1.12 show interfaces description

This command is used to display the description and link status of interfaces.

Syntax

- show interfaces [*INTERFACE-ID* [, | -]] description

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface ID. If no interface is specified, then information related to 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.
description	Specifies to display the description and link status of interfaces.

Default

None.

Command Mode

User/Privileged EXEC Mode.
Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the description and link status of interfaces.

Example

This example shows how to display the description and link status of interfaces.

```
ZEQUOxxxxRE#show interfaces description
```

Interface	Status	Administrative	Description
-----	-----	-----	-----
Gi1/0/1	up	enabled	
Gi1/0/2	down	enabled	
Gi1/0/3	down	enabled	
Gi1/0/4	down	enabled	
Gi1/0/5	down	enabled	
Gi1/0/6	down	enabled	
Gi1/0/7	down	enabled	
Gi1/0/8	down	enabled	
Gi1/0/9	down	enabled	
Gi1/0/10	down	enabled	Pysical Port 10
Gi1/0/11	down	enabled	
Gi1/0/12	down	enabled	
Gi1/0/13	down	enabled	
Gi1/0/14	down	enabled	
Gi1/0/15	down	enabled	
Gi1/0/16	down	enabled	
Gi1/0/17	down	enabled	
Gi1/0/18	down	enabled	
Gi1/0/19	down	enabled	
Gi1/0/20	down	enabled	
Gi1/0/21	down	enabled	
--More--			

3.1.13 shutdown

This command is used to disable an interface. Use the **no** form of this command to enable an interface.

Syntax

- shutdown
- no shutdown

Parameters

None.

Default

By default, this option is **no shutdown**.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The Physical port, loopback, VLAN, tunnel, and management interfaces are valid for this configuration. This command is also configurable for port channel member ports.

The command will cause the port to enter the disabled state. Under the disabled state, the port will not be able to receive or transmit any packets. Using the **no shutdown** command will put the port back into the enabled state. When a port is shut down, the link status will also be turned off.

Example

This example shows how to enter the shutdown command to disable the port state of interface port 1/0/1.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil0/1
ZEQUOxxxxRE(config-if)#shutdown
ZEQUOxxxxRE(config-if)#
```

3.2 Switch Port Commands

3.2.1 duplex

This command is used to configure the physical port interface's duplex setting. Use the **no** form of this command to revert to the default settings.

Syntax

- `duplex {full | auto} [rj45 | sfp]`
- `no duplex [rj45 | sfp]`

Parameters

Parameters	description
full	Specifies that the port operates in the full-duplex mode.
auto	Specifies that the port's duplex mode will be determined by auto-negotiation.
rj45	(Optional) Specifies to configure the duplex for RJ45 media. For combo ports, if RJ45 or SFP is not specified, RJ45 is implied.
sfp	(Optional) Specifies to configure the duplex for SFP media.

Default

The duplex mode will be set as automatic for 100BASE-TX and 1000BASE-T interfaces.

The duplex mode will be set as full for 100BASE-FX and 1000BASE-SX/LX interfaces.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

100BASE-FX is always set at the speed of 10 Mbps and full-duplex. 1000BASE-SX/LX is always set at the speed of 100 Mbps and full-duplex.

For 100BASE-FX and 1000BASE-SX/LX modules, this command cannot take effect.

Auto-negotiation will be enabled if either the speed parameter is set to auto or the duplex parameter is set to auto if the speed parameter is set to auto and the duplex parameter is set to the fixed mode only the speed will be negotiated. The advertised capability will be configured to the duplex mode combined with all the possible speeds. If the speed is to set to a fixed speed and duplex is set to auto, only the duplex mode is negotiated.

Example

This example shows how to configure the GigabitEthernet1/0/1 to operate at a forced speed of 100Mbps and specifies that the duplex mode should be set to auto-negotiated.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# speed 100
ZEQUOxxxxRE(config-if)# duplex auto
ZEQUOxxxxRE(config-if)#
```

3.2.2 flowcontrol

This command is used to configure the flow control capability of the port interface. Use the **no** form of this command to revert to the default setting.

Syntax

- flowcontrol {on | off}
- no flowcontrol

Parameters

Parameters	description
on	Specifies to enable a port to send PAUSE frames or process PAUSE frames from remote ports.
off	Specifies to disable the ability for a port to send or receive PAUSE frames.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command can only assure that the flow control capability has been configured in the Switch software and not guarantee the actual hardware operation. The actual hardware operation may be different to the settings that have been configured on the Switch because the flow control capability is determined by both the local port/device and the device connected at the other end of the link, not just by the local device.

If the speed is set to the forced mode, the final flow control setting will be determined by the configured flow control setting. If the speed is set to the auto mode, the final flow control setting will be based on the negotiated result between the local side setting and the partner side setting. The configured flow control setting here is the local side setting.

This command does not work through Switches that are physically stacked.

Example

This example shows how to enable the flow control on GigabitEthernet 1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# flowcontrol on
ZEQUOxxxxRE(config-if)#
```

3.2.3 media-type

This command is used to configure the media of a combo port that is selected for connection. Use the **no** form of this command to revert to the default settings.

Syntax

- **media-type** { auto-select | rj45 | sfp }
- **no media-type**

Parameters

Parameters	description
auto-select	Specifies that the media is selected based on the user's connection.
rj45	Specifies to use RJ45 media for the connection, and SFP is disabled.
sfp	Specifies to use SFP media for the connection, and RJ45 is disabled.

Default

By default, this option is **auto-select**.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for the combo ports.

Example

This example shows how to configure the media type for interface GigabitEthernet 1/0/21 to sfp.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/21
ZEQUOxxxxRE(config-if)#media-type sfp
ZEQUOxxxxRE(config-if)#
```

3.2.4 mdix

This command is used to configure the port Media-Dependent Interface Crossover (MDIX) state. Use the **no** form of this command to revert to the default setting.

Syntax

- mdix {auto | normal | cross}

- no mdix

Parameters

Parameters	description
auto	Specifies to set the port interface's MDIX state to the auto-MDIX mode.
normal	Specifies to force the port interface's MDIX state to the normal mode.
cross	Specifies to force the port interface's MDIX state to the cross mode.

Default

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

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command cannot be applied to a port when the medium of the port interface is fiber.

Example

This example shows how to configure the MDIX state of interface GigabitEthernet 1/0/1 to auto:

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)#interface gil/0/1
ZEQUOxxxxRE(config-if)#mdix auto
ZEQUOxxxxRE(config-if)#
```

3.2.5 speed

This command is used to configure the physical port interface's speed settings. Use the **no** form of this command to revert to the default setting.

NOTE 10G does not support speed configurations of 10Mbps and 100Mbps.

Syntax

- speed { 10 | 100 | 1000 [master | slave] | 10giga [master | slave] | 40giga | auto [SPEED-LIST] } [rj45 | sfp]
- no speed [rj45 | sfp]

Parameters

Parameters	description
10	Specifies to force the speed to 10Mbps.
100	Specifies to force the speed to 100Mbps.
1000	Specifies that for copper ports, it forces the speed to 1000Mbps and the user must manually set that the port operates as master or slave. Specifies that for fiber ports (1000BASE-SX/LX), the port will disable the auto-negotiation.
master slave	Specifies the port operates as master or slave timing. This parameter is only applicable to 1000BASE-T connections.
10giga	Specifies to force the speed to 10Gbps.
master slave	Specifies the port operates as master or slave timing. This parameter is only applicable to 10GBASE-T connections.
auto	Specifies that for copper ports, it specifies to determine the speed and flow control via auto-negotiation with its link partner. Specifies that for fiber ports (1000BASE-SX/LX), it enables the auto-negotiation option. Auto-negotiation will start to negotiate the clock and flow control with its link partner.
SPEED-LIST	(Optional) Specifies a list of speeds that the Switch will only auto-negotiate to. The speed can be 1000 , and/or 10giga . Use a comma (,) to separate multiple speeds. If the speed list is not specified, all speed will be advertised.
rj45	(Optional) Specifies to configure speed for RJ45 media. For combo ports, if RJ45 or SFP/SFP+ is not specified, RJ45 is used.
sfp	(Optional) Specifies to configure speed for SFP/SFP+ media.

Default

The speed is automatic for 100BASE-TX, 1000BASE-T and 10GBASE-T interfaces.
The speed is fixed to 100Mbps for 100BASE-FX interfaces.
The speed is fixed to 1000Mbps for 1000BASE-SX/LX interfaces.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If the specified speed is not supported by the hardware, error messages will be returned. For the 100BASE-FX modules, the speed is always fixed at 100Mbps, full duplex, and no-negotiation. No command can change the settings. For the 1000BASE-SX/LX modules, the speed is always fixed to 1000Mbps and full duplex, and only the **speed 1000** and **speed auto** commands are valid. For a 1000BASE-T connection, if the speed is specified to 1000Mbps, the port must be configured as master or slave. For a 10GBASE-T connection, if the speed is specified to 10Gbps, the port must be configured as master or slave.

Auto-negotiation will be enabled if either the speed parameter is set to **auto**, or the duplex parameter is set to **auto**. If the speed parameter is set to auto, and the duplex parameter is set to the fixed mode. Only the speed will be negotiated. The advertised capability will be configured to the duplex mode combined with all the possible speeds. If the speed is to set to a fixed speed and duplex is set to auto, only the duplex mode is negotiated.

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 GigabitEthernet 1/0/1 to only auto-negotiate to 10Mbps or 100Mbps.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# speed auto 10,100
ZEQUOxxxxRE(config-if)#
```

3.3 Jumbo Frame Commands

3.3.1 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.

Syntax

- **max-rcv-frame-size** *BYTES*
- **no max-rcv-frame-size**

Parameters

Parameters	description
<i>BYTES</i>	Specifies the maximum Ethernet frame size allowed. The range is from 64 to 9216 bytes.

Default

By default, this value is 1518 bytes.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical ports configuration. Oversize frames will be dropped and checks are carried out on ingress ports. Use this command to transfer large frames or jumbo frames through the Switch 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 1/0/3.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/3
ZEQUOxxxxRE(config-if)#max-rcv-frame-size 6000
ZEQUOxxxxRE(config-if)#
```

3.4 Power Saving Commands

3.4.1 line power-saving

This command is used to configure the power-saving mode for ports. The power saving mode is our unique function for automatically detecting the port connection status and minimizing power consumption if not connected. This Switching Hub supports two modes: the Half mode for giving priority to connectivity with other device, and the Full mode for minimizing power consumption.

Syntax

- **line power-saving {disable | full | half}**

Parameters

Parameters	description
disable	Specifies to disable the power saving function.
half	Specifies to fully enable the power saving function.
full	Specifies to enable the power saving function between disable and full.

Default

By default, this option is disable.

Command Mode

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

This command is used to enable or disable the power saving function.

Example

This example shows how to enable power saving on Gigabit Ethernet ports 1/0/1-2.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface range gil/0/1-2
ZEQUOxxxxRE(config-if-range)#line power-saving full
ZEQUOxxxxRE(config-if-range)#
```

3.4.2 line eee

This command is used to configure the Energy-Efficient Ethernet (EEE) function for specified ports. Use the no form of this command to revert to the default setting. The EEE power-saving mode saves power consumption while a link is up when there is low utilization of packet traffic.

Syntax

line eee

- **no line eee**

Parameters

None

Default

By default, this option is enabled.

And, the copper port(RJ45 port) is valid for this command.

Command Mode

Interface Configuration Mode

Command Default Level

Level : 12

Usage Guideline

This command is only available for physical port interface configuration.

The physical interface will enter into a Low Power Idle (LPI) mode when there is no data to be transmitted. In order to use EEE, the opposite port must also be EEE compliant.

Example

This example shows how to enable the EEE power saving function.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/1
ZEQUOxxxxRE(config-if)#line eee
ZEQUOxxxxRE(config-if)#
```

3.4.3 show line configuration

This command is used to display the line configuration information.

Syntax

- **show line configuration**

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level : 1

Usage Guideline

This command is used to display the line configuration information.

Example

This example shows how to display the line configuration information.

```
ZEQUOxxxxRE#show line configuration
```

Interface	Link	Type	Mode	Power-saving	EEE
-----	-----	-----	-----	-----	-----
Gil/0/1	Up	1000T	Auto (100F)	Full	Enabled
Gil/0/2	Down	1000T	Auto	Full	Enabled
Gil/0/3	Up	1000T	Auto (100F)	Disabled	Enabled
Gil/0/4	Down	1000T	Auto	Disabled	Enabled
Gil/0/5	Down	1000T	Auto	Disabled	Enabled
Gil/0/6	Down	1000T	Auto	Disabled	Enabled
Gil/0/7	Down	1000T	Auto	Disabled	Enabled
Gil/0/8	Down	1000T	Auto	Disabled	Enabled
Gil/0/9	Down	1000T	Auto	Disabled	Enabled
Gil/0/10	Down	1000T	Auto	Disabled	Enabled
Gil/0/11	Down	1000T	Auto	Disabled	Enabled
Gil/0/12	Down	1000T	Auto	Disabled	Enabled
Gil/0/13	Down	1000T	Auto	Disabled	Enabled
Gil/0/14	Down	1000T	Auto	Disabled	Enabled
Gil/0/15	Down	1000T	Auto	Disabled	Enabled
Gil/0/16	Down	1000T	Auto	Disabled	Enabled
Gil/0/17	Down	1000T	Auto	Disabled	Enabled
Gil/0/18	Down	1000T	Auto	Disabled	Enabled
Gil/0/19	Down	1000T	Auto	Disabled	Enabled
Gil/0/20	Down	1000T	Auto	Disabled	Enabled
Gil/0/21	Down	1000T	Auto	Disabled	Enabled
--More--					

3.5 Error Disable Commands

3.5.1 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 revert to the default setting for causes.

Syntax

- errdisable recovery cause {all | psecure-violation | storm-control | bpdu-protect | arp-rate | dhcp-rate | loopback-detect | l2pt-guard | duld} [interval *SECONDS*]
- no errdisable recovery cause {all | psecure-violation | storm-control | bpdu-protect | arp-rate | dhcp-rate | loopback-detect | l2pt-guard | duld} [interval *SECONDS*]

Parameters

Parameters	description
all	Specifies to enable the auto-recovery option for all causes.
arp-rate	Specifies to enable the auto-recovery option for an error port caused by ARP rate limiting.
bpdu-protect	Specifies to enable the auto-recovery option for an error port caused by BPDU guard.
dhcp-rate	Specifies to enable the auto-recovery option for an error port caused by DHCP rate limiting.
l2pt-guard	Specifies to enable the auto-recovery option for an error port caused by L2PT guard.
psecure-violation	Specifies to enable the auto-recovery option for an error port caused by port security violation.
storm-control	Specifies to enable the auto-recovery option for an error port caused by storm control.
Udld	Specifies to enable the auto-recovery option for an error port caused by Unidirectional Link Detection (UDLD).
interval <i>SECONDS</i>	(Optional) Specifies the time, in seconds, to recover the port from the error state caused by the specified module. The valid value is 5 to 86400. The default value is 300 seconds.

Default

Auto-recovery is disabled for all causes.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A port can be put in an error disabled state by causes such as port security violations, storm control and so on. When a port enters the error disabled state, the port is shutdown although the setting running the configuration remains in the no shutdown state.

There are two ways to recover an error disabled port. Administrators can use the **errdisable recovery cause** command to enable the auto-recovery of error ports disabled by each cause. Alternatively, administrators can manually recover the port by entering the **shutdown** command first and then the **no shutdown** command for the port.

Example

This example shows how to set the recovery timer to 200 seconds for port security violation.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# errdisable recovery cause psecure-violation interval 200
ZEQUOxxxxRE(config)#
```

This example shows how to enable the auto-recovery option for port security violations.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# errdisable recovery cause psecure-violation
ZEQUOxxxxRE(config)#
```

3.5.2 show errdisable recovery

This command is used to display the error-disable recovery timer related settings.

Syntax

- show errdisable recovery

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to verify the settings of the error disable recovery timer.

Example

This example shows how to display the settings of the error disable recovery timer.

```
ZEQUOxxxxRE# show errdisable recovery
```

ErrDisable Cause	State	Interval
Port Security	enabled	120 seconds
Storm Control	enabled	120 seconds
BPDU Attack Protection	disabled	120 seconds
Dynamic ARP Inspection	enabled	120 seconds
DHCP Snooping	enabled	120 seconds
L2pt-guard	disabled	300 seconds
Unidirectional Link Detection	disabled	300 seconds

Interfaces that will be recovered at the next timeout:

Interface	ErrDisable Cause	Time left(sec)
Gil/0/7	BPDU Attack Protection	infinite

```
ZEQUOxxxxRE#
```

3.6 Port Security Commands

3.6.1 clear port-security

This command is used to delete the auto-learned secured MAC addresses.

Syntax

- clear port-security {all | {address *MAC-ADDR* | interface *INTERFACE-ID* [, | -]} [vlan *VLAN-ID*]}

Parameters

Parameters	description
all	Specifies to delete all auto-learned secured entries.
address <i>MAC-ADDR</i>	Specifies to delete the specified auto -learned secured entry based on the MAC address entered.
interface <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.
vlan <i>VLAN-ID</i>	Specifies to delete the auto-learned secured entry learned with the specified VLAN.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command clears auto-learned secured entries, either dynamic or permanent.

Example

This example shows how to remove a specific secure address from the MAC address table.

```
ZEQUOxxxxRE# clear port-security address 0080.0070.0007
ZEQUOxxxxRE#
```

3.6.2 show port-security

This command is used to display the current port security settings.

Syntax

- show port-security [[interface *INTERFACE-ID* [, | -]] [address] | vlan *VLAN-ID* [, | -]]

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	(Optional) Specifies the ID of the interface 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.
address	(Optional) Specifies to display all the secure MAC addresses, including both configured and learned entries.
vlan <i>VLAN-ID</i>	(Optional) Specifies to display port security settings for the VLAN.
.	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the current port security settings.

Example

This example shows how to display the port security settings of interfaces GigabitEthernet1/0/1 to 1/0/3.

```
ZEQUOxxxxRE#show port-security interface gil/0/1-3
```

Interface No.	Max No.	Curr No.	D:Delete-on-Timeout P:Permanent Violation Act.	Violation Count	Security Mode	Admin State	Current State
Gil/0/1	32	0	Protect -		D	Disabled	-
Gil/0/2	32	0	Shutdown 0		D	Enabled	Err-disabled
Gil/0/3	32	0	Shutdown 0		P	Disabled	-

```
ZEQUOxxxxRE#
```

3.6.3 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.

Syntax

- snmp-server enable traps port-security [trap-rate *TRAP-RATE*]
- no snmp-server enable traps port-security [trap-rate]

Parameters

Parameters	description
trap-rate <i>TRAP-RATE</i>	(Optional) Specifies the number of traps to send per second. The range is from 0 to 1000. The default value of 31 indicates that an SNMP trap is to be generated for every security violation.

Default

By default, this feature is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enable or disable the sending of SNMP notifications for port security address violations.

Example

This example shows how to enable the sending of traps for port security address violations and set the number of traps per second to 3.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server enable traps port-security
ZEQUOxxxxRE(config)# snmp-server enable traps port-security trap-rate 3
ZEQUOxxxxRE(config)#
```

3.6.4 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.

Syntax

- **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

Parameters	description
maximum <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 1 to 3328.
protect	(Optional) Specifies to drop all packets from the insecure hosts at the port-security process level, but does not increment the security-violation count.
restrict	(Optional) Specifies to drop all packets from the insecure hosts at the port-security process level and increments the security-violation count and record the system log.
shutdown	(Optional) Specifies to shut down the port if there is a security violation and record the system log.
permanent	(Optional) Specifies that under this mode, all learned MAC addresses will not be purged out unless the user manually deletes those entries.
delete-on-timeout	(Optional) Specifies that under this mode, all learned MAC addresses will be purged out when an entry is aged out or when the user manually deletes these entries.
mac-address <i>MAC-ADDRESS</i>	(Optional) Specifies to add a secure MAC address to gain port access rights.
permanent	(Optional) Specifies to set the secure permanent configured MAC address of the port. This entry is same as the one learnt under the permanent mode.
vlan <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.

Command Default Level

Level: 12.

Usage Guideline

When port security is enabled, if the port mode is configured as **delete-on-timeout**, the port will automatically learn the dynamic secured entry which will be timed out. These entries will be aged out based on the setting specified by the **switchport port-security aging** command. If the port mode is permanent, the port will automatically learn permanent secured entries which will not be timed out. The auto-learned permanent secured entry will be stored in the running configuration.

As the port mode-security state is changed, the violation counts will be cleared, and the auto-permanent entries will be converted to corresponding dynamic entries. As the port-security state is changed to disabled, the auto-learned secured entries, either dynamic or permanent with its violation counts are cleared. As the related VLAN configuration is changed, the auto-learned dynamic secured entries are cleared.

Permanent secured entry will be kept in the running configuration and can be stored to the NVRAM by using the **copy** command. The user configured secure MAC addresses are counted in the maximum number of MAC addresses on a port.

As a permanent secured entry of a port security enabled port, the MAC address cannot be moved to another port.

When the maximum setting is changed, the learned address will remain unchanged when the maximum number increases. If the maximum number is changed to a lower value which is lower than the existing entry number, the command is rejected.

A port-security enabled port has the following restrictions.

- The port security function cannot be enabled simultaneously with 802.1X, MAC (MAC-based Access Control), WAC and IMPB, that provides more advanced security capabilities.
- If a port is specified as the destination port for the mirroring function, the port security function cannot be enabled.
- If the port is a link aggregation member port, the port security function cannot be enabled.

When the maximum number of secured users is exceeded, one of the following actions can occur:

- **Protect** - When the number of port secure MAC addresses reaches the maximum number of users that is allowed on the port, the packets with the unknown source address is dropped until some secured entry is removed to release the space.
- **Restrict** - A port security violation restricts data and causes the security violation counter to increment.
- **Shutdown** - The interface is disabled, based on errors, when a security violation occurs.

Example

This example shows how to configure the port security mode to be permanent, specifying that a maximum of 5 secure MAC addresses are allowed on the port.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# switchport port-security mode permanent
ZEQUOxxxxRE(config-if)# switchport port-security maximum 5
ZEQUOxxxxRE(config-if)#
```

This example shows how to manually add the secure MAC addresses 00-00-12-34-56-78 with VID 5 at GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# switchport port-security mac-address 00-00-12-34-56-78 vlan 5
ZEQUOxxxxRE(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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# switchport port-security violation restrict
ZEQUOxxxxRE(config-if)#
```

3.6.5 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 setting.

Syntax

- switchport port-security aging {time *MINUTES* | type {absolute | inactivity}}
- no switchport port-security aging {time | type}

Parameters

Parameters	description
time <i>MINUTES</i>	Specifies the aging time for the auto-learned dynamic secured address on this port. Its range is from 1 to 1440 in minutes.
type	Specifies to set the aging type.

Parameters	description
absolute	Specifies to set absolute aging type. All the secure addresses on this port age out exactly after the time specified and is removed from the secure address list. This is the default type.
inactivity	Specifies to set the inactivity aging type. The secure addresses on this port age out only if there is no data traffic from the secure source address for the specified time period.

Default

By default, the port security aging feature is disabled.
The default time is 0 minutes.
The default aging type is **absolute**.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to disable the ageing or set the ageing time for auto-learned dynamic secured entries. In order for the inactivity setting to take effect, the FDB table ageing function must be enabled.

Example

This example shows how to apply the aging time for automatically learned secure MAC addresses for GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# switchport port-security aging time 1
ZEQUOxxxxRE(config-if)#
```

This example shows how to configure the port security aging time type for GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# switchport port-security aging type inactivity
ZEQUOxxxxRE(config-if)#
```

3.6.6 port-security limit

This command is used to configure the maximum secure MAC address number on the system or on the specified VLAN. Use the **no** form of this command to revert to the default setting.

Syntax

- `port-security limit {global | vlan VLAN-ID [, | -]} VALUE`
- `no port-security limit {global | vlan VLAN-ID [, | -]}`

Parameters

Parameters	description
global	Specifies that this setting will be applied to the system.
vlan <i>VLAN-ID</i>	Specifies the VLAN ID that will be used.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.
<i>VALUE</i>	Specifies the maximum number of port security entries that can be learned on the system or specified VLAN. 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

By default, this option is no limit.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to set the limit on the port security entry number which can be learned on a system or on VLANs.

Example

This example shows how to configure the maximum secure MAC address number for the system.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# port-security limit global 100
ZEQUOxxxxRE(config)#
```

4 L2 Switching

4.1 FDB (Filter Database) Commands

4.1.1 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.

Syntax

- `clear mac-address-table dynamic { all | address MAC-ADDR | interface INTERFACE-ID | vlan VLAN-ID }`

Parameters

Parameters	description
all	Specifies to clear all dynamic MAC addresses.
address <i>MAC-ADDR</i>	Specifies to delete the specified dynamic MAC address.
interface <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.
vlan <i>VLAN-ID</i>	Specifies the VLAN ID. The valid values are from 1 to 4094.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

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.

```
ZEQUOxxxxRE# clear mac-address-table dynamic address 00:08:00:70:00:07
ZEQUOxxxxRE#
```

4.1.2 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.

Syntax

- mac-address-table aging-time *SECONDS*
- no mac-address-table aging-time

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

Setting the aging time to 0 will disable the MAC address table aging out function.

Example

This example shows how to set the aging time value to 200 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# mac-address-table aging-time 200
ZEQUOxxxxRE(config)#
```

4.1.3 mac-address-table aging destination-hit

This command is used to enable the destination MAC address triggered update function. Use the **no** form of this command to disable the destination MAC address triggered updated function.

Syntax

- **mac-address-table aging destination-hit**
- **no mac-address-table aging destination-hit**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The source MAC address triggered update function is always enabled. The hit bit of MAC address entries corresponding to the port that receives the packet will be updated based on the source MAC address and the VLAN of the packet. When the user enables the destination MAC address triggered update function by using the **mac-address-table aging destination-hit** command, the hit bit of MAC address entries corresponding to the port that transmit the packet will be updated based on the destination MAC address and the VLAN of the packet.

The destination MAC address triggered update function increases the MAC address entries hit bit update frequency and reduce traffic flooding by the MAC address entries aging time-out.

Example

This example shows how to enable the destination MAC address triggered update function.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# mac-address-table aging destination-hit
ZEQUOxxxxRE(config)#
```

4.1.4 mac-address-table learning

This command is used to enable MAC address learning on the physical port or VLAN. Use the **no** form of this command to disable learning.

Syntax

- **mac-address-table learning interface** {vlan *VLAN-ID* [, | -] | *INTERFACE-ID* [, | -]}
- **no mac-address-table learning interface** {vlan *VLAN-ID* [, | -] | *INTERFACE-ID* [, | -]}

Parameters

Parameters	description
vlan <i>VLAN-ID</i>	Specifies the VLAN ID to be configured.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.
<i>INTERFACE-ID</i>	Specifies the physical port interface 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.

Command Default Level

Level: 12.

Usage Guideline

Use this commands to enable or disable MAC address learning on a physical port or VLAN.

The behavior of MAC addresses learning on VLAN interfaces:

By default, MAC address learning is always enabled on all VLANs on the Switch when VLAN is created. MAC address learning will be recovered to the default value when a VLAN is deleted.

MAC address learning only can be configured on the existed VLAN.

Disabling MAC address learning on a VLAN will cause all ports belong to this VLAN stop the MAC address learning.

Disabling MAC address learning on the voice or surveillance VLAN, the function will work abnormally based on MAC address learning.

Disabling MAC address learning on a VLAN will cause asymmetric VLAN work abnormally on the related VLAN.

Disabling MAC address learning on a private VLAN will cause related private VLAN work abnormally.

RSPAN VLAN has the higher precedence, and MAC address learning is always disabled on the RSPAN VLAN. If RSPAN VLAN is deleted, the configured MAC address learning state takes effect.

The MAC address learning for the secure modules such as Port Security, 802.1x, MAC-based Access Control, Web-based Access Control and IMPB has the higher precedence. If MAC address learning on a VLAN that includes a secure port is disabled, MAC address learning is not disabled on the VLAN. If all the secure ports on the VLAN are disabled, the configured MAC address learning state takes effect.

NOTE

Secure modules are port security, 802.1X, MAC-based access control, WAC, and IP-MAC-Port binding.

Example

This example shows how to enable the MAC address learning option.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# mac-address-table learning interface gi1/0/5
ZEQUOxxxxRE(config)#
```

4.1.5 mac-address-table notification change

This command is used to enable or configure the MAC address notification function. Use the **no** form of this command to disable the function or set the optional configuration to default.

Syntax

- **mac-address-table notification change** [interval *SECONDS* | history-size *VALUE*]
- **no mac-address-table notification change** [interval | history-size]

Parameters

Parameters	description
interval <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.
history-size <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.

Default

MAC address notification is disabled.
The default trap interval is 1 second.
The default number of entries in the history table is 1.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the Switch learns or removes a MAC address, a notification can be sent to the notification history table and then sent to the SNMP server if the **snmp-server enable traps mac-notification change** command is enabled. The MAC notification history table stores the MAC address learned or deleted on each interface for which the trap is enabled. Events are not generated for multicast addresses.

Example

This example shows how to enable MAC address change notification and set the interval to 10 seconds and set the history size value to 500 entries.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# mac-address-table notification change
ZEQUOxxxxRE(config)# mac-address-table notification change interval 10
ZEQUOxxxxRE(config)# mac-address-table notification change history-size 500
ZEQUOxxxxRE(config)#

```

4.1.6 mac-address-table static

This command is used to add a static address to the MAC address table. Use the **no** form of the command to remove a static MAC address entry from the table.

Syntax

- **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

Parameters	description
<i>MAC-ADDR</i>	Specifies the MAC address of the entry. The address can be a unicast or a multicast entry. Packets with a destination address that match this MAC address received by the specified VLAN are forwarded to the specified interface.
vlan <i>VLAN-ID</i>	Specifies the VLAN of the entry. The range is 1 to 4094.
interface <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.
drop	Specifies to drop the frames that are sent by or sent to the specified MAC address on the specified VLAN.
all	Specifies to remove all static MAC address entries.

Default

No static addresses are configured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

For a unicast MAC address entry, only one interface can be specified. For a multicast MAC address entry, multiple interfaces can be specified. To delete a unicast MAC address entry, there is no need to specify the interface ID. To delete a multicast MAC address entry, if an interface ID is specified, only this interface will be removed. Otherwise, the entire multicast MAC entry will be removed. The **drop** parameter can only be specified for a unicast MAC address entry.

Example

This example shows how to add the static address C2:F3:22:0A:12:F4 to the MAC address table. It also specifies that when any packet received on VLAN 4 that has a destination MAC address of C2:F3:22:0A:12:F4 will be forwarded to Gigabit Ethernet port 1/0/1.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#mac-address-table static C2:F3:22:0A:12:F4 vlan 4 interface gil/
0/1
ZEQUOxxxxRE(config)#
```

4.1.7 multicast filtering-mode

This command is used to configure the handling method for multicast packets for an interface. Use the **no** form of this command to revert to the default setting.

Syntax

- multicast filtering-mode { forward-all | forward-unregistered | filter-unregistered }
- no multicast filtering-mode

Parameters

Parameters	description
forward-all	Specifies to flood all multicast packets based on the VLAN domain.

Parameters	description
forward-unregistered	Specifies to forward registered multicast packets based on the forwarding table and flood all unregistered multicast packets based on the VLAN domain.
filter-unregistered	Specifies to forward registered packets based on the forwarding table and filter all unregistered multicast packets.

Default

By default, the **forward-unregistered** option is enabled.

Command Mode

VLAN Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This filtering mode is only applied to multicast packets that are destined for addresses other than those reserved for multicast addresses.

Example

This example shows how to set the multicast filtering mode on VLAN 100 to filter unregistered.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 100
ZEQUOxxxxRE(config-vlan)# multicast filtering-mode filter-unregistered
ZEQUOxxxxRE(config-vlan)#
```

4.1.8 show mac-address-table

This command is used to display a specific MAC address entry or the MAC address entries for a specific interface or VLAN.

Syntax

- show mac-address-table** [dynamic | static] [address *MAC-ADDR* | interface *INTERFACE-ID* | vlan *VLAN-ID*]

Parameters

Parameters	description
dynamic	(Optional) Specifies to display dynamic MAC address table entries only.
static	(Optional) Specifies to display static MAC address table entries only.
address <i>MAC-ADDR</i>	(Optional) Specifies the 48-bit MAC address.
interface <i>INTERFACE-ID</i>	(Optional) Specifies to display information for a specific interface. Valid interfaces include physical ports and port-channels.
vlan <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.

Command Default Level

Level: 1.

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 00-23-7D-BC-08-44.

```
ZEQUOxxxxRE#show mac-address-table address 00-23-7D-BC-08-44
```

VLAN	MAC Address	Type	Ports
1	00-23-7D-BC-08-44	Dynamic	Gi1/0/1

Total Entries: 1

```
ZEQUOxxxxRE#
```


This example shows how to display all the static MAC address table entries.

```
ZEQUOxxxxRE#show mac-address-table static
```

VLAN	MAC Address	Type	Ports
1	00-50-40-3C-77-81	Static	CPU
4	C2-F3-22-0A-12-F4	Static	Gi1/0/1

Total Entries: 2

```
ZEQUOxxxxRE#
```

This example shows how to display all the MAC address table entries for VLAN 1.

```
ZEQUOxxxxRE#show mac-address-table vlan 1
```

VLAN	MAC Address	Type	Ports
1	00-23-7D-BC-08-44	Dynamic	Gi1/0/1
1	00-23-7D-BC-2E-18	Dynamic	Gi1/0/1
1	00-50-40-3C-77-81	Static	CPU
1	00-FF-47-77-70-B8	Dynamic	Gi1/0/1
1	10-BF-48-D6-E2-E2	Dynamic	Gi1/0/1
1	5C-33-8E-43-B3-68	Dynamic	Gi1/0/1
1	D0-AE-EC-C4-E3-80	Dynamic	Gi1/0/1

Total Entries: 7

```
ZEQUOxxxxRE#
```

4.1.9 show mac-address-table aging-time

This command is used to display the aging time of the MAC address table.

Syntax

- show mac-address-table aging-time

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used 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.

```
ZEQUOxxxxRE# show mac-address-table aging-time
```

```
Aging Time is 300 seconds.
```

```
ZEQUOxxxxRE#
```

4.1.10 show mac-address-table learning

This command is used to display the MAC-address learning state.

Syntax

- show mac-address-table learning interface [vlan [*VLAN-ID* [, | -]] | *INTERFACE-ID* [, | -]]

Parameters

Parameters	description
<i>VLAN-ID</i>	(Optional) Specifies the VLAN ID to be displayed. If not specified, all VLANs will be displayed.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.
<i>INTERFACE-ID</i>	(Optional) Specifies the interface to be displayed.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If no optional parameter is specified, all physical ports will be displayed.

Example

This example shows how to display the MAC address learning status on port 1-10.

```
ZEQUOxxxxRE#show mac-address-table learning interface gil/0/1-10
```

Port	Status
-----	-----
Gil/0/1	Enabled
Gil/0/2	Enabled
Gil/0/3	Enabled
Gil/0/4	Enabled
Gil/0/5	Enabled
Gil/0/6	Enabled
Gil/0/7	Enabled
Gil/0/8	Enabled
Gil/0/9	Enabled
Gil/0/10	Enabled

```
ZEQUOxxxxRE#
```

4.1.11 show mac-address-table notification change

This command is used to display the MAC address notification configuration or history content.

Syntax

- `show mac-address-table notification change [interface [INTERFACE-ID] | history]`

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	(Optional) Specifies the interface to display.
history	(Optional) Specifies to display the MAC address notification change history.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If no optional parameter is specified, the global configuration will be displayed. Use the **interface** parameter without an interface ID to display information related to all interfaces. If the interface ID is included, information related to the specified interface will be displayed.

Example

This example shows how to display the MAC address notification change configuration on all interfaces.

```
ZEQUOxxxxRE#show mac-address-table notification change interface
```

Interface	Added Trap	Removed Trap
-----	-----	-----
Gil/0/1	Disabled	Disabled
Gil/0/2	Disabled	Disabled
Gil/0/3	Disabled	Disabled
Gil/0/4	Disabled	Disabled
Gil/0/5	Disabled	Disabled
Gil/0/6	Disabled	Disabled
Gil/0/7	Disabled	Disabled
Gil/0/8	Disabled	Disabled
Gil/0/9	Disabled	Disabled
Gil/0/10	Disabled	Disabled
Gil/0/11	Disabled	Disabled
Gil/0/12	Disabled	Disabled
Gil/0/13	Disabled	Disabled
Gil/0/14	Disabled	Disabled
Gil/0/15	Disabled	Disabled
Gil/0/16	Disabled	Disabled
Gil/0/17	Disabled	Disabled
Gil/0/18	Disabled	Disabled
Gil/0/19	Disabled	Disabled
Gil/0/20	Disabled	Disabled
Gil/0/21	Disabled	Disabled
--More--		

This example shows how to display the MAC address notification global configuration.

```
ZEQUOxxxxRE#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
```

```
ZEQUOxxxxRE#
```

This example shows how to display the MAC address notification history.

```
ZEQUOxxxxRE# show mac-address-table notification change history
```

```
History Index: 1
Operation:ADD Vlan: 1 MAC Address: 00-f8-d0-12-34-56 gil/0/1
History Index: 2
Operation:DEL Vlan: 1 MAC Address: 00-f8-d0-00-00-01 te1/0/26
History Index: 3
Operation:DEL Vlan: 1 MAC Address: 00-f8-d0-00-00-02 fo1/0/1
```

```
ZEQUOxxxxRE#
```

4.1.12 show multicast filtering-mode

This command is used to display the filtering mode for handling multicast packets that are received on an interface.

Syntax

- `show multicast filtering-mode [interface INTERFACE-ID]`

Parameters

Parameters	description
<code>interface <i>INTERFACE-ID</i></code>	(Optional) Specifies the VLAN to display.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If no optional parameter is specified, all existing VLAN will be displayed.

Example

This example shows how to display the multicast filtering mode configuration for all VLANs.

```
ZEQUOxxxxRE# show multicast filtering-mode
```

Interface	Layer 2 Multicast Filtering Mode
-----	-----
default	forward-unregistered

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

4.1.13 snmp-server enable traps mac-notification change

This command is used to enable the sending of SNMP MAC notification traps. Use the **no** form of this command to disable the sending of SNMP MAC notification traps.

Syntax

- snmp-server enable traps mac-notification change
- no snmp-server enable traps mac-notification change

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable the sending of SNMP MAC notification traps.

Example

This example shows how to enable the sending of SNMP MAC notification traps.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server enable traps mac-notification change
ZEQUOxxxxRE(config)#
```

4.1.14 snmp trap mac-notification change

This command is used to enable the MAC address change notification on a specific interface. Use the **no** form of this command to revert to the default setting.

Syntax

- **snmp trap mac-notification change {added | removed}**
- **no snmp trap mac-notification change{added | removed}**

Parameters

Parameters	description
added	Specifies to enable the MAC change notification when a MAC address is added on the interface.
removed	Specifies to enable the MAC change notification when a MAC address is removed from the interface.

Default

The traps for both address addition and address removal are disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Even when enabling the notification trap for a specific interface by using the **snmp trap mac-notification change** command, the notification is sent to the notification history table only when the **mac-address-table notification change** command was enabled.

Example

This example shows how to enable the MAC address added notification trap on Gigabit Ethernet port 1/0/2.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/2
ZEQUOxxxxRE(config-if)# snmp trap mac-notification change added
ZEQUOxxxxRE(config-if)#
```

4.2 Link Aggregation Control Protocol (LACP) Commands

Link aggregation is a technology to connect two switches with multiple ports and bundle them as one port. This provides path redundancy and enhanced bandwidth.

You can select how to distribute communications to bundled ports from several methods.

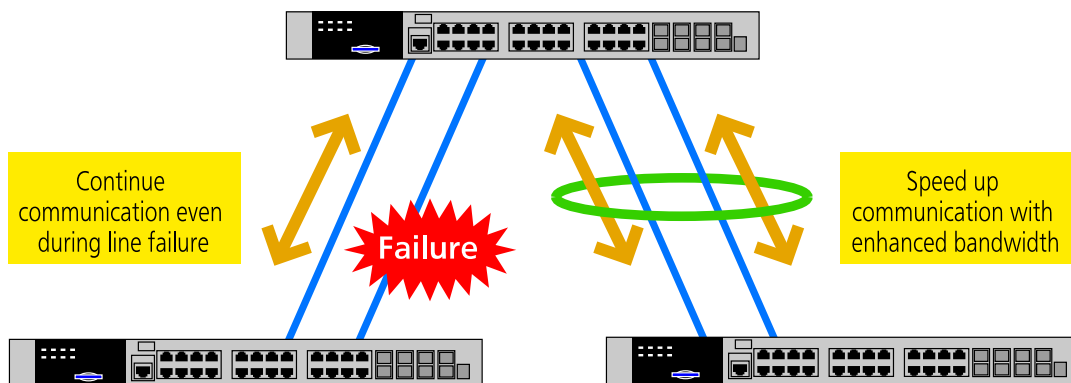


Figure 25-1 Link aggregation overview

4.2.1 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.

Syntax

- `channel-group CHANNEL-NO mode {on | active | passive}`
- `no channel-group`

Parameters

Parameters	description
<i>CHANNEL-NO</i>	Specifies the channel group ID. The valid range is 1 to 48.
on	Specifies that the interface is a static member of the channel-group.

Parameters	description
active	Specifies the interface to operate in LACP active mode.
passive	Specifies the interface to operate in LACP passive mode.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for physical port interface configuration. The system will automatically create the port-channel when a physical port first joins a channel group. An interface can only join one channel-group.

If the mode **on** is specified in the command, the channel group type is static. If the mode **active** or **passive** is specified in the command, the channel group type is LACP. A channel group can only consist of either static members or LACP members. Once the type of channel group has been determined, other types of interfaces cannot join the channel group.

If the security function is enabled on a port, then this port cannot be specified as a channel group member.

NOTE When using the link aggregation on your device, if the system logs and SNMP traps regarding the link status of the physical port cannot be normally transmitted to the SYSLOG server or SNMP server, you may be able to solve issue by using **logtrap linkchange delay** command.

Example

This example shows how to assign Ethernet interfaces 1/0/4 to 1/0/5 to a new LACP channel-group, with an ID of 3, and sets the LACP mode to active.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface range g1l/0/4-1/0/5
ZEQUOxxxxRE(config-if)# channel-group 3 mode active
ZEQUOxxxxRE(config-if)#
```

4.2.2 lacp port-priority

This command is used to configure the port priority. Use the **no** form of this command to revert to the default setting.

Syntax

- `lacp port-priority PRIORITY`
- `no lacp port-priority`

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

The LACP port-priority determines which ports can join a port-channel and which ports are put in the standalone mode. The lower value has a higher priority. If two or more ports have the same priority, the port number determines the priority.

Example

This example shows how to configure the port priority to 20000 on interfaces 1/0/4 to 1/0/5.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface range gil0/4-1/0/5
ZEQUOxxxxRE(config-if)# lacp port-priority 20000
ZEQUOxxxxRE(config-if)#
```

4.2.3 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.

Syntax

- lacp timeout {short | long}
- no lacp timeout

Parameters

Parameters	description
short	Specifies that there will be 3 seconds before invalidating received LACPDU information and there will be 1 second between LACP PDU periodic transmissions when the link partner uses Short Timeouts.
long	Specifies that there will be 90 seconds before invalidating received LACPDU information and there will be 30 seconds between LACP PDU periodic transmissions when the link partner uses Long Timeouts.

Default

By default, the LACP timeout mode is short.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port interface configuration.

Example

This example shows how to configure the port LACP timeout to long mode on GigabitEthernet interface 1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# lacp timeout long
ZEQUOxxxxRE(config-if)#
```

4.2.4 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.

Syntax

- **lacp system-priority** *PRIORITY*
- **no lacp system-priority**

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

During LACP negotiation, the system priority and port priority of the local partner will be exchanged with the remote partner. 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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# lacp system-priority 30000
ZEQUOxxxxRE(config)#
```

4.2.5 port-channel load-balance

This command is used to configure the load-balancing 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.

Syntax

- port-channel load-balance {dst-ip | dst-mac | src-dst-ip | src-dst-mac | src-ip | src-mac | dst-l4-port | src-dst-l4-port | src-l4-port}
- no port-channel load-balance

Parameters

Parameters	description
dst-ip	Specifies that the Switch should examine the IP destination address.
dst-mac	Specifies that the Switch should examine the MAC destination address.
src-dst-ip	Specifies that the Switch should examine the IP source address and IP destination address.
src-dst-mac	Specifies that the Switch should examine the MAC source and MAC destination address.
src-ip	Specifies that the Switch should examine the IP source address.
src-mac	Specifies that the Switch should examine the MAC source address.
dst-l4-port	Specifies that the Switch should examine the Layer 4 destination TCP/UDP port.
src-dst-l4-port	Specifies that the Switch should examine the Layer 4 source TCP/UDP port and Layer 4 destination port
src-l4-port	Specifies that the Switch should examine the Layer 4 source TCP/UDP port.

Default

The default load-balancing algorithm is **src-dst-mac**.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the load balance algorithm. Only one algorithm can be specified.

Example

This example shows how to configure the load-balancing algorithm as **src-ip**.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# port-channel load-balance src-ip
ZEQUOxxxxRE(config)#
```

4.2.6 show channel-group

This command is used to display the channel group information.

Syntax

- show channel-group [channel [*CHANNEL-NO*] {detail | neighbor} | load-balance | sys-id]

Parameters

Parameters	description
channel	(Optional) Specifies to display information for the specified port-channels.
<i>CHANNEL-NO</i>	(Optional) Specifies the channel group ID.
detail	(Optional) Specifies to display detailed channel group information.
neighbor	(Optional) Specifies to display neighbor information.
load-balance	(Optional) Specifies to display the load balance information.

Parameters	description
sys-id	(Optional) Specifies to display the system identifier that is being used by LACP.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If a port-channel number is not specified, all port-channels will be displayed. If the channel, **load-balance** and **sys-id** keywords are not specified with the **show channel-group** command, only summary channel-group information will be displayed.

Example

This example shows how to display the detailed information of all port-channels.

```
ZEQUOxxxxRE#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.

down: Port is down.

Channel Group 3

Member Ports: 2, Maxports = 16, Protocol: LACP

Port	Flags	LACP State	Port Priority	Port Number
Gi1/0/4	FA	down	20000	0
Gi1/0/5	FA	down	20000	0

```
ZEQUOxxxxRE#
```

This example shows how to display the neighbor information for port-channel 3.

```
ZEQUOxxxxRE#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
Gi1/0/21	32768,F0-7D-68-36-3C-00	21	FA	32768
Gi1/0/22	32768,F0-7D-68-36-3C-00	22	FA	32768
Gi1/0/23	0,00-00-00-00-00-00	0	SP	0
Gi1/0/24	0,00-00-00-00-00-00	0	SP	0

```
ZEQUOxxxxRE#
```

This example shows how to display the load balance information for all channel groups.

```
ZEQUOxxxxRE#show channel-group load-balance
```

load-balance algorithm: src-dst-mac

```
ZEQUOxxxxRE#
```

This example shows how to display the system identifier information.

```
ZEQUOxxxxRE#show channel-group sys-id
```

System-ID: 32768,F0-7D-68-34-00-10

```
ZEQUOxxxxRE#
```

This example shows how to display the summary information for all port-channels.

```
ZEQUOxxxxRE#show channel-group
```

load-balance algorithm: src-ip
System-ID: 32768,00-50-40-3F-54-1B

Group	Protocol
3	LACP

```
ZEQUOxxxxRE#
```

4.3 VLAN (Virtual LAN) Commands

VLAN (Virtual LAN) is a function to divide ports of this switch into groups and create multiple virtual LAN environments. As one VLAN corresponds to the broadcast domain, this function allows to improve security by restraining communications between VLANs, as well as reducing traffic on the network. This switch supports many VLANs, including port-based VLAN, IEEE 802.1Q compliant tagged VLAN, MAC-based VLAN, and subnet VLAN.

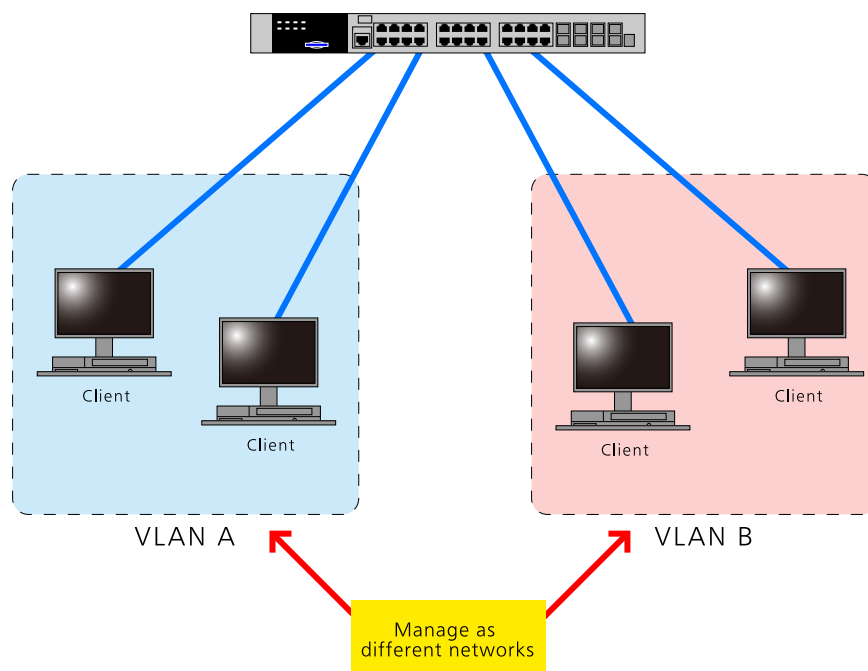


Figure 26-1 VLAN overview

4.3.1 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 setting.

Syntax

- `acceptable-frame {tagged-only | untagged-only | admit-all}`
- `no acceptable-frame`

Parameters

Parameters	description
tagged-only	Specifies that only tagged frames are admitted.
untagged-only	Specifies that only untagged frames are admitted.
admit-all	Specifies that all frames are admitted.

Default

For the access VLAN mode, the default option is **untagged-only**.

For the other VLAN mode, the default option is **admit-all**.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to set the acceptable types of frames by a port.

Example

This example shows how to set the acceptable frame type to **tagged-only** for port GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# acceptable-frame tagged-only
ZEQUOxxxxRE(config-if)#
```

4.3.2 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.

Syntax

- **ingress-checking**
- **no ingress-checking**

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable ingress checking for packets received by the interface. If ingress checking is enabled, the packet will be dropped if the received port is not a member port of the VLAN classified for the received packet.

Example

This example shows how to set ingress checking to enabled port GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# ingress-checking
ZEQUOxxxxRE(config-if)#
```

4.3.3 mac-vlan

This command is used to create the MAC-based VLAN classification entry. Use the **no** form of this command to remove the MAC-based VLAN classification entry.

Syntax

- **mac-vlan** *MAC-ADDRESS* **vlan** *VLAN-ID* [**priority** *COS-VALUE*]
- **no mac-vlan** *MAC-ADDRESS*

Parameters

Parameters	description
<i>MAC-ADDRESS</i>	Specifies the MAC address for the entry.
vlan <i>VLAN-ID</i>	Specifies the VLAN ID for the MAC-based VLAN entry.
priority <i>COS-VALUE</i>	(Optional) Specifies the priority CoS value. If not specified, the default CoS is 0.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to create the MAC-based VLAN classification entry. The classification entry will be applied to packets received by the Switch. By default, the precedence to classify the VLAN for an untagged packet is MAC-based > Subnet-based > Protocol VLAN.

Example

This example shows how to create a MAC-based VLAN ID entry for the MAC address 00-80-cc-00-00-11.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# mac-vlan 00-80-cc-00-00-11 vlan 101 priority 4
ZEQUOxxxxRE(config)#
```

4.3.4 protocol-vlan profile

This command is used to create a protocol group. Use the **no** form of this command to remove the specified protocol group.

Syntax

- protocol-vlan profile** *PROFILE-ID* **frame-type** { ethernet2 | snap | llc } **ether-type** *TYPE-VALUE*

- no protocol-vlan profile *PROFILE-ID*

Parameters

Parameters	description
<i>PROFILE-ID</i>	Specifies the protocol group to add or delete.
frame-type	Specifies the frame type.
ethernet2	Specifies the value for the type of the Ethernet II frames.
snap	Specifies the value for the type of the SNAP frames.
llc	Specifies the value for the type of the LLC frames.
ether-type <i>TYPE-VALUE</i>	Specifies the type. This value should be 2 bytes in hexadecimal form.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **protocol-vlan profile** command in the global configuration mode to create a protocol group. Then use the **protocol-vlan profile** command in the interface configuration mode to configure the VLAN classification for the protocol group received by the port.

Example

This example shows how to create a protocol VLAN group with a group ID of 10, specifying that the IPv6 protocol (frame type is Ethernet2 value is 0x86dd) will be used.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# protocol-vlan profile 10 frame-type ethernet2 ether-type 0x86dd
ZEQUOxxxxRE(config)#
```

4.3.5 protocol-vlan profile (Interface)

This command is used to configure the VLAN classification entry for a protocol group on a port. Use the **no** form of this command to remove the VLAN classification entry on a port.

Syntax

- protocol-vlan profile *PROFILE-ID* vlan *VLAN-ID* [priority *COS-VALUE*]
- no protocol-vlan profile *PROFILE-ID*

Parameters

Parameters	description
<i>PROFILE-ID</i>	Specifies the ID of the protocol group to be classified.
vlan <i>VLAN-ID</i>	Specifies the VLAN ID of the protocol VLAN. Only one VLAN ID can be specified for each binding group.
priority <i>COS-VALUE</i>	(Optional) Specifies the priority CoS value. If not specified, the default COS is 0.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this to specify a VLAN for a protocol group on a port. As a result, the packet received by the port that matches the specified protocol group will be classified to the specified VLAN. The VLAN does not need to exist to configure the command. The precedence for classifying the untagged packet is MAC-based > Subnet-based > Protocol VLAN.

Example

This example shows how to create a VLAN classification entry on gi1/0/1 to classify packets in the protocol group 10 to VLAN 3000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gi1/0/1
ZEQUOxxxxRE(config-if)# protocol-vlan profile 10 vlan 3000
ZEQUOxxxxRE(config-if)#
```

4.3.6 subnet-vlan

The **subnet-vlan ipv4** command is used to configure a VLAN classification entry for an IPv4 subnet. The **subnet-vlan ipv6** command is used to configure a VLAN classification entry for an IPv6 subnet. Use the **no** form of this command to remove a subnet-based VLAN classification entry.

Syntax

- **subnet-vlan** { **ipv4** *NETWORK-PREFIX NETWORK-MASK* | **ipv6** *IPv6-NETWORK-PREFIX/PREFIX-LENGTH* } **vlan** *VLAN-ID* [**priority** *COS-VALUE*]
- **no subnet-vlan** { **ipv4** *NETWORK-PREFIX NETWORK-MASK* | **ipv6** *IPv6-NETWORK-PREFIX/PREFIX-LENGTH* }

Parameters

Parameters	description
ipv4 <i>NETWORK-PREFIX NETWORK-MASK</i>	Specifies the IPv4 network prefix and network mask.
ipv6 <i>IPv6-NETWORK-PREFIX/PREFIX-LENGTH</i>	Specifies the IPv6 network prefix and the prefix length. The prefix length of IPv6 network address cannot be greater than 64 bits.
vlan <i>VLAN-ID</i>	Specifies the VLAN ID of the subnet VLAN.
priority <i>COS-VALUE</i>	(Optional) Specifies the priority CoS value. If not specified, the default COS is 0.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **subnet-vlan ipv4** command to configure a VLAN classification entry for an IPv4 subnet. Use the **subnet-vlan ipv6** command to configure a VLAN classification entry for an IPv6 subnet. The classification entry will be applied to packets received by the Switch. By default, the precedence to classify the VLAN for an untagged packet is MAC-based > Subnet-based > Protocol VLAN.

Example

This example shows how to configure VLAN classification entries to classify that packets belong to subnets 20.0.0.0/8, 192.0.0.0/8, and 3ffe:22:33:44::/64 to VLAN 100.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# subnet-vlan ipv4 20.0.0.0/8 vlan 100
ZEQUOxxxxRE(config)# subnet-vlan ipv4 192.0.0.0/8 vlan 100 priority 4
ZEQUOxxxxRE(config)# subnet-vlan ipv6 3ffe:22:33:44::/64 vlan 100
ZEQUOxxxxRE(config)#
```

4.3.7 show protocol-vlan profile

This command is used to display the configuration settings of the protocol VLAN related setting.

Syntax

- show protocol-vlan {profile [*PROFILE-ID* [, | -]] | interface [*INTERFACE-ID* [, | -]]}

Parameters

Parameters	description
profile	Specifies the protocol group.
<i>PROFILE-ID</i>	(Optional) Specifies the protocol group to be displayed.
,	(Optional) Specifies a series of profile IDs, or separate a range of profile IDs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of profile IDs. No space is allowed before and after the hyphen.
interface	Specifies the interfaces to be displayed.

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the port to display the protocol VLAN classification 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.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the settings for VLAN classification on a port based on the protocol group.

Example

This example shows how to display the setting for VLAN classification based on the protocol group on GigabitEthernet1/0/1 to 1/0/3.

```
ZEQUOxxxxRE#show protocol-vlan interface gil/0/1-3
```

Interface	Protocol Group ID	VLAN	Priority
Gil/0/1	10	3000	0
Gil/0/2	10	3	0
	11	2001	4
	12	3002	1
Gil/0/3	2	100	6

```
ZEQUOxxxxRE#
```

This example shows how to display the protocol group profile settings.

```
ZEQUOxxxxRE#show protocol-vlan profile

Profile ID   Frame-type   Ether-type
-----
1            Ethernet2    0x8600 (User define)
10           Ethernet2    0x86DD (IPv6)

ZEQUOxxxxRE#
```

4.3.8 show vlan

This command is used to display the parameters for all configured VLANs or one VLAN on the Switch.

Syntax

- show vlan [*VLAN-ID* [, | -] | interface [*INTERFACE-ID* [, | -]] | mac-vlan | subnet-vlan]

Parameters

Parameters	description
<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 and after the hyphen.
interface <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.
mac-vlan	(Optional) Specifies to display MAC-based VLAN information.
subnet-vlan	(Optional) Specifies to display subnet-based VLAN information.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the parameters for all configured VLANs or one VLAN on the Switch.

Example

This example shows how to display all the current VLAN entries.

```
ZEQUOxxxxRE# show vlan
```

```
VLAN 1
```

```
  Name : default
```

```
  Tagged Member Ports  :
```

```
  Untagged Member Ports : Gi1/0/1-1/0/24,Gi2/0/1-2/0/24,Gi3/0/1-3/0/24,  
                           Gi4/0/1-4/0/24, Te1/0/25-1/0/28,Te2/0/25-2/0/28,  
                           Te3/0/25-3/0/28,Te4/0/25-4/0/28
```

```
Total Entries : 1
```

```
ZEQUOxxxxRE#
```

This example shows how to display the PVID, ingress checking, and acceptable frame type information for GigabitEthernet1/0/1-1/0/2.

```
ZEQUOxxxxRE# show vlan interface gi1/0/1-1/0/4
```

```
Gi1/0/1
  VLAN Mode           : Hybrid
  Native VLAN         : 1
  Hybrid Untagged VLAN : 1
  Hybrid Tagged VLAN   :
  Ingress Checking     : Enabled
  Acceptable Frame Type : Admit-All
  Dynamic Tagged VLAN   :
  VLAN Precedence      : MAC-VLAN
```

```
Gi1/0/2
  VLAN Mode           : Hybrid
  Native VLAN         : 1
  Hybrid Untagged VLAN : 1
  Hybrid Tagged VLAN   :
  Ingress Checking     : Enabled
  Acceptable Frame Type : Admit-All
  Dynamic Tagged VLAN   :
  VLAN Precedence      : MAC-VLAN
```

```
ZEQUOxxxxRE#
```

This example shows how to display all the MAC-based VLAN entries.

```
ZEQUOxxxxRE# show vlan mac-vlan
```

MAC Address	VLAN ID	Priority	Status
00-80-cc-00-00-11	101	4	Active

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

This example shows how to display all the subnet-based VLAN entries.

```
ZEQUOxxxxRE# show vlan subnet-vlan
```

Subnet	VLAN ID	Priority
20.0.0.0/8	100	0
192.0.0.0/8	100	4
3FFE:22:33:44::/64	100	0

```
Total Entries: 3
```

```
ZEQUOxxxxRE#
```

4.3.9 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.

Syntax

- switchport access vlan *VLAN-ID*
- no switchport access vlan

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

The command takes effect when the interface is set to access mode, or dot1q-tunnel mode. The VLAN specified as the access VLAN does not need to exist to configure the command.

Only one access VLAN can be specified. The succeeding command overwrites the previous command.

Example

This example shows how to configure the GigabitEthernet1/0/1 to access mode with access VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# switchport mode access
ZEQUOxxxxRE(config-if)# switchport access vlan 1000
ZEQUOxxxxRE(config-if)#
```

4.3.10 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.

Syntax

- switchport hybrid allowed vlan {[add] {tagged | untagged} | remove} *VLAN-ID* [, | -]
- no switchport hybrid allowed vlan

Parameters

Parameters	description
add	(Optional) Specifies the port will be added into the specified VLAN(s).
tagged	Specifies the port as a tagged member of the specified VLAN(s).
untagged	Specifies the port as an untagged member of the specified VLAN(s).
remove	Specifies the port will be removed from 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 and after the hyphen.

Default

By default, a hybrid port is an untagged member port of VLAN 1.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

By setting the hybrid VLAN command multiple times with different VLAN IDs, a port can be a tagged member port or an untagged member port of multiple VLANs.

When the allowed VLAN is only specified as the VLAN ID, the succeeding command will 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 gi1/0/1 to be a tagged member of VLAN 1000 and an untagged member of VLAN 2000 and 3000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gi1/0/1
ZEQUOxxxxRE(config-if)# switchport mode hybrid
ZEQUOxxxxRE(config-if)# switchport hybrid allowed vlan add tagged 1000
ZEQUOxxxxRE(config-if)# switchport hybrid allowed vlan add untagged 2000,3000
ZEQUOxxxxRE(config-if)#
```

4.3.11 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.

Syntax

- **switchport hybrid native vlan** *VLAN-ID*
- **no switchport hybrid native vlan**

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

When configuring the hybrid port join to its native VLAN, use the **switchport hybrid allowed vlan** command to add the native VLAN into its allowed VLAN. The specified VLAN does not need to exist to apply the command. The command takes effect when the interface is set to hybrid mode.

Example

This example shows how to configure gi1/0/1 to become a hybrid interface and configure the PVID to 20.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gi1/0/1
ZEQUOxxxxRE(config-if)# switchport mode hybrid
ZEQUOxxxxRE(config-if)# switchport hybrid allowed vlan add untagged 1000,20
ZEQUOxxxxRE(config-if)# switchport hybrid native vlan 20
ZEQUOxxxxRE(config-if)#
```

4.3.12 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.

Syntax

- **switchport mode {access | hybrid | trunk}**
- **no switchport mode**

Parameters

Parameters	description
access	Specifies the port as an access port.
hybrid	Specifies the port as a hybrid port.
trunk	Specifies the port as a trunk port.

Default

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

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a port is set to access mode, this port will be an untagged member of the access VLAN configured for the port. When a port is set to hybrid mode, the port can be an untagged or tagged member of all VLANs configured. The purpose of this VLAN mode is to support of protocol VLAN, subnet-based VLAN, and MAC-based VLAN.

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.

NOTE

When the switchport mode is **access**, only untagged packets can be forwarded through the MPLS Virtual Circuit (VC). To be able to forward both tagged and untagged packets through the MPLS VC, configure the switchport mode as **trunk**.

Example

This example shows how to set the GigabitEthernet1/0/1 as a trunk port.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# switchport mode trunk
ZEQUOxxxxRE(config-if)#
```

4.3.13 switchport trunk allowed vlan

To establish a VLAN that spans multiple switches, you need to enable VLAN Trunking on ports connecting the switches. In a trunking port, packets with a VLAN tag added are transferred from switch to switch and sent to the VLAN specified by the tag information on the destination switch.

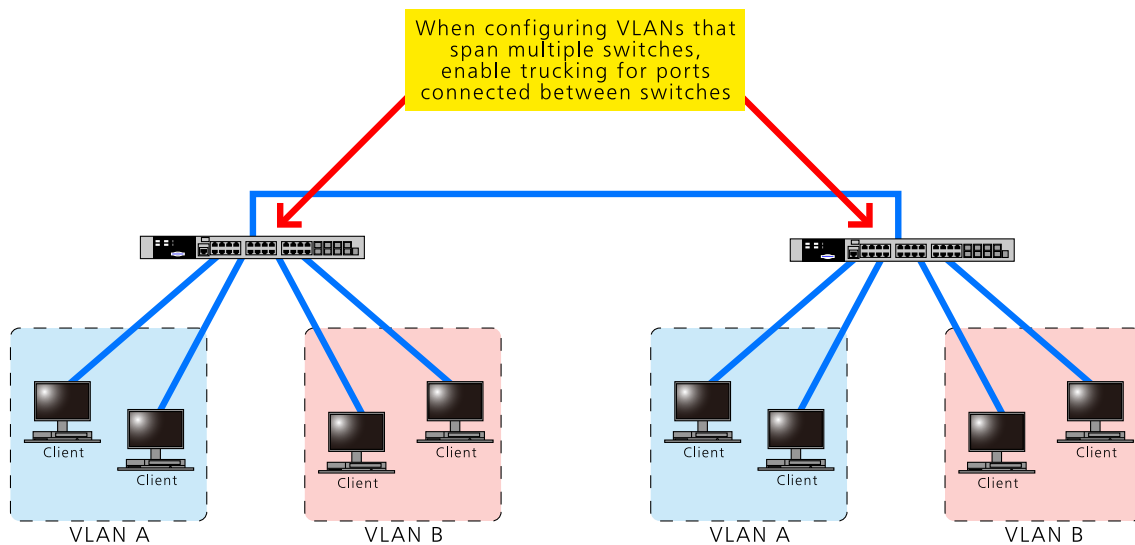


Figure 26-2 VLAN Trunking overview

A trunk interface is an untagged member of a single VLAN, and, in addition, it may be an tagged member of one or more VLANs. Use the **switchport trunk allowed vlan** Interface Configuration mode command to add/remove VLAN(s) to/from a trunk port. Use the **no** form of the command to return to the default.

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.

Syntax

- **switchport trunk allowed vlan** {all | [add | remove | except] *VLAN-ID* [, | -]}
- **no switchport trunk allowed vlan**

Parameters

Parameters	description
all	Specifies that all VLANs are allowed on the interface.
add	Specifies to add the specified VLAN list to the allowed VLAN list.
remove	Specifies to remove the specified VLAN list from the allowed VLAN list.
except	Specifies that all VLANs except the VLANs in the exception list are allowed.
<i>VLAN-ID</i>	Specifies the allow VLAN list or the VLAN list to be added to or removed from the allow VLAN list.

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

Default

By default, all VLANs are allowed.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the interface is set to trunk mode. If a VLAN is allowed on a trunk port, the port will become the tagged member of the VLAN. When the allowed VLAN option is set to **all**, the port will be automatically added to all the VLAN created by the system.

Example

This example shows how to configure GigabitEthernet1/0/1 as a tagged member of VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# switchport mode trunk
ZEQUOxxxxRE(config-if)# switchport trunk allowed vlan add 1000
ZEQUOxxxxRE(config-if)#
```

4.3.14 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.

Syntax

- switchport trunk native vlan { *VLAN-ID* | tag }

- no switchport trunk native vlan [tag]

Parameters

Parameters	description
<i>VLAN-ID</i>	Specifies the native VLAN for a trunk port.
tag	Specifies to enable the tagging mode of the native VLAN.

Default

By default, the native VLAN is 1, untagged mode.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command only takes effect when the interface is set to trunk mode. When a trunk port native VLAN is set to tagged mode, normally the acceptable frame type of the port should be set to "tagged-only" to only accept tagged frames. When a trunk port works in the untagged mode for a native VLAN, transmitting untagged packet for a native VLAN and tagged packets for all other VLANs and the acceptable frame types of the port has to be set to "admit-all" in order to function correctly.

The specified VLAN does not need to exist to apply the command.

Example

This example shows how to configure GigabitEthernet1/0/1 as a trunk interface and configures the native VLAN to 20.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# switchport mode trunk
ZEQUOxxxxRE(config-if)# switchport trunk native vlan 20
ZEQUOxxxxRE(config-if)#
```

4.3.15 vlan

This command is used to add VLANs and enter the VLAN configuration mode. Use the **no** form of this command to remove VLANs.

Syntax

- **vlan** *VLAN-ID* [, | -]
- **no vlan** *VLAN-ID* [, | -]

Parameters

Parameters	description
<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 and after the hyphen.

Default

The VLAN ID 1 exists in the system as the default VLAN.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **vlan** global configuration command to create VLANs. Entering the **vlan** command with a VLAN ID enters the VLAN configuration mode. Entering the VLAN ID of an existing VLAN does not create a new VLAN, but allows the user to modify the VLAN parameters for the specified VLAN. When the user enters the VLAN ID of a new VLAN, the VLAN will be automatically created.

Use the **no vlan** command to remove a VLAN. The default VLAN cannot be removed. If the removed VLAN is a port's access VLAN, the port's access VLAN will be reset to VLAN 1.

Example

This example shows how to add new VLANs, assigning the new VLANs with the VLAN IDs 1000 to 1005.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000-1005
ZEQUOxxxxRE(config-vlan)#
```

4.3.16 vlan precedence

This command is used to specify the VLAN classification precedence for the port. Use the **no** form of this command to reset the VLAN classification precedence for the port.

Syntax

- **vlan precedence { mac-vlan | subnet-vlan }**
- **no vlan precedence**

Parameters

Parameters	description
mac-vlan	Specifies the port MAC-based VLAN classification is precedence than the subnet-based VLAN.
subnet-vlan	Specifies the port subnet-based VLAN classification is precedence than MAC-based VLAN.

Default

By default, this option is Mac-based VLAN.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

By default, the precedence to classify the VLAN for an untagged packet is MAC-based > Subnet-based > Protocol VLAN. Use the **vlan precedence** command to configure the VLAN classification precedence between MAC-based VLAN and subnet-based VLAN. The command only takes effect on hybrid or dot1q tunnel interfaces.

Example

This example shows how to configure the GigabitEthernet1/0/1 as a subnet VLAN has higher precedence.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# vlan precedence subnet-vlan
ZEQUOxxxxRE(config-if)#
```

4.3.17 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.

Syntax

- **name** *VLAN-NAME*
- **no name**

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the name of a VLAN. The VLAN name must be unique within the administrative domain.

Example

This example shows how to configure the VLAN name of VLAN 1000 to be "admin-vlan".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# name admin-vlan
ZEQUOxxxxRE(config-vlan)#
```

4.4 Private VLAN Commands

4.4.1 private-vlan

This command is used to configure a VLAN as a private VLAN. Use the **no** form of this command to remove the private VLAN configuration.

Syntax

- `private-vlan { community | isolated | primary }`
- `no private-vlan { community | isolated | primary }`

Parameters

Parameters	description
<code>community</code>	Specifies the VLAN as a community VLAN in a private VLAN domain. Member ports within a community VLAN can communicate with each other but cannot communicate with member ports of other communities at Layer 2.
<code>isolated</code>	Specifies the VLAN as an isolated VLAN in a private VLAN domain. Member ports of an isolate VLAN cannot communicate with each other and with member ports of the community VLAN at Layer 2.
<code>primary</code>	Specifies the VLAN as a primary VLAN in a private VLAN domain.

Default

None.

Command Mode

VLAN Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A private VLAN domain is defined with one primary VLAN, one isolated VLAN, and multiple community VLANs. Use this command first to specify the role of the private VLAN before they can be referenced in other private VLAN configuration commands.

Example

This example shows how to configure a VLAN as a private VLAN. VLAN 1000, VLAN 1001 and VLAN 1002 are configured as a primary VLAN, an isolated VLAN and a community VLAN respectively.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# private-vlan primary
ZEQUOxxxxRE(config-vlan)# exit
ZEQUOxxxxRE(config)# vlan 1001
ZEQUOxxxxRE(config-vlan)# private-vlan isolated
ZEQUOxxxxRE(config-vlan)# exit
ZEQUOxxxxRE(config)# vlan 1002
ZEQUOxxxxRE(config-vlan)# private-vlan community
ZEQUOxxxxRE(config-vlan)#

```

4.4.2 private-vlan association

This command is used to associate secondary VLANs with a primary VLAN. Use the **no** form of this command to remove the association of secondary VLANs with the primary VLAN.

Syntax

- **private-vlan association** {add *SECONDARY-VLAN-ID* [, | -] | remove *SECONDARY-VLAN-ID* [, | -]}
- **no private-vlan association**

Parameters

Parameters	description
add <i>SECONDARY-VLAN-ID</i>	Specifies to add the association of the specified secondary VLANs with the primary VLAN. The valid ID range of secondary VLAN is from 2 to 4094.
remove <i>SECONDARY-VLAN-ID</i>	Specifies to remove the association of the specified secondary VLANs with the primary VLAN.
,	(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.

Parameters	description
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

None.

Command Mode

VLAN Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only one isolated VLAN can be associated with the primary VLAN. Multiple community VLANs can be associated with the primary VLAN. A secondary VLAN can only be associated with one primary VLAN.

Example

This example shows how to associate secondary VLAN 1001 and secondary VLAN 1002 with the primary VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# private-vlan association add 1001-1002
ZEQUOxxxxRE(config-vlan)#
```

4.4.3 private-vlan synchronize

This command is used to synchronize secondary VLANs to have the same mapping MST ID as the primary VLAN.

Syntax

- private-vlan synchronize

Parameters

None.

Default

None.

Command Mode

MST Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The secondary VLANs need to be mapped to the same MST ID as the primary VLAN if private VLAN is configured. If the mapping is not synchronized when the user exits the MST Configuration Mode, a warning message will be displayed. Use the **private-vlan synchronize** command to synchronize the MST ID mapping before exiting the MST Configuration Mode. This command will not be saved in the running configuration.

Example

This example shows how to synchronize the MST mapping before exiting the MST Configuration Mode.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# spanning-tree mst configuration
ZEQUOxxxxRE(config-mst)# instance 1 vlans 1-100
ZEQUOxxxxRE(config-mst)# instance 2 vlans 101-200
ZEQUOxxxxRE(config-mst)# private-vlan synchronize
ZEQUOxxxxRE(config-mst)#
```

4.4.4 switchport mode private-vlan

This command is used to specify a port as a private VLAN port. The port type can be a host port, promiscuous port, trunk promiscuous port or trunk secondary port.

Syntax

- **switchport mode private-vlan {host | promiscuous}**

Parameters

Parameters	description
host	Specifies the port as an isolated port or a community port.
promiscuous	Specifies the port as a promiscuous port.

Default

By default, this option is configured as Hybrid VLAN mode.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

For isolated ports or community ports, use the **switchport mode private-vlan host** command to specify the port mode with the primary VLAN.

For a promiscuous port, use the **switchport mode private-vlan promiscuous** command to specify the port mode and use the **switchport private-vlan mapping** command to associate the port with a primary VLAN and define the mapping secondary VLAN.

For a trunk port of a primary VLAN, use the **switchport mode trunk** command to specify the port mode and use the **switchport trunk allowed vlan** command to define the associated VLANs.

When an interface's mode is changed, the setting associated with the previous mode will be lost.

Example

This example shows how to configure physical ports as private VLAN ports. Here, we specify the GigabitEthernet1/0/1 as a private VLAN host port and specify the GigabitEthernet1/0/2 as a private VLAN promiscuous port.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# switchport mode private-vlan host
ZEQUOxxxxRE(config-if)# exit
ZEQUOxxxxRE(config)# interface gil/0/2
ZEQUOxxxxRE(config-if)# switchport mode private-vlan promiscuous
ZEQUOxxxxRE(config-if)#
```

4.4.5 switchport private-vlan host-association

This command is used to associate the private VLAN with an isolated port or a community port. Use the no form of this command to remove the association.

Syntax

- `switchport private-vlan host-association PRIMARY-VLAN-ID SECONDARY-VLAN-ID`
- `no switchport private-vlan host-association`

Parameters

Parameters	description
<i>PRIMARY-VLAN-ID</i>	Specifies the ID of primary VLAN to be associated. The valid ID range of a primary VLAN is from 2 to 4094.
<i>SECONDARY-VLAN-ID</i>	Specifies the ID of secondary VLAN to be associated. The valid ID range of a secondary VLAN is from 2 to 4094.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The port is an isolated port if the secondary VLAN specified by the command is an isolated VLAN. The port is a community port if the secondary VLAN specified by the command is a community VLAN.

Example

This example shows how to associate GigabitEthernet1/0/1 with the primary VLAN 1000 and the secondary VLAN 1001.


```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# switchport mode private-vlan host
ZEQUOxxxxRE(config-if)# switchport private-vlan host-association 1000 1001
ZEQUOxxxxRE(config-if)#
```

4.4.6 switchport private-vlan mapping

This command is used to associate the private VLAN membership with a promiscuous port. Use the **no** form of this command to remove the association.

Syntax

- **switchport private-vlan mapping** *PRIMARY-VLAN-ID* {**add** *SECONDARY-VLAN-ID* [, | -] | **remove** *SECONDARY-VLAN-ID* [, | -]}
- **no switchport private-vlan mapping**

Parameters

Parameters	description
<i>PRIMARY-VLAN-ID</i>	Specifies the primary VLAN to be mapped. The valid ID range of the primary VLAN is from 2 to 4094.
add <i>SECONDARY-VLAN-ID</i>	Specifies to add membership of the specified secondary VLAN. The valid ID range of secondary VLAN is from 2 to 4094.
remove <i>SECONDARY-VLAN-ID</i>	Specifies to remove membership of the specified secondary VLAN.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

This example shows how to configure GigabitEthernet1/0/2 as a private VLAN promiscuous port and to map it to a primary VLAN 1000 and secondary VLAN 1001 and VLAN 1002.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/2
ZEQUOxxxxRE(config-if)# switchport mode private-vlan promiscuous
ZEQUOxxxxRE(config-if)# switchport private-vlan mapping 1000 add 1001,1002
ZEQUOxxxxRE(config-if)#
```

4.4.7 show vlan private-vlan

This command is used to display private VLAN configurations.

Syntax

- show vlan private-vlan

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the listing of the private VLAN contained in the private VLAN domain, association of a secondary VLAN with a primary VLAN, and member port of each private VLAN.

Example

This example shows how to display the private VLAN settings. In this example, there are two private VLAN domains configured.

```
ZEQUOxxxxRE#show vlan private-vlan
```

Primary VLAN	Secondary VLAN	Type	Interface
-----	-----	-----	-----
1000	1001	Isolated	Gi1/0/1-1/0/2
1000	1002	Community	Gi1/0/2

```
Total Entries : 2
```

```
ZEQUOxxxxRE#
```

4.5 Asymmetric VLAN Commands

4.5.1 asymmetric-vlan

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

Syntax

- `asymmetric-vlan`
- `no asymmetric-vlan`

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enable or disable the asymmetric VLAN function.

Example

This example shows how to enable asymmetric VLAN.

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

4.6 Voice VLAN Commands

Voice VLAN is a function to configure a voice-specific VLAN to secure the bandwidth of voice data when normal communication data and voice data such as an IP phone coexist on the network. It prevents voice data delay and maintains the quality at the constant level regardless of the traffic status on the network. To use a voice VLAN, you need to pre-register the vendor code (OUI) of an IP phone connected.

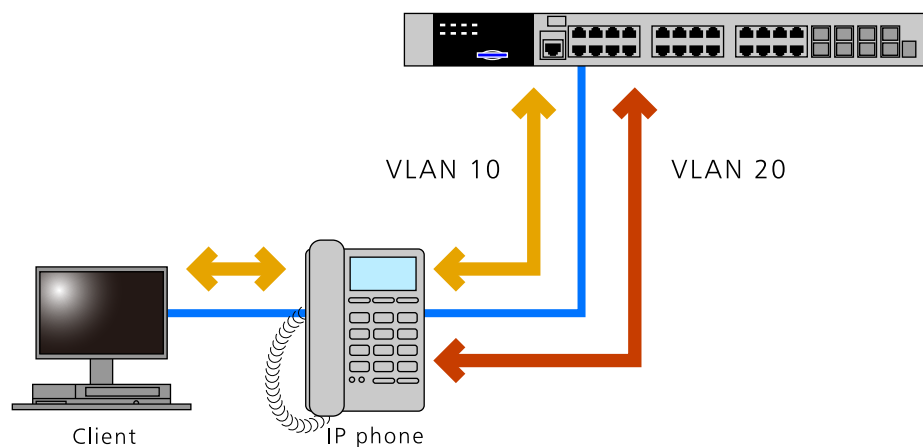


Figure 29-1 Voice VLAN overview

4.6.1 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.

Syntax

- **voice vlan** *VLAN-ID*
- **no voice vlan**

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enable the global voice VLAN function and to specify the voice VLAN on the Switch. The Switch has only one voice VLAN.

Both the **voice vlan** command in the global configuration and the **voice vlan enable** command in the interface configuration mode need to be enabled for a port to start the voice VLAN function.

When the voice VLAN is enabled for a port, the received voice packets will be forwarded in the voice VLAN. The received packets are determined as voice packets if the source MAC addresses of packets comply with the organizationally unique identifier (OUI) addresses configured by the **voice vlan mac-address** command.

The VLAN to be specified as the voice VLAN needs to pre-exist before configuration. If the voice VLAN is configured, 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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# voice vlan 1000
ZEQUOxxxxRE(config)#
```

4.6.2 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.

Syntax

- voice vlan aging *MINUTES*
- no voice vlan aging

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the aging time for aging out the voice device and the voice VLAN automatically learned member ports. When the last voice device connected to the port stops sending traffic and the MAC address of this voice device is aged out from FDB, the voice VLAN aging timer will be started. The port will be removed from the voice VLAN after the expiration of the voice VLAN aging timer. If voice traffic resumes during the aging time, the aging timer will be cancelled.

Example

This example shows how to configure the aging time of the voice VLAN to 30 minutes.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# voice vlan aging 30
ZEQUOxxxxRE(config)#
```

4.6.3 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.

Syntax

- **voice vlan enable**
- **no voice vlan enable**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command takes effect for access ports or hybrid ports. Use the **voice vlan enable** command to enable the voice VLAN function for ports. Both the **voice vlan** command in the global configuration and the **voice vlan enable** command in the interface configuration mode need to be enabled for a port to start the voice VLAN function.

Example

This example shows how to enable the voice VLAN function on the physical port GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# voice vlan enable
ZEQUOxxxxRE(config-if)#
```

4.6.4 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.

Syntax

- **voice vlan mac-address** *MAC-ADDRESS MASK* [**description** *TEXT*]
- **no voice vlan mac-address** *MAC-ADDRESS MASK*

Parameters

Parameters	description
<i>MAC-ADDRES</i>	Specifies the OUI MAC address.
<i>MASK</i>	Specifies the OUI MAC address matching bitmask.
description <i>TEXT</i>	(Optional) Specifies the description for the user defined OUI with a maximum of 32 characters.

Default

None

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to add a user-defined OUI for the voice VLAN. The OUI for the voice VLAN is used to identify the voice traffic by using the voice VLAN function. If the source MAC addresses of the received packet matches any of the OUI patterns, the received packet is determined as a voice packet. The user-defined OUI cannot be the same as the default OUI. The default OUI cannot be deleted.

Example

This example shows how to add a user-defined OUI for voice devices.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# voice vlan mac-address 00-02-03-00-00-00 FF-FF-FF-00-00-00
description User1
ZEQUOxxxxRE(config)#
```

4.6.5 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.

Syntax

- voice vlan mode {manual | auto {tag | untag}}
- no voice vlan mode

Parameters

Parameters	description
manual	Specifies that voice VLAN membership will be manually configured.
auto	Specifies that voice VLAN membership will be automatically learned.
tag	Specifies to learn voice VLAN tagged members.
untag	Specifies to learn voice VLAN untagged members.

Default

By default, this option is set to **untag** and **auto**.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure automatic learning or manual configuration of voice VLAN member ports.

If auto-learning is enabled, the port will automatically be learned as a voice VLAN member. This membership will be automatically be aged out. When the port is working in the **auto tagged** mode and the port captures a voice device through the device's OUI, it will join the voice VLAN as a tagged member automatically. When the voice device sends tagged packets, the Switch will change its priority. When the voice device sends untagged packets, it will forward them in port's PVID VLAN.

When the port is working in **auto untagged** mode, and the port captures a voice device through the device's OUI, it will join the voice VLAN as an untagged member automatically. When the voice device sends tagged packets, the Switch will change its priority. When the voice device sends untagged packets, it will forward them in voice VLAN.

When the Switch receives LLDP-MED packets, it checks the VLAN ID, tagged flag, and priority flag. The Switch should follow the tagged flag and priority setting. If auto learning is disabled, the user should use the **switchport hybrid vlan** command to configure the port as a voice VLAN tagged or untagged member port.

Example

This example shows how to configure physical port GigabitEthernet1/0/1 to be in the **auto tag** mode.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# voice vlan mode auto tag
ZEQUOxxxxRE(config-if)#
```

4.6.6 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.

Syntax

- **voice vlan qos** *COS-VALUE*
- **no voice vlan qos**

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

The voice packets arriving at the voice VLAN enabled port are marked to the CoS specified by the command. The remarking of CoS allows the voice VLAN traffic to be distinguished from data traffic in quality of service.

Example

This example shows how to configure the priority of the voice VLAN to be 7.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# voice vlan qos 7
ZEQUOxxxxRE(config)#
```

4.6.7 show voice vlan

This command is used to display the voice VLAN configurations.

Syntax

- show voice vlan [interface [*INTERFACE-ID* [, | -]]]
- show voice vlan {device | lldp-med device} [interface *INTERFACE-ID* [, | -]]

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	(Optional) Specifies to display voice 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.

Parameters	description
device	Specifies to display the voice devices learned by OUI.
lldp-med device	Specifies to display the voice devices learned by LLDP-MED.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the voice VLAN configurations.

Example

This example shows how to display the voice VLAN global settings.

```
ZEQUOxxxxRE#show voice vlan

Voice VLAN ID      : 1000
Voice VLAN CoS     : 5
Aging Time         : 30 minutes
Member Ports       :
Dynamic Member Ports :

Voice VLAN OUI      :

OUI Address      Mask      Description
-----
Total OUI: 0

ZEQUOxxxxRE#
```

This example shows how to display the voice VLAN information of ports.

```
ZEQUOxxxxRE#show voice vlan interface gi1/0/1-3

Interface      State      Mode
-----
Gi1/0/1        Enabled    Auto/Tag
Gi1/0/2        Disabled   Auto/Untag
Gi1/0/3        Disabled   Auto/Untag

ZEQUOxxxxRE#
```

This example shows how to display the learned voice devices on ports GigabitEthernet1/0/1-1/0/2.

```
ZEQUOxxxxRE#show voice vlan device interface gi1/0/1-2
```

Interface	Voice Device	Start Time	Status
-----	-----	-----	-----
Gi1/0/1	00-03-6B-00-00-01	2017-03-19 09:00	Active
Gi1/0/1	00-03-6B-00-00-02	2017-03-20 10:09	Aging
Gi1/0/1	00-03-6B-00-00-05	2017-03-20 12:04	Active
Gi1/0/2	00-03-6B-00-00-0a	2017-03-19 08:11	Aging
Gi1/0/2	33-00-61-10-00-11	2017-03-20 06:45	Aging

Total Entries: 5

```
ZEQUOxxxxRE#
```

This example shows how to display the learned LLDP-MED voice devices on ports GigabitEthernet1/0/1-1/0/2.

```
ZEQUOxxxxRE#show voice vlan lldp-med device interface gi1/0/1-2
```

```

Index          : 1
Interface      : Gi1/0/1
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    : 2/23/2017 05:21:14
Remain Time    : 108 Seconds

```

```

Index          : 2
Interface      : Gi1/0/2
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    : 2/23/2017 05:21:14
Remain Time    : 105 Seconds

```

Total Entries: 2

```
ZEQUOxxxxRE#
```

4.7 GVRP (GARP VLAN Registration Protocol) Commands

4.7.1 clear gvrp statistics

This command is used to clear the statistics for a GVRP port.

Syntax

- clear gvrp statistics {all | interface *INTERFACE-ID* [, | -]}

Parameters

Parameters	description
all	Specifies to clear GVRP statistic counters associated with all interfaces.
interface <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

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear the GVRP counters.

Example

This example shows how to clear statistics for all interfaces.

```
ZEQUOxxxxRE# clear gvrp statistics all
ZEQUOxxxxRE#
```

4.7.2 gvrp global

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

Syntax

- gvrp global
- no gvrp global

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Administrators can enable the global GVRP state and individual port's GVRP state to start GVRP on the port.

Example

This example shows how to enable the GVRP protocol global state.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# gvrp global
ZEQUOxxxxRE(config)#
```


4.7.3 gvrp enable

This command is used to enable the GVRP function on a port. Use the **no** form of this command to disable the GVRP function on a port.

Syntax

- **gvrp enable**
- **no gvrp enable**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for both physical ports and port-channel interface configuration. This command only takes effect for hybrid mode and trunk mode. This command does not take effect if the Layer 2 protocol tunnel is enabled for GVRP.

Example

This example shows how to enable the GVRP function on GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# gvrp enable
ZEQUOxxxxRE(config-if)#
```

4.7.4 gvrp advertise

This command is used to specify the VLAN that are allowed to be advertised by the GVRP protocol. Use the **no** form of this command to disable the VLAN advertisement function.

Syntax

- gvrp advertise {all | [add | remove] *VLAN-ID* [, | -]}
- no gvrp advertise

Parameters

Parameters	description
all	Specifies that all VLANs are advertised on the interface.
add	(Optional) Specifies a VLAN or a list VLANs to be added to advertise the VLAN list.
remove	(Optional) Specifies a VLAN or a list VLANs to be removed from the advertised VLAN list.
<i>VLAN-ID</i>	Specified the VLAN ID to be added to or removed from the advertise VLAN list. If the add or remove parameter is not specified, the specified VLAN list overwrites the advertise VLAN list. The range is 1 to 4094.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

By default, no VLANs are advertised.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for both physical ports and port-channel interface configuration. Administrators can use the **gvrp advertise** command to enable the specified VLANs' GVRP advertise function on the specified interface. The command only takes effect when GVRP is enabled. The command only takes effect for hybrid mode and trunk mode.

Example

This example shows how to enable the advertise function of VLAN 1000 on GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# gvrp advertise 1000
ZEQUOxxxxRE(config-if)#
```

4.7.5 gvrp vlan create

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

Syntax

- **gvrp vlan create**
- **no gvrp vlan create**

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When dynamic VLAN creation is enabled, if a port has learned a new VLAN membership and the VLAN does not exist, the VLAN will be created automatically. Otherwise, the newly learned VLAN will not be created.

Example

This example shows how to enable the creation of dynamic VLANs registered with the GVRP protocol.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# gvrp vlan create
ZEQUOxxxxRE(config)#
```

4.7.6 gvrp forbidden

This command is used to specify a port as being a forbidden member of the specified VLAN. Use the **no** form of this command to remove the port as a forbidden member of all VLANs.

Syntax

- gvrp forbidden {all | [add | remove] *VLAN-ID* [, | -]}
- no gvrp forbidden

Parameters

Parameters	description
all	Specifies that all VLANs, except VLAN 1, are forbidden on the interface.
add	(Optional) Specifies a VLAN or a list of VLANs to be added to the forbidden VLAN list.
remove	(Optional) Specifies a VLAN or a list of VLANs to be removed from the forbidden VLAN list.
<i>VLAN-ID</i>	Specified the forbidden VLAN list. If the add or remove parameter is not specified, the specified VLAN list will overwrite the forbidden VLAN list. The range is 2 to 4094.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

No VLANs are forbidden.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for both physical ports and port-channel interface configuration. As a forbidden port of a VLAN, a port is forbidden from becoming a member port of the VLAN via the GVRP operation. The VLAN specified by the command does not need to exist.

This command only affects the GVRP operation. The setting only takes effect when GVRP is enabled. The command only takes effect for hybrid mode and trunk mode.

Example

This example shows how to configure the GigabitEthernet1/0/1 as a forbidden port of VLAN 1000 via the GVRP operation.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# gvrp forbidden 1000
ZEQUOxxxxRE(config-if)#
```

4.7.7 gvrp timer

This command is used to configure the GVRP timer value on a port. Use the **no** form of the command to revert the timer to the default setting.

Syntax

- **gvrp timer** [**join** *TIMER-VALUE*] [**leave** *TIMER-VALUE*] [**leave-all** *TIMER-VALUE*]
- **no gvrp timer** [**join**] [**leave**] [**leave-all**]

Parameters

Parameters	description
join	(Optional) Specifies to set the timer for joining a group. The unit is in a hundredth of a second.
leave	(Optional) Specifies to set the timer for leaving a group. The unit is in a hundredth of a second.
leave-all	(Optional) Specifies to set the timer for leaving all groups. The unit is in a hundredth of a second.
<i>TIMER-VALUE</i>	(Optional) Specifies the timer value in a hundredth of a second. The valid range is 10 to 10000.

Default

Join: 20.
Leave: 60.
Leave-all: 1000.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the GVRP timer value on a port.

Example

This example shows how to configure the leave-all timer to 500 hundredths of a second on GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# gvrp timer leave-all 500
ZEQUOxxxxRE(config-if)#
```

4.7.8 show gvrp configuration

This command is used to display the GVRP settings.

Syntax

- show gvrp configuration [interface [*INTERFACE-ID* [, | -]]]

Parameters

Parameters	description
interface	(Optional) Specifies to display the GVRP interface configuration. If the interface ID is not specified, all interfaces are displayed.
<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.

Command Default Level

Level: 1.

Usage Guideline

This command only displays GVRP related configurations. If no parameter is specified, the GVRP global configuration is displayed.

Example

This example shows how to display the GVRP configuration for the global configuration.

```
ZEQUOxxxxRE# show gvrp configuration

Global GVRP State      : Enabled
Dynamic VLAN Creation  : Enabled

ZEQUOxxxxRE#
```

This example shows how to display the GVRP configuration on interfaces GigabitEthernet1/0/5 to 1/0/6.

```
ZEQUOxxxxRE# show gvrp configuration interface gil/0/5-1/0/6
```

```
Gil/0/5
  GVRP Status      : Enabled
  Join Time        : 20 centiseconds
  Leave Time       : 60 centiseconds
  Leave-All Time   : 1000 centiseconds
  Advertise VLAN   : 1-4094
  Forbidden VLAN   : 2
```

```
Gil/0/6
  GVRP Status      : Disabled
  Join Time        : 20 centiseconds
  Leave Time       : 60 centiseconds
  Leave-All Time   : 1000 centiseconds
  Advertise VLAN   :
  Forbidden VLAN   :
```

```
ZEQUOxxxxRE#
```

4.7.9 show gvrp statistics

This command is used to display the statistics for a GVRP port.

Syntax

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

Parameters

Parameters	description
<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 EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command only displays the ports which have the GVRP state enabled.

Example

This example shows how to display statistics for GVRP interfaces GigabitEthernet1/0/5 to 1/0/6.

```
ZEQUOxxxxRE#show gvrp statistics interface gil/0/5-1/0/6
```

Interface		JoinEmpty	JoinIn	LeaveEmpty	LeaveIn	LeaveAll	Empty
Gil/0/5	RX	0	0	0	0	0	0
	TX	4294967296	4294967296	4294967296	4294967296	4294967296	4294967296
Gil/0/6	RX	0	0	0	0	0	0
	TX	0	0	0	0	0	0

```
ZEQUOxxxxRE#
```

4.8 Traffic Segmentation Commands

4.8.1 show traffic-segmentation forward

This command is used to display the traffic segmentation for some ports or all ports.

Syntax

- show traffic-segmentation forward [interface *INTERFACE-ID* [, | -]]

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed. The acceptable interface will be physical port or port channel.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If no optional parameter is specified, the traffic segmentation configuration for all ports will be displayed.

Example

This example shows how to display the configuration of traffic segmentation for GigabitEthernet1/0/1.

```
ZEQUOxxxxRE#show traffic-segmentation forward interface gil/0/1
```

```
Interface      Forwarding Domain
-----
Gil/0/1        Gil/0/3-1/0/6
```

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

4.8.2 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.

Syntax

- traffic-segmentation forward interface *INTERFACE-ID* [, | -]
- no traffic-segmentation forward interface *INTERFACE-ID* [, | -]

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interfaces to be used. The allowed interfaces include physical port.
,	(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.

Command Default Level

Level: 12.

Usage Guideline

When traffic segmentation forwarding domain is specified, packets received by the port will be restricted in Layer 2 packet forwarding to interfaces within the domain. When the forwarding domain of a port is empty, Layer 2 forwarding for packets received by the port is not restricted.

The **traffic-segmentation forward** command can be entered multiple times. The following interfaces will be appended into the forwarding domain. Use the **no** form 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, then there is no restriction on Layer 2 forwarding of packets received by the port.

Example

This example shows how to configure traffic segmentation. It restricts the flooding domain of GigabitEthernet1/0/1 to a set of ports, which are GigabitEthernet1/0/3 to GigabitEthernet1/0/6.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)#interface gil/0/1
ZEQUOxxxxRE(config-if)#traffic-segmentation forward interface gil/0/3-6
ZEQUOxxxxRE(config-if)#
```

4.9 NLB (Network Load Balancing) Commands

4.9.1 nlb unicast-fdb

This command is used to add a unicast MAC entry to the NLB unicast address table. Use the **no** form of this command to remove a unicast entry from the NLB unicast address table or remove interfaces from an NLB entry.

Syntax

- `nlb unicast-fdb MAC-ADDR interface INTERFACE-ID [, | -]`
- `no nlb unicast-fdb MAC-ADDR [interface INTERFACE-ID [, | -]]`

Parameters

Parameters	description
<i>MAC-ADDR</i>	Specifies the MAC address of the entry. The address must be a unicast address. If a received packet contains a destination MAC address that matches the specified MAC address, it will be forwarded to the specified interface.
interface <i>INTERFACE-ID</i>	Specifies the interface to which the matched packets will be forwarded. Only physical ports are valid 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

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to create an NLB unicast MAC entry. The Network Load Balancing (NLB) function is used to support the Microsoft server load balancing application where multiple servers can share the same IP address and MAC address. The requests from clients will be forwarded to all the servers, but will only be processed by one of them. The server can work in two different modes:

- **Unicast mode:** The client uses a unicast MAC address as the destination MAC address to reach the server.
- **Multicast mode:** The client uses a multicast MAC address as the destination MAC address to reach the server.

This destination MAC address is called the shared MAC address. However, the server uses its own MAC address (rather than the shared MAC address) as the source MAC address in the reply packet. In other words, a NLB unicast address usually is not the source MAC address of a packet.

When the received packet contains the destination MAC address matches the configured unicast MAC address, it will be forwarded to those configured ports, regardless of the VLAN membership configuration.

Administrators cannot configure a static address of the MAC address table as a NLB address. However, if a MAC address is created as a NLB MAC address entry, the same MAC address can be still dynamically learnt in the Layer 2 MAC address table. In this situation, the NLB has higher priority; the dynamically learnt FDB entry won't take effect.

Example

This example shows how to add an NLB unicast address 00-F3-22-0A-12-F4 to the MAC address table. The candidate forwarding interfaces are GigabitEthernet1/0/1 to 1/0/5.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# nlb unicast-fdb 00-F3-22-0A-12-F4 interface gi1/0/1-5
ZEQUOxxxxRE(config)#
```

4.9.2 nlb multicast-fdb

This command is used to add an entry to the NLB multicast address table. Use the **no** form of this command to remove an NLB entry from the NLB multicast address table or remove interfaces from a multicast NLB entry.

Syntax

- `nlb multicast-fdb MAC-ADDR vlan VLAN-ID interface INTERFACE-ID [, | -]`
- `no nlb multicast-fdb MAC-ADDR vlan VLAN-ID [interface INTERFACE-ID [, | -]]`

Parameters

Parameters	description
<i>MAC-ADDR</i>	Specifies the MAC address of the entry. The address must be a multicast address. If a received packet contains a destination address that matches the specified MAC address it will be forwarded to the specified interfaces.
vlan <i>VLAN-ID</i>	Specifies the VLAN ID of the entry. The range is 1 to 4094.
interface <i>INTERFACE-ID</i>	Specifies the interface to which the matched packets will be forwarded to. Only physical ports are valid 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

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to create an NLB multicast MAC address entry. This destination MAC address is called the shared MAC address. The server uses its own MAC address (rather than the shared MAC) as the source MAC address of the reply packet. In other words, an NLB unicast address usually is not the source MAC address of a packet.

The NLB multicast and Layer 2 multicast FDB are mutually exclusive. The IPv6 multicast mapped MAC addresses (33:33:xx:xx:xx:xx) and IEEE reserved MAC addresses (01:80:c2:00:00:xx) are forbidden to set as the NLB multicast MAC address. NLB entry 01:00:5E:xx:xx:xx (IPv4 multicast mapped MAC address) has higher priority.

Example

This example shows how to add a multicast address 01-F3-22-0A-12-F4 received on VLAN 1 candidate forwarding ports GigabitEthernet1/0/1 to 1/0/5 to the NLB multicast address table.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# nlb multicast-fdb 01-F3-22-0A-12-F4 vlan 1 interface gil1/0/1-5
ZEQUOxxxxRE(config)#
```

4.9.3 show nlb fdb

This command is used to display NLB configured entries.

Syntax

- show nlb fdb

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display NLB configured entries, including unicast and multicast entries.

Example

This example shows how to display NLB configured entries, including unicast and multicast entries.

```
ZEQUOxxxxRE#show nlb fdb

MAC Address      VLAN ID  Interface
-----
00-F3-22-0A-12-F4 -          Gi1/0/1-1/0/5
01-F3-22-0A-12-F4 1          Gi1/0/1-1/0/5

Total Entries :2

ZEQUOxxxxRE#
```

4.10 L2PT (Layer 2 Protocol Tunnel) Commands

4.10.1 clear l2protocol-tunnel counters

This command is used to clear the Layer 2 Protocol Tunnel (L2PT) statistics counters.

Syntax

- clear l2protocol-tunnel counters {all | interface *INTERFACE-ID*}

Parameters

Parameters	description
all	Specifies to clear counters for all interfaces.
interface <i>INTERFACE-ID</i>	Specifies the interface to clear counters.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear protocol tunnel counters for all interfaces or for the specified interface. Only the physical port and port-channel interface can be specified for the command.

Example

This example shows how to clear L2PT counters for all L2PT ports.

```
ZEQUOxxxxRE# clear l2protocol-tunnel counters all
ZEQUOxxxxRE#
```

4.10.2 l2protocol-tunnel

This command is used to enable the protocol tunneling for the specified protocols. Use the **no** form of this command to disable the protocol tunneling.

Syntax

- l2protocol-tunnel [gvrp | stp | protocol-mac {01-00-0c-cc-cc-cc | 01-00-0c-cc-cc-cd}]
- no l2protocol-tunnel [gvrp | stp | protocol-mac {01-00-0c-cc-cc-cc | 01-00-0c-cc-cc-cd}]

Parameters

Parameters	description
gvrp	(Optional) Specifies to enable tunneling for GARP VLAN Registration Protocol (GVRP) packets.
stp	(Optional) Specifies to enables tunneling for Spanning Tree Protocol (STP) packets.
01-00-0c-cc-cc-cc	(Optional) Specifies to tunnel the protocol packets with this Destination Address (DA).
01-00-0c-cc-cc-cd	(Optional) Specifies to tunnel the protocol packets with this DA.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the command to enable tunneling of Layer 2 protocol packets. With protocol tunneling, the protocol operation information at the local site and the remote site can be exchanged through the service provider network. If the protocol type is not specified, the command enables tunneling of all types of protocol packets. Configure the Layer 2 protocol tunnel for GVRP/STP on the port whether GVRP/STP is enabled or not. However, the protocol operation of GVRP/STP will not work on the port when the corresponding Layer 2 protocol tunnel for GVRP/STP is enabled.

When a Layer 2 protocol packet arrives at port which is enabled for protocol tunneling, the Switch will classify the packet with the service VLAN and forward the packet to the service VLAN member ports. Generally, the packet is encapsulated and forwarded to the remote site via the trunk port. When forwarding a packet to the remote site via a trunk port, the tunneled packet will be tagged with service VLAN. The packet can also be forwarded to other ports at the local site which are enabled for protocol tunneling.

Normally, protocol tunneling encapsulates the protocol packet by replacing the destination MAC address of the packet with a vendor specific multicast address. However, if the port being forwarded is Layer 2 protocol tunnel enabled, then the destination MAC address of the protocol packet will not be overwritten.

At the remote site, the Switch decapsulates the tunneled packet by restoring the vendor specific multicast address to the original PDU address and forward the packet to the customer network via the ports that are enabled for protocol tunneling.

If the port that is enabled for the Layer 2 protocol tunnel receives an encapsulated packet, then the port will enter the error-disable state.

Example

This example shows how to enable a tunneling protocol for the STP protocol on an interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# l2protocol-tunnel stp
```

```
WARNING: STP doesn't run when l2 protocol tunnel is enabled for the port.
ZEQUOxxxxRE(config-if)#
```

4.10.3 l2protocol-tunnel cos

This command is used to specify the CoS value for tunneling of the protocol packets. Use the **no** form of this command to revert to the default setting.

Syntax

- l2protocol-tunnel cos *COS-VALUE*
- no l2protocol-tunnel cos

Parameters

Parameters	description
<i>COS-VALUE</i>	Specifies the CoS value. The values are from 0 to 7. 7 is the highest priority.

Default

By default, this value is 5.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a Layer 2 protocol packet arrives at a port that is enabled for the Layer 2 protocol tunnel, the Switch encapsulates the packet with a service VLAN tag and rewrites the CoS with the value specified by this command.

Example

This example shows how to specify a CoS value for tunneling of the protocol packets.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# l2protocol-tunnel cos 7
ZEQUOxxxxRE(config)#
```

4.10.4 l2protocol-tunnel drop-threshold

This command is used to specify the threshold in tunneling of the specified Layer 2 protocol packets received by a port before it is dropped. Use the **no** form of this command to revert to the default setting.

Syntax

- `l2protocol-tunnel drop-threshold [gvrp | stp | protocol-mac {01-00-0c-cc-cc-cc | 01-00-0c-cc-cc-cd}] PPS`
- `no l2protocol-tunnel drop-threshold [gvrp | stp | protocol-mac {01-00-0c-cc-cc-cc | 01-00-0c-cc-cc-cd}]`

Parameters

Parameters	description
gvrp	(Optional) Specifies GVRP packets.
stp	(Optional) Specifies STP packets.
01-00-0c-cc-cc-cc	(Optional) Specifies the protocol packets with this DA.
01-00-0c-cc-cc-cd	(Optional) Specifies the protocol packets with this DA.
<i>PPS</i>	Specifies the threshold in number of packets per second. This value must be between 1 and 4096 packets per second.

Default

By default, no threshold is configured.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The tunneling of Layer 2 protocol packets will consume CPU processing power when encapsulating, decapsulating and forwarding packets. Use this command to restrict the CPU processing bandwidth consumption by specifying a threshold in the tunneling of the specified Layer 2 protocol packets received by a port. When the threshold is exceeded, the excessive incoming packets are dropped. If the protocol type is not specified, the setting applies to all protocol types. The **l2protocol-tunnel drop-threshold** command can be used together with the **l2protocol-tunnel shutdown-threshold** command to restrict the processing bandwidth. If the shutdown threshold is also configured on the interface, the drop-threshold value must be less than or equal to the shutdown-threshold value.

Example

This example shows how to configure the drop threshold for the STP protocol.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# l2protocol-tunnel drop-threshold stp 2000
ZEQUOxxxxRE(config-if)#
```

4.10.5 l2protocol-tunnel global drop-threshold

This command is used to specify the maximum number of Layer 2 protocol packets that can be processed by the system per second. Use the **no** form of this command to revert to the default setting.

Syntax

- l2protocol-tunnel global drop-threshold *PPS*
- no l2protocol-tunnel global drop-threshold

Parameters

Parameters	description
<i>PPS</i>	Specifies the maximum rate of incoming Layer 2 protocol packets that can be tunneled. This value must be between 100 and 20000.

Default

By default, no threshold is configured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The tunneling of the Layer 2 protocol packets will consume CPU processing power in encapsulating, decapsulating, and forwarding of the packet. Use the command to restrict the CPU processing bandwidth consumed by specifying a threshold on the number of all Layer 2 protocol packets that can be processed by the system. When the maximum number of packets is exceeded, the excessive protocol packets are dropped.

Use the **l2protocol-tunnel global drop-threshold** command and the **l2protocol-tunnel drop-threshold** command in the global configuration mode to leverage the bandwidth restriction.

Example

This example shows how to enable rate limiting globally.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# l2protocol-tunnel global drop-threshold 5000
ZEQUOxxxxRE(config)#
```

4.10.6 l2protocol-tunnel shutdown-threshold

This command is used to specify a threshold in the tunneling of the specified Layer 2 protocol packets received by a port before the shutdown. Use the **no** form of this command to revert to the default setting.

Syntax

- l2protocol-tunnel shutdown-threshold [gvrp | stp | protocol-mac {01-00-0c-cc-cc-cc | 01-00-0c-cc-cc-cd}] *PPS*
- no l2protocol-tunnel shutdown-threshold [gvrp | stp | protocol-mac {01-00-0c-cc-cc-cc | 01-00-0c-cc-cc-cd}]

Parameters

Parameters	description
gvrp	(Optional) Specifies GVRP tunneling.
stp	(Optional) Specifies STP tunneling.
01-00-0c-cc-cc-cc	(Optional) Specifies the protocol packets with this DA.
01-00-0c-cc-cc-cd	(Optional) Specifies the protocol packets with this DA.
<i>PPS</i>	Specifies the threshold in number of packets per second This value must be between 1 and 4096 packets.

Default

By default, no threshold is configured.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the command to restrict the CPU processing bandwidth consumption by specifying a threshold for tunneling of the specified Layer 2 protocol packets received the port. When the threshold is exceeded, the port is put in error-disabled state.

If protocol type is not specified, the setting applies to all protocol types.

The **l2protocol-tunnel shutdown-threshold** command can be used together with the **l2protocol-tunnel drop-threshold** command. If drop threshold is also configured on the interface, the shutdown-threshold value must be greater than or equal to the drop-threshold value.

Example

This example shows how to specify the maximum number of STP packets that can be processed on that interface in 1 second.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# l2protocol-tunnel shutdown-threshold stp 200
ZEQUOxxxxRE(config-if)#
```

4.10.7 l2protocol-tunnel mac-address

This command is used to specify the L2PT tunneling multicast address for the specified protocol. Use the **no** form of this command to revert to the default setting.

Syntax

- l2protocol-tunnel mac-address [gvrp | stp | protocol-mac {01-00-0c-cc-cc-cc | 01-00-0c-cc-cc-cd}] *MAC-ADDR*

- no l2protocol-tunnel mac-address [gvrp | stp | protocol-mac {01-00-0c-cc-cc-cc | 01-00-0c-cc-cc-cd}]

Parameters

Parameters	description
gvrp	(Optional) Specifies the GVRP packets to be tunneled to the specified address.
stp	(Optional) Specifies the STP packets to be tunneled to the specified address.
01-00-0c-cc-cc-cc	(Optional) Specifies the protocol packets with this DA to be tunneled to the specified address.
01-00-0c-cc-cc-cd	(Optional) Specifies the protocol packets with this DA to be tunneled to the specified address.
<i>MAC-ADDR</i>	Specifies MAC address for the packets to be tunneled to. The address should not be reserved or used by other protocols.

Default

By default, the tunneling address of GVRP is 00-C0-8F-04-92-C1.

By default, the tunneling address of STP is 00-C0-8F-04-92-C0.

By default, the tunneling address of protocol MAC 01-00-0C-CC-CC-CC is 00-C0-8F-04-92-C2.

By default, the tunneling address of protocol MAC 01-00-0C-CC-CC-CD is 00-C0-8F-04-92-C3.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the command to specify the L2PT tunneling multicast address for the specified protocol.

If protocol type is not specified, the setting applies to all protocol types.

The following MAC addresses are reserved or used by other protocols, and should not be configured in the command:

- FF-FF-FF-FF-FF-FF
- 00-00-00-00-00-00

- 01-00-0C-CC-CC-CC
- 01-00-0C-CC-CC-CD
- 01-80-C2-00-00-00 to 01-80-C2-00-00-0F
- 01-80-C2-00-00-10
- 01-80-C2-00-00-20 to 01-80-C2-00-00-2F
- 01-00-5E-00-00-00 to 01-00-5E-FF-FF-FF
- 33-33-00-00-00-04
- 33-33-00-00-00-05
- 33-33-00-00-00-06
- 33-33-00-00-00-09
- 33-33-00-00-00-0D
- 00-C0-8F-04-93-00
- 00-C0-8F-00-00-02

Example

This example shows how to specify the L2PT tunneling multicast address of STP to 01-00-0c-cd-cd-d0.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#l2protocol-tunnel mac-address stp 01-00-0c-cd-cd-d0
ZEQUOxxxxRE(config)#
```

4.10.8 show l2protocol-tunnel

This command is used to display the protocols that are tunneled on an interface or on all interfaces.

Syntax

- show l2protocol-tunnel [interface *INTERFACE-ID*]

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	(Optional) Specifies the interface to display.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the Layer 2 protocol tunnel related settings, status, and counters.

Example

This example shows how to display the protocols that are tunneled on all interfaces.

```
ZEQUOxxxxRE#show l2protocol-tunnel
```

```
CoS for Encapsulated Packets          :5
```

```
Drop Threshold for Encapsulated Packets :0
```

Protocol	Drop Counter	Tunneling Address
gvrp	0	00-C0-8F-04-92-C1
stp	0	00-C0-8F-04-92-C0
01-00-0c-cc-cc-cc	0	00-C0-8F-04-92-C2
01-00-0c-cc-cc-cd	0	00-C0-8F-04-92-C3

Port	Protocol	Shutdown Threshold	Drop Threshold	Encap Counter	Decap Counter	Drop Counter
Gi1/0/3	gvrp	-	2000	8	0	0
Gi1/0/5	gvrp	-	2000	8	0	0
	stp	-	2000	1268	1100	0
	01000ccccccc	-	2000	0	0	0

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
CoS for Encapsulated Packets	Indicates the Class of Service (CoS) value for tunneled L2 protocol packets.
Drop Threshold for Encapsulated Packets	Indicates the rate limiting on L2PT.
Protocol	Indicates the type of L2 protocol to be tunneled.
Drop Counter	Indicates the number of specified L2 protocol packets which are dropped.
Tunneling Address	Indicates the protocol tunneling multicast address setting.
Port	Indicates the port that is enabled for L2PT.
Shutdown Threshold	Indicates the shutdown threshold for specified L2 protocol packet.

Parameters	description
Drop Threshold	Indicates the drop threshold for the specified L2 protocol packet.
Encap Counter	Indicates the number of L2 protocol packets received and encapsulated by the L2PT-enabled port.
Decap Counter	Indicates the number of L2 protocol packets decapsulated and transmitted to the L2PT-enabled port.

4.11 Line Loopback Commands

4.11.1 line loopback enable (Global)

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

Syntax

line loopback enable
no line loopback enable

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

This command is used to enable the line loopback function globally.

Example

This example shows how to enable line loopback function globally.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# line loopback enable
ZEQUOxxxxRE(config)#
```

4.11.2 line loopback (Interface)

This command is used to enable the line loopback function for an interface. Use the **no** form of this command to disable the function for an interface.

Syntax

line loopback

no line loopback

Parameters

None.

Default

By default, this option is enabled on Gigabit Ethernet ports and disabled on other ports.

Command Mode

Interface Configuration Mode

Command Default Level

Level : 12

Usage Guideline

Use this command to enable the line loopback function on an interface. This command is available for physical port and port-channel interface configuration.

Example

This example shows how to enable the line loopback function on interface Gigabit Ethernet port 1/0/1.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/1
ZEQUOxxxxRE(config-if)#line loopback
ZEQUOxxxxRE(config-if)#
```

4.11.3 line loopback mode

This command is used to line loopback mode. Use the **no** form of this command to revert to the default setting.

Syntax

line loopback mode {block | shutdown}

Parameters

Parameters	概要
block	Specifies that the port enters the block mode when detecting loop.
shutdown	Specifies that the port first enters the shutdown mode and then the block mode when detecting loop.

Default

By default, the mode is block.

Command Mode

Interface Configuration Mode

Command Default Level

Level : 12

Usage Guideline

In the **block** mode, when a loop is detected on a port, the Switch will generate Loop Detection Frames and probe the port until the loop is resolved. After the port receives a Loop Detection Frame, it will enter the **Blocking** state. During the **line loopback recovery** time, the port will enter the **Forwarding** state if no Loop Detection Frame was received by the port.

In the **shutdown** mode, when a loop is detected on a port, the Switch will generate Loop Detection Frames and probe the port until the loop is resolved. After the port receives a Loop Detection Frame, it will immediately enter the **Shutdown** state first and then change to the **Blocking** state. At the start of the last 30 seconds of the **line loopback recovery** time, the port will return to the **Up** state. During the last 30 seconds of the **line loopback recovery** time, the port will enter the **Forwarding** state if no Loop Detection Frame was received by the port.

Example

This example shows how to configure the line loopback mode to the shutdown mode for Gigabit Ethernet port 1/0/1.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/1
ZEQUOxxxxRE(config-if)#line loopback mode shutdown
ZEQUOxxxxRE(config-if)#
```

4.11.4 line loopback recovery

This command is used to configure the auto-recovery time for line loopback. Use the **no** form of this command to disable auto-recovery.

Syntax

- **line loopback recovery** *SECONDS*
- **no line loopback recovery**

Parameters

Parameters	概要
<i>SECONDS</i>	Specifies the auto-recovery time in seconds. The valid range is from 60 to 86400 (seconds).

Default

By default, the auto-recovery time is 60 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

Use this command to configure the auto-recovery time for line loopback. When this is enabled and the loop is detected, the port state will return to normal after the auto-recovery time expires.

Example

This example shows how to configure the auto-recovery time to 100 seconds for Gigabit Ethernet port 1/0/1.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/1
ZEQUOxxxxRE(config-if)#line loopback recovery 100
ZEQUOxxxxRE(config-if)#
```

4.11.5 show line loopback configuration

This command is used to display the current line loopback control settings.

Syntax

show line loopback configuration

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level : 1

Usage Guideline

Use this command to display the line loopback setting and status.

Example

This example shows how to display the current line loopback settings and status.

```
ZEQUOxxxxRE#show line loopback configuration
```

```
Global Loop Detection Status : Enabled
Interface      Link      State      Loop Detect      Mode      Recovery      RecoveryTime
-----
G11/0/1        Up        Forwarding  Enabled          Shutdown  Enabled        100
G11/0/2        Down      Forwarding  Enabled          Block     Enabled        60
G11/0/3        Up        Forwarding  Enabled          Block     Enabled        60
G11/0/4        Down      Forwarding  Enabled          Block     Enabled        60
G11/0/5        Down      Forwarding  Enabled          Block     Enabled        60
G11/0/6        Down      Forwarding  Enabled          Block     Enabled        60
G11/0/7        Down      Forwarding  Enabled          Block     Enabled        60
G11/0/8        Down      Forwarding  Enabled          Block     Enabled        60
G11/0/9        Down      Forwarding  Enabled          Block     Enabled        60
G11/0/10       Down      Forwarding  Enabled          Block     Enabled        60
G11/0/11       Down      Forwarding  Enabled          Block     Enabled        60
G11/0/12       Down      Forwarding  Enabled          Block     Enabled        60
G11/0/13       Down      Forwarding  Enabled          Block     Enabled        60
G11/0/14       Down      Forwarding  Enabled          Block     Enabled        60
G11/0/15       Down      Forwarding  Enabled          Block     Enabled        60
G11/0/16       Down      Forwarding  Enabled          Block     Enabled        60
G11/0/17       Down      Forwarding  Enabled          Block     Enabled        60
G11/0/18       Down      Forwarding  Enabled          Block     Enabled        60
G11/0/19       Down      Forwarding  Enabled          Block     Enabled        60
G11/0/20       Down      Forwarding  Enabled          Block     Enabled        60
--More--
```

Display Parameters

Parameters	description
Interface	Indicates the port that has line loopback enabled.
Link	Indicates the link state of the port.
State	Indicates the port state.
Loop Detect	Indicates the line loop state.
Mode	Indicates the line loop mode.
Recovery	Indicates the auto-recovery state.
Recovery Time	Indicates the auto-recovery time.

4.11.6 show line loopback history

This command is used to display the line loopback history.

Syntax

show line loopback history

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level : 1

Usage Guideline

Use this command to display the line loopback history. This is saved in DRAM and can be saved to flash by using the **logging buffered [write-delay { SECONDS | infinite}]** command. When a loop is detected, the Switch records the looping message to syslog and loop history, and sends the SNMP private trap.

Example

This example shows how to display the line loopback history.

```
ZEQUOxxxxRE#show line loopback history
```

Entry	Time (YYYY/MM/DD HH:MM:SS)	Event
1	2017/06/28 20:13:07	The loop detected between port Gi1/0/9 and Gi1/0/10.
2	2017/06/28 20:13:55	The loop detected between port Gi1/0/15 and Gi1/0/16.

```
ZEQUOxxxxRE#
```

4.11.7 clear line loopback history

This command is used to clear the line loopback history saved in DRAM.

Syntax

clear line loopback histroy

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level : 12

Usage Guideline

Use this command to clear the line loopback history saved in DRAM.

Example

This example shows how to clear the line loopback history saved in DRAM.

```
ZEQUOxxxxRE#clear line loopback history
```

```
ZEQUOxxxxRE#
```

4.11.8 snmp-server enable traps line loopback

This command is used to enable the sending of SNMP notifications for line loopback. Use the **no** form of this command to revert to the default setting.

Syntax

snmp-server enable traps line loopback

no snmp-server enable traps line loopback

Parameters

None.

Default

By default, this feature is disabled

Command Mode

Global Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

This command is used to enable or disable the sending of SNMP notifications for line loopback.

Example

This example shows how to enable the sending of SNMP notifications for line loopback.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#snmp-server enable traps line loopback
ZEQUOxxxxRE(config)#
```

4.12 Unidirectional Link Detection (UDLD) Commands

4.12.1 udld enable

This command is used to enable UDLD on the specified port. Use the **no** form of this command to disable the function.

Syntax

- **udld enable**
- **no udld enable**

Parameters

None.

Default

By default, this option is disable.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration. UDLD provides a mechanism to detect unidirectional link for point-to-point Ethernet.

Example

This example shows how to enable UDLD on GigabitEthernet1/0/1.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/1
ZEQUOxxxxRE(config-if)#udld enable
ZEQUOxxxxRE(config-if)#
```

4.12.2 udld mode

This command is used to configure the UDLD mode on the specified port. Use the **no** form of this command to revert to the default setting.

Syntax

- **udld mode shutdown**
- **no udld mode**

Parameters

Parameters	description
shutdown	Specifies to shut down the port when the unidirectional link is detected.

Default

By default, this option is in the normal mode.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When configured to the shutdown mode and the unidirectional link is detected on the specified port. The port is disabled and an event is recorded in the system log.

Example

This example shows how to configure the UDLD mode to shutdown on GigabitEthernet1/0/1.


```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/1
ZEQUOxxxxRE(config-if)#udld mode shutdown
ZEQUOxxxxRE(config-if)#
```

4.12.3 udld detection-time

This command is used to configure the detection time of the unidirection link. Use the **no** form of this command to revert to the default setting.

Syntax

- **udld detection-time** *SECONDS*
- **no udld detection-time**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the detection time. The range is from 5 to 65535 seconds.

Default

By default, this time is 5 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command configure the time to identify whether the link is bidirectional. The link will be classified as unidirectional if it cannot be identified as bidirectional during the detection time.

Example

This example shows how to configure the detection time to 10 seconds.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#udld detection-time 10
ZEQUOxxxxRE(config)#
```

4.12.4 show udld

This command is used to display the information of UDLD.

Syntax

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

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed. This is only available for physical port 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.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the information of UDLD.

Example

This example shows how to display the information of UDLD on GigabitEthernet1/0/1.

```
ZEQUOxxxxRE#show udld interface gi1/0/1
```

```
Gi1/0/1
```

```
  Admin State      : Enabled
  Mode             : Shutdown
  Link State       : Bidirectional

  Neighbor MAC     : 00-50-40-xx-xx-xx
  Neighbor Port    : 1/0/3
  Neighbor State   : Bidirectional
```

```
ZEQUOxxxxRE#
```

5 Traffic Control

5.1 Access Control List (ACL) Commands

For network security protection, blocking unauthorized access from internal and external sources is important.

Access Control is a function to filter packet transfer by setting rules after checking the header information of packets that reach the switch. To use the Access Control function, you need to create an Access Control List (ACL), which defines filtering targets, conditions, and actions, and configure target ports and VLANs.

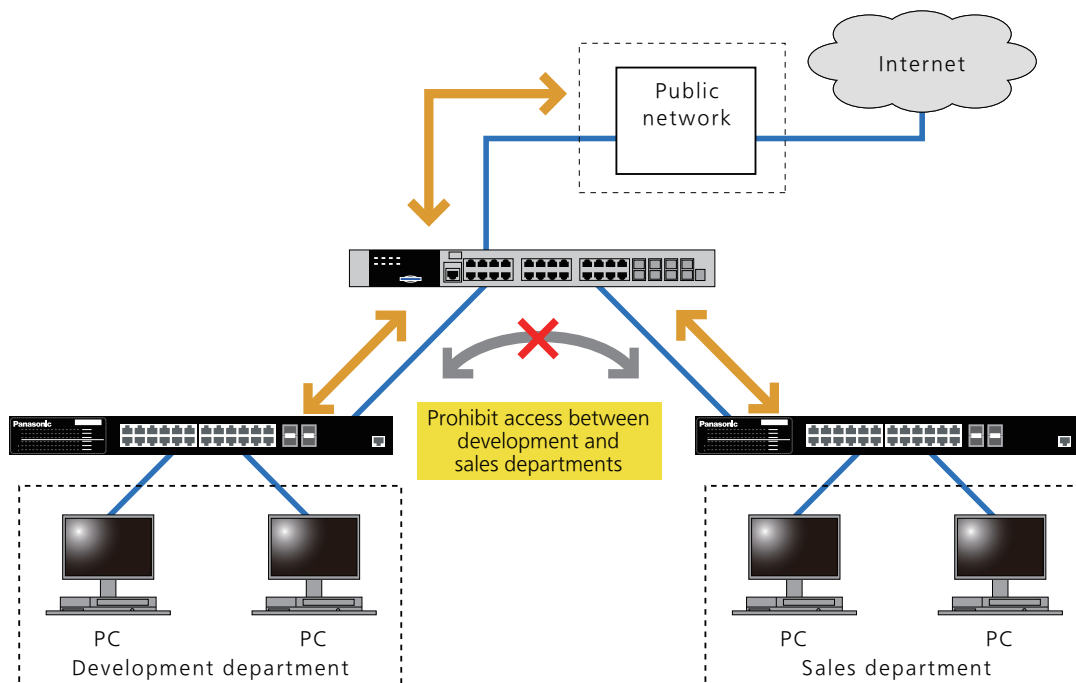


Figure 36-1 Access Control overview

5.1.1 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.

Syntax

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

- no access-list resequence

Parameters

Parameters	description
<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 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.

Command Default Level

Level: 12.

Usage Guideline

This feature allows the user to re-sequence the entries of a specified access list with an initial sequence number determined by the *STARTING-SEQUENCE-NUMBER* parameter and continuing in the increments determined by the *INCREMENT* parameter. If the highest sequence number exceeds the maximum possible sequence number, then there will be no re-sequencing. If a rule entry is created without specifying the sequence number, the sequence number will be automatically assigned. If it is the first entry, a start sequence number is assigned. Subsequent rule entries are assigned a sequence number that is 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.

```

ZEQUOxxxxRE# show access-list ip R&D

Extended IP access list R&D(ID: 3999)
 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

ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#ip access-list extended R&D
ZEQUOxxxxRE(config-ip-ext-acl)# 5 permit tcp any 10.30.0.0 0.0.255.255
ZEQUOxxxxRE(config-ip-ext-acl)# end
ZEQUOxxxxRE# show access-list ip R&D

Extended IP access list R&D(ID: 3999)
 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

ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)# access-list resequence R&D 1 2
ZEQUOxxxxRE(config)# end
ZEQUOxxxxRE# show access-list ip R&D

Extended IP access list R&D(ID: 3999)
 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

ZEQUOxxxxRE#

```

5.1.2 acl-hardware-counter

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

Syntax

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

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

Parameters

Parameters	description
access-group <i>ACCESS-LIST-NAME</i>	Specifies the name of the access list to be configured.
access-group <i>ACCESS-LIST-NUMBER</i>	Specifies the number of the access list to be configured.
vlan-filter <i>ACCESS-MAP-NAME</i>	Specifies the name of the access map to be configured.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

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

Example

This example shows how to enable the ACL hardware counter.

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


5.1.3 action

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

Syntax

- **action** { **forward** | **drop** | **redirect** *INTERFACE-ID* }
- **no action**

Parameters

Parameters	description
forward	Specifies to forward the packet when matched.
drop	Specifies to drop the packet when matched.
redirect <i>INTERFACE-ID</i>	Specifies the interface ID for the redirection action. Only physical ports are allowed to be specified.

Default

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

Command Mode

VLAN Access-map Sub-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE# show vlan access-map
VLAN access-map vlan-map 20
  match mac access list: ext_mac(ID: 7999)
  action: forward
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan access-map vlan-map 20
ZEQUOxxxxRE(config-access-map)# action redirect gil/0/5
ZEQUOxxxxRE(config-access-map)# end
ZEQUOxxxxRE# show vlan access-map
VLAN access-map vlan-map 20
  match mac access list: ext_mac(ID: 7999)
  action: redirect Gil/0/5
ZEQUOxxxxRE#
```

5.1.4 clear acl-hardware-counter

This command is used to clear the ACL hardware counter.

Syntax

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

Parameters

Parameters	description
access-group	Specifies to clear the access group.
<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 configured.
vlan-filter	Specifies to clear VLAN filter.
<i>ACCESS-MAP-NAME</i>	(Optional) Specifies the name of the access map to be cleared.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

This example shows how to clear the ACL hardware counter.

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

5.1.5 expert access-group

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

Syntax

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

Parameters

Parameters	description
<i>NAME</i>	Specifies the name of the expert access-list to be configured. The name can be up to 32 characters.
<i>NUMBER</i>	Specifies the number of the expert access list to be configured.
in	(Optional) Specifies to filter the incoming packets of the interface. If the direction is not specified, in is used.
out	(Optional) Specifies to filter the outgoing packets to transmit to the interface.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration.

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

If the access-list is assigned to the egress interface, rules that are for this access-list and with the TCP/UDP port range field will be ignored.

Example

This example shows how to apply an expert ACL to an interface. The purpose is to apply the ACL **exp_acl** on the GigabitEthernet1/0/2 to filter the incoming packets.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/2
ZEQUOxxxxRE(config-if)# expert access-group exp_acl in

  PROMPT: The remaining applicable EXPERT related access entries are 1920, remaining
range entries are 32.]

ZEQUOxxxxRE(config-if)#
```

5.1.6 expert access-list

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

Syntax

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

Parameters

Parameters	description
<i>NAME</i>	Specifies the name of the extended expert access list to be configured. The name can be up to 32 characters.
<i>NUMBER</i>	Specifies the ID number of expert access list. For extended expert access lists, the value is from 8000 to 9999.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

This example shows how to create an extended expert ACL.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#expert access-list extended exp_acl
ZEQUOxxxxRE(config-exp-nacl)#
```

5.1.7 ip access-group

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

Syntax

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

Parameters

Parameters	description
<i>NAME</i>	Specifies the name of the IP access list to be applied. The maximum length is 32 characters.
<i>NUMBER</i>	Specifies the number of the IP access list to be applied.
in	(Optional) Specifies that the IP access list will be applied to check packets in the ingress direction. If the direction is not specified, in is used.
out	(Optional) Specifies that the IP access list will be applied to check packets in the egress direction.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration.

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

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

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 GigabitEthernet1/0/2.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/2
ZEQUOxxxxRE(config-if)#ip access-group Strict-Control in

PROMPT: The remaining applicable IP related access entries are 3840, remaining range
entries are 32.
ZEQUOxxxxRE(config-if)#
```

5.1.8 ip access-list

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

Syntax

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

Parameters

Parameters	description
extended	(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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip access-list extended Strict-Control
ZEQUOxxxxRE(config-ip-ext-acl)# permit tcp any 10.20.0.0 0.0.255.255
ZEQUOxxxxRE(config-ip-ext-acl)# exit
ZEQUOxxxxRE(config)# ip access-list pim-srcfilter
ZEQUOxxxxRE(config-ip-acl)# permit host 172.16.65.193 any
ZEQUOxxxxRE(config-ip-acl)#
```

5.1.9 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.

Syntax

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

Parameters

Parameters	description
<i>NAME</i>	Specifies the name of the IPv6 access list to be applied.
<i>NUMBER</i>	Specifies the number of the IPv6 access list to be applied.
in	(Optional) Specifies that the IPv6 access list will be applied to check in the ingress direction. If the direction is not specified, in is used.
out	(Optional) Specifies that the IPv6 access list will be applied to check in the egress direction.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

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

Example

This example shows how to specify the IPv6 access list "ip6-control" as an IP access group for GigabitEthernet1/0/3.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/3
ZEQUOxxxxRE(config-if)#ipv6 access-group ip6-control
```

```
PROMPT: The remaining applicable IPv6 related access entries are 896, remaining
range entries are 32.
ZEQUOxxxxRE(config-if)#
```

5.1.10 ipv6 access-list

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

Syntax

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

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

Parameters

Parameters	description
extended	(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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

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

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

5.1.11 list-remark

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

Syntax

- **list-remark** *TEXT*
- **no list-remark**

Parameters

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

Default

None.

Command Mode

Access-list Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

```

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

ZEQUOxxxxRE#

```

5.1.12 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.

Syntax

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

Parameters

Parameters	description
<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.
in	(Optional) Specifies that the MAC access list will be applied to check in the ingress direction. If direction is not specified, in is used.
out	(Optional) Specifies that the MAC access list will be applied to check in the egress direction.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration.

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

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

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

Example

This example shows how to apply the MAC access list daily-profile to GigabitEthernet1/0/4.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/4
ZEQUOxxxxRE(config-if)#mac access-group daily-profile in
```

```
PROMPT: The remaining applicable MAC related access entries are 1280.
ZEQUOxxxxRE(config-if)#
```

5.1.13 mac access-list

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

Syntax

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

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

5.1.14 match ip address

This command is used to associate an IP access list for the configured sub-map. Use the **no** form of this command to remove the matched entry.

Syntax

- match ip address {*ACL-NAME* | *ACL-NUMBER*}
- no match ip address

Parameters

Parameters	description
<i>ACL-NAME</i>	Specifies the name of the ACL access list to be configured. The name can be up to 32 characters.

Parameters	description
<i>ACL-NUMBER</i>	Specifies the number of the IP ACL access list to be configured.

Default

None.

Command Mode

VLAN Access-map Sub-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to associate an IP access list with the configured sub-map. One sub-map can only be associated with one access list (IP access list, IPv6 access list, or MAC access list). The IP sub-map only checks IP packets. Newer commands will overwrite the previous settings.

Example

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

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

5.1.15 match ipv6 address

This command is used to associate IPv6 access lists for the configured sub-maps. Use the **no** form of this command to remove the matched entry.

Syntax

- match ipv6 address { *ACL-NAME* | *ACL-NUMBER* }
- no match ipv6 address

Parameters

Parameters	description
<i>ACL-NAME</i>	Specifies the name of the IPv6 ACL access list to be configured. The name can be up to 32 characters.
<i>ACL-NUMBER</i>	Specifies the number of the IPv6 ACL access list to be configured.

Default

None.

Command Mode

VLAN Access-map Sub-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to associate an IPv6 access list with the configured sub-map. One sub-map can only be associated with one access list (IP access list, IPv6 access list, or MAC access list). The IPv6 sub-map only checks IPv6 packets. Newer commands will overwrite the previous settings.

Example

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

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

5.1.16 match mac address

This command is used to associate MAC access lists for the configured sub-maps. Use the **no** form of this command to remove the matched entry.

Syntax

- **match mac address** { *ACL-NAME* | *ACL-NUMBER* }
- **no match mac address**

Parameters

Parameters	description
<i>ACL-NAME</i>	Specifies the name of the ACL MAC access list to be configured. The name can be up to 32 characters.
<i>ACL-NUMBER</i>	Specifies the number of the ACL MAC access list to be configured.

Default

None.

Command Mode

VLAN Access-map Sub-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to associate a MAC access list with the configured sub-map. One sub-map can only be associated with one access list (IP access list, IPv6 access list, or MAC access list). The MAC sub-map only checks non-IP packets. Newer commands will overwrite the previous settings.

Example

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

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

5.1.17 permit | deny (expert access-list)

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

Syntax

Extended Expert ACL:

[*SEQUENCE-NUMBER*] {**permit** | **deny**} *PROTOCOL* {*SRC-IP-ADDR SRC-IP-WILDCARD* | **host** *SRC-IP-ADDR* | **any**} {*SRC-MAC-ADDR SRC-MAC-WILDCARD* | **host** *SRC-MAC-ADDR* | **any**} {*DST-IP-ADDR DST-IP-WILDCARD* | **host** *DST-IP-ADDR* | **any**} {*DST-MAC-ADDR DST-MAC-WILDCARD* | **host** *DST-MAC-ADDR* | **any**} [**cos** *OUTER-COS* [*MASK*] [**vlan** *OUTER-VLAN* [*MASK*] [**fragments**] [**precedence** *PRECEDENCE* [*MASK*]] [**tos** *TOS* [*MASK*]] | **dscp** *DSCP* [*MASK*]] [**time-range** *PROFILE-NAME*]

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

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

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

no *SEQUENCE-NUMBER*

Parameters

Parameters	description
<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.

Parameters	description
<i>PROTOCOL</i>	(Optional) Specifies the IP protocol ID or one of the following protocol names. Available protocol names are eigrp , esp , gre , igmp , ospf , pim , vrrp , pcp and ipinip . If the protocol ID is specified, the <i>MASK</i> (0x0-0xff) parameter is optional. The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.
cos <i>OUTER-COS</i>	(Optional) Specifies the outer priority value. This value must be between 0 and 7.
<i>MASK</i>	(Optional) Specifies the outer priority mask (0x0-0x7). The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.
vlan <i>OUTER-VLAN</i>	(Optional) Specifies the outer VLAN ID.
<i>MASK</i>	(Optional) Specifies the outer VLAN ID mask (0x0-0xffff). The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.
any	Specifies to use any source MAC address, any destination MAC address, any source IP address, or any destination IP address.
host <i>SRC-MAC-ADDR</i>	Specifies a specific source host MAC address.
<i>SRC-MAC-ADDR SRC-MAC-WILDCARD</i>	Specifies a group of source MAC addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to bit value 0 will be checked.
host <i>DST-MAC-ADDR</i>	Specifies a specific destination host MAC address.
<i>DST-MAC-ADDR DST-MAC-WILDCARD</i>	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.
host <i>SRC-IP-ADDR</i>	Specifies a specific source host IP address.
<i>SRC-IP-ADDR SRC-IP-WILDCARD</i>	Specifies a group of source IP addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to the bit value 0 will be checked.
host <i>DST-IP-ADDR</i>	Specifies a specific destination host IP address.
<i>DST-IP-ADDR DST-IP-WILDCARD</i>	Specifies a group of destination IP addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to the bit value 0 will be checked.
precedence <i>PRECEDENCE</i>	(Optional) Specifies that packets can be filtered by precedence level, as specified by a number from 0 to 7.
<i>MASK</i>	(Optional) Specifies the precedence mask (0x0-0x7). The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.

Parameters	description
tos <i>TOS</i>	(Optional) Specifies that packets can be filtered by type of service level, as specified by a number from 0 to 15.
<i>MASK</i>	(Optional) Specifies the ToS mask (0x0-0xf). The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.
dscp <i>DSCP</i>	(Optional) Specifies the matching DSCP code in the 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.
<i>MASK</i>	(Optional) Specifies the DSCP mask (0x0-0x3f). The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.
lt <i>PORT</i>	(Optional) Specifies to match if less than the specified port number.
gt <i>PORT</i>	(Optional) Specifies to match if greater than the specified port number.
eq <i>PORT</i>	(Optional) Specifies to match if equal to the specified port number.
neq <i>PORT</i>	(Optional) Specifies to match if not equal to the specified port number.
range <i>MIN-PORT MAX-PORT</i>	(Optional) Specifies to match if falling within the specified range of ports.
mask <i>PORT MASK</i>	(Optional) Specifies to match ports defined by the mask. The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.
<i>TCP-FLAG</i>	(Optional) Specifies the TCP flag fields and the specified TCP header bits called ack (acknowledge), fin (finish), psh (push), rst (reset), syn (synchronize), or urg (urgent).
fragments	(Optional) Specifies the packet fragment's filtering.
time-range <i>PROFILE-NAME</i>	(Optional) Specifies the name of time period profile associated with the access list delineating its activation period.
<i>ICMP-TYPE</i>	(Optional) Specifies the ICMP message type. The valid number for the message type is from 0 to 255.
<i>ICMP-CODE</i>	(Optional) Specifies the ICMP message code. The valid number for the message code is from 0 to 255.

Parameters	description
<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, header, hop-limit, mld-query, mld-reduction, mld-report, nd-na, nd-ns, next-header, no-admin, no-route, packet-too-big, parameter-option, parameter-problem, port-unreachable, reassembly-timeout, redirect, renum-command, renum-result, renum-seq-number, router-advertisement, router-renumbering, router-solicitation, time-exceeded, unreachable.

Default

None.

Command Mode

Extended Expert Access-list Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

The user can use the **access-list resequence** command to change the start sequence number and the increment number of entries for the specified access list. After the command is applied, new entries without any specified sequence number will be assigned a number based on the 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 be more difficult 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.

Rules with the TCP/UDP port range field can only be assigned to ingress interfaces. If the access-list is assigned to the egress interface, rules that are for this access-list and with the TCP/UDP port range field will be ignored.

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# expert access-list extended exp_acl
ZEQUOxxxxRE(config-exp-nacl)# deny tcp host 192.168.4.12 host 0013.0049.8272 any any
ZEQUOxxxxRE(config-exp-nacl)#
```

5.1.18 permit | deny (ip access-list)

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

Syntax

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 | mask PORT MASK] {any | host DST-IP-ADDR | DST-IP-ADDR DST-IP-WILDCARD} [{eq | lt | gt | neq} PORT | range MIN-PORT MAX-PORT | mask PORT MASK] [TCP-FLAG] [[precedence PRECEDENCE [MASK]] [tos TOS [MASK]] | dscp DSCP [MASK]] [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 | mask PORT MASK] {any | host DST-IP-ADDR | DST-IP-ADDR DST-IP-WILDCARD} [{eq | lt | gt | neq} PORT | range MIN-PORT MAX-PORT | mask PORT MASK] [[precedence PRECEDENCE [MASK]] [tos TOS [MASK]] | dscp DSCP [MASK]] [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 [MASK]] [tos TOS [MASK]] | dscp DSCP [MASK]] [time-range PROFILE-NAME]
```

[*SEQUENCE-NUMBER*] {permit | deny} {gre | esp | eigrp | igmp | ipinip | ospf | pcp | pim | vrrp | protocol-id *PROTOCOL-ID* [*MASK*]} {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* [*MASK*]] [tos *TOS* [*MASK*]] | dscp *DSCP* [*MASK*]] [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* [*MASK*]] [tos *TOS* [*MASK*]] | dscp *DSCP* [*MASK*]] [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

Parameters	description
<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.
any	Specifies any source IP address or any destination IP address.
host <i>SRC-IP-ADDR</i>	Specifies a specific source host IP address.
<i>SRC-IP-ADDR SRC-IP-WILDCARD</i>	Specifies a group of source IP addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to the bit value 0 will be checked.
host <i>DST-IP-ADDR</i>	Specifies a specific destination host IP address.
<i>DST-IP-ADDR DST-IP-WILDCARD</i>	Specifies a group of destination IP addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to the bit value 0 will be checked.
precedence <i>PRECEDENCE</i>	(Optional) Specifies that packets can be filtered by precedence level, as specified by a number from 0 to 7.
<i>MASK</i>	(Optional) Specifies the precedence mask (0x0-0x7). The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.

Parameters	description
dscp <i>DSCP</i>	(Optional) Specifies the matching DSCP code in the 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.
mask	(Optional) Specifies the DSCP mask (0x0-0xf). The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.
tos <i>TOS</i>	(Optional) Specifies that packets can be filtered by type of service level, as specified by a number from 0 to 15.
mask	(Optional) Specifies the ToS mask (0x0-0xf). The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.
lt <i>PORT</i>	(Optional) Specifies to match if less than the specified port number.
gt <i>PORT</i>	(Optional) Specifies to match if greater than the specified port number.
eq <i>PORT</i>	(Optional) Specifies to match if equal to the specified port number.
neq <i>PORT</i>	(Optional) Specifies to match if not equal to the specified port number.
range <i>MIN-PORT MAX-PORT</i>	(Optional) Specifies to match if falling within the specified range of ports.
mask <i>PORT MASK</i>	(Optional) Specifies to match ports defined by the mask. The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.
TCP-FLAG	(Optional) Specifies the TCP flag fields and the specified TCP header bits called ack (acknowledge), fin (finish), psh (push), rst (reset), syn (synchronize), or urg (urgent).
fragments	(Optional) Specifies the packet fragment's filtering
time-range <i>PROFILE-NAME</i>	(Optional) Specifies the name of the time period profile associated with the access list delineating its activation period.
tcp, udp, igmp, ipinip, gre, esp, eigrp, ospf, pcp, pim, vrrp	Specifies Layer 4 protocols.
PROTOCOL-ID	(Optional) Specifies the protocol ID. The valid value is from 0 to 255.
MASK	(Optional) Specifies the protocol ID mask (0x0-0xff). The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.

Parameters	description
<i>ICMP-TYPE</i>	(Optional) Specifies the ICMP message type. The valid number for the message type is from 0 to 255.
<i>ICMP-CODE</i>	(Optional) Specifies the ICMP message code. The valid number for the message code is from 0 to 255.
<i>ICMP-MESSAGE</i>	(Optional) Specifies the ICMP message. The pre-defined parameters are available for selection: administratively-prohibited,alternate-address,conversion-error,host-prohibited,net-prohibited,echo,echo-reply,pointer-indicates-error,host-isolated,host-precedence-violation,host-redirect,host-tos-redirect,host-tos-unreachable,host-unknown,host-unreachable, information-reply,information-request,mask-reply,mask-request,mobile-redirect,net-redirect,net-tos-redirect,net-tos-unreachable, net-unreachable,net-unknown,bad-length,option-missing,packet-fragment,parameter-problem,port-unreachable,precedence-cutoff, protocol-unreachable,reassembly-timeout,redirect-message,router-advertisement,router-solicitation,source-quench,source-route-failed, time-exceeded,timestamp-reply,timestamp-request,traceroute,ttl-expired,unreachable.

Default

None.

Command Mode

IP Access-list Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

The user can use the **access-list resequence** command to change the start sequence number and the increment number of entries for the specified access list. After the command is applied, new entries without any specified sequence number will be assigned a number based on the 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 be more difficult 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 for network 10.20.0.0, permit TCP packets destined for host 10.100.1.2, permit all TCP packets go to TCP destination port 80 and permit all ICMP packets.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip access-list extended Strict-Control
ZEQUOxxxxRE(config-ip-ext-acl)# permit tcp any 10.20.0.0 0.0.255.255
ZEQUOxxxxRE(config-ip-ext-acl)# permit tcp any host 10.100.1.2
ZEQUOxxxxRE(config-ip-ext-acl)# permit tcp any any eq 80
ZEQUOxxxxRE(config-ip-ext-acl)# permit icmp any any
ZEQUOxxxxRE(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 for network 10.20.0.0, permit IP packets destined for host 10.100.1.2.

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

5.1.19 permit | deny (ipv6 access-list)

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

Syntax

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

```
[SEQUENCE-NUMBER] {permit | deny} {esp | pcp | sctp | protocol-id PROTOCOL-ID [MASK]} {any | host SRC-IPV6-ADDR | SRC-IPV6-ADDR/PREFIX-LENGTH} {any | host DST-IPV6-ADDR | DST-IPV6-ADDR/PREFIX-LENGTH} [fragments] [dscp VALUE [MASK] | traffic-class VALUE [MASK]] [flow-label FLOW-LABEL [MASK]] [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 [MASK] | traffic-class VALUE [MASK]] [flow-label FLOW-LABEL [MASK]] [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

Parameters	description
<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.
any	Specifies any source IPv6 address or any destination IPv6 address.
host <i>SRC-IPV6-ADDR</i>	Specifies a specific source host IPv6 address.
<i>SRC-IPV6-ADDR/PREFIX-LENGTH</i>	Specifies a source IPv6 network.
host <i>DST-IPV6-ADDR</i>	Specifies a specific destination host IPv6 address.
<i>DST-IPV6-ADDR/PREFIX-LENGTH</i>	Specifies a destination IPv6 network.
tcp, udp, icmp, esp, pcp, sctp	Specifies the Layer 4 protocol type.
dscp <i>VALUE</i>	(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.
<i>MASK</i>	(Optional) Specifies the DSCP mask (0x0-0x3f). The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.
traffic-class <i>VALUE</i>	(Optional) Specifies the matching traffic class value in the IPv6 header. The range is from 0 to 255.
<i>MASK</i>	(Optional) Specifies the traffic class mask (0x0-0xff). If not specified, 0xff is used.
lt <i>PORT</i>	(Optional) Specifies to match if less than the specified port number.
gt <i>PORT</i>	(Optional) Specifies to match if greater than the specified port number.
eq <i>PORT</i>	(Optional) Specifies to match if equal to the specified port number.
neq <i>PORT</i>	(Optional) Specifies to match if not equal to the specified port number.
range <i>MIN-PORT MAX-PORT</i>	(Optional) Specifies to match if falling within the specified range of ports.
mask <i>PORT MASK</i>	(Optional) Specifies to match ports defined by the mask. The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.

Parameters	description
<i>PROTOCOL-ID</i>	(Optional) Specifies the protocol ID. The valid value is from 0 to 255.
<i>MASK</i>	(Optional) Specifies the protocol ID mask (0x0-0xff). The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.
<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 ack (acknowledge), fin (finish), psh (push), rst (reset), syn (synchronize), or urg (urgent).
flow-label <i>FLOW-LABEL</i>	(Optional) Specifies the flow label value, within the range of 0 to 1048575.
<i>MASK</i>	(Optional) Specifies the flow label mask (0x0-0xfffff). The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.
fragments	(Optional) Specifies the packet fragment's filtering
time-range <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.

Command Default Level

Level: 12.

Usage Guideline

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

The user can use the **access-list resequence** command to change the start sequence number and the increment number of entries for the specified access list. After the command is applied, new entries without any specified sequence number will be assigned a number based on the 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 be more difficult 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 for network ff02::0:2/16, permit TCP packets destined for host ff02::1:2, permit all TCP packets go to port 80, and permit all ICMP packets.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 access-list extended ipv6-control
ZEQUOxxxxRE(config-ipv6-ext-acl)# permit tcp any ff02::0:2/16
ZEQUOxxxxRE(config-ipv6-ext-acl)# permit tcp any host ff02::1:2
ZEQUOxxxxRE(config-ipv6-ext-acl)# permit tcp any any eq 80
ZEQUOxxxxRE(config-ipv6-ext-acl)# permit icmp any any
ZEQUOxxxxRE(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 IPv6 packets destined for network ff02::0:2/16, and permit IPv6 packets destined for host ff02::1:2.

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

5.1.20 permit | deny (mac access-list)

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

Syntax

[*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* [*MASK*]] [**vlan** *VLAN-ID* [*MASK*]] [**time-range** *PROFILE-NAME*]

no *SEQUENCE-NUMBER*

Parameters

Parameters	description
<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.
any	Specifies any source MAC address or any destination MAC address.
host <i>SRC-MAC-ADDR</i>	Specifies a specific source host MAC address.
<i>SRC-MAC-ADDR</i> <i>SRC-MAC-WILDCARD</i>	Specifies a group of source MAC addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to the bit value 0 will be checked.
host <i>DST-MAC-ADDR</i>	Specifies a specific destination host MAC address.
<i>DST-MAC-ADDR</i> <i>DST-MAC-WILDCARD</i>	Specifies a group of destination MAC addresses by using a wildcard bitmap. The bit corresponding to the bit value 1 will be ignored. The bit corresponding to the bit value 0 will be checked.
ethernet-type <i>TYPE</i> <i>MASK</i>	(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, or arp.
cos <i>VALUE</i>	(Optional) Specifies the priority value of 0 to 7.
<i>MASK</i>	(Optional) Specifies the outer priority mask (0x0-0x7). The bit corresponding to the bit value 0 will be ignored. The bit corresponding to the bit value 1 will be checked.
vlan <i>VLAN-ID</i>	(Optional) Specifies the VLAN-ID.
<i>MASK</i>	(Optional) Specifies the outer VLAN ID mask (0x0-0x0fff). If not specified, 0x0fff is used.
time-range <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

MAC Access-list Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

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

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

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

Rules with the TCP/UDP port range field can only be assigned to ingress interfaces. If the access-list is assigned to the egress interface, the rules that are for this access-list and with the TCP/UDP port range field will be ignored.

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

Example

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

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


5.1.21 show access-group

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

Syntax

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

Parameters

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

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE# show access-group

Gi1/0/2:
  Inbound expert access-list : exp_acl(ID: 9999)
Gi1/0/3:
  Inbound ipv6 access-list   : ip6-control(ID: 14999)
Gi1/0/4:
  Inbound mac access-list    : daily-profile(ID: 7999)

ZEQUOxxxxRE#
```

5.1.22 show access-list

This command is used to display the access list configuration information.

Syntax

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

Parameters

Parameters	description
ip	(Optional) Specifies to display a listing of all IP access lists.
mac	(Optional) Specifies to display a listing of all MAC access lists.
ipv6	(Optional) Specifies to display a listing of all IPv6 access lists.
expert	(Optional) Specifies to display a listing of all expert access lists.
arp	(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.

Command Default Level

Level: 1.

Usage Guideline

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

Example

This example shows how to display all access lists.

```
ZEQUOxxxxRE#show access-list
```

Access-List-Name	Type
-----	-----
strict-control(ID: 3999)	ip ext-acl
daily-profile(ID: 7999)	mac ext-acl
exp_acl(ID: 9999)	expert ext-acl
ip6-control(ID: 14999)	ipv6 ext-acl
Total Entries: 4	

```
ZEQUOxxxxRE#
```

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

```
ZEQUOxxxxRE#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
```

```
ZEQUOxxxxRE#
```

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

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

```
extended IP access list simple-ip-acl(ID: 3999)
 10 permit tcp any 10.20.0.0 0.0.255.255 (Ing: 9991983 packets Egr: 3211439
packets)
 20 permit tcp any host 10.100.1.2 (Ing: 30452866 packets Egr: 23836237 packets)
 30 permit icmp any any (Ing: 66764143 packets Egr: 25643740 packets)

Counter enable on following port(s):
Ingress port(s): Gi1/0/5-1/0/8
Egress port(s): Gi1/0/3
```

```
ZEQUOxxxxRE#
```

5.1.23 show vlan access-map

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

Syntax

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

Parameters

Parameters	description
<i>MAP-NAME</i>	(Optional) Specifies the name of the VLAN access map being configured. The name can be up to 32 characters.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE#show vlan access-map

VLAN access-map vlan-map 10
  match ip access list: stp_ip1(ID: 1888)
action: forward
VLAN access-map vlan-map 20
  match mac access list: ext_mac(ID: 6995)
  action: redirect Gi1/0/5

ZEQUOxxxxRE#
```

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

```
ZEQUOxxxxRE# show vlan access-map

VLAN access-map vlan-map 10
  match ip access list: stp_ip1(ID: 1888)
  action: forward
  Counter enable on VLAN(s): 1-2
  match count: 8541 packets
VLAN access-map vlan-map 20
  match mac access list: ext_mac(ID: 6995)
  action: redirect Gi1/0/5
  Counter enable on VLAN(s): 1-2
  match count: 5647 packets

ZEQUOxxxxRE#
```

5.1.24 show vlan filter

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

Syntax

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

Parameters

Parameters	description
access-map <i>MAP-NAME</i>	(Optional) Specifies the name of the VLAN access map. The name can be up to 32 characters.
vlan <i>VLAN-ID</i>	(Optional) Specifies the VLAN ID.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

This example shows how to display VLAN filter information.

```
ZEQUOxxxxRE# show vlan filter

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

ZEQUOxxxxRE#

ZEQUOxxxxRE# show vlan filter vlan 5

VLAN ID 5
  VLAN Access Map: aa

ZEQUOxxxxRE#
```

5.1.25 vlan access-map

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

Syntax

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

Parameters

Parameters	description
<i>MAP-NAME</i>	Specifies the name of the VLAN access map to be configured. The name can be up to 32 characters.
<i>SEQUENCE-NUM</i>	(Optional) Specifies the sequence number of the sub-map. The valid range is from 1 to 65535.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

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

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

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

Example

This example shows how to create a VLAN access map.

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

5.1.26 vlan filter

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

Syntax

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

Parameters

Parameters	description
<i>MAP-NAME</i>	Specifies the name of the VLAN access map.
vlan-list <i>VLAN-ID-LIST</i>	Specifies the VLAN ID list.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

```
VLAN Map vlan-map
  Configured on VLANs: 5
```

```
ZEQUOxxxxRE#
```


5.2 QoS (Quality of Service) Commands

QoS (Quality of Service) is a function to allocate the optimum bandwidth according to the communication purpose to secure response time and throughput required for each communication.

It performs communication priority control based on the priority tag (priority information) added to the header of a receive packet.

It also allows to restrict bandwidth according to the priority tag for each port.

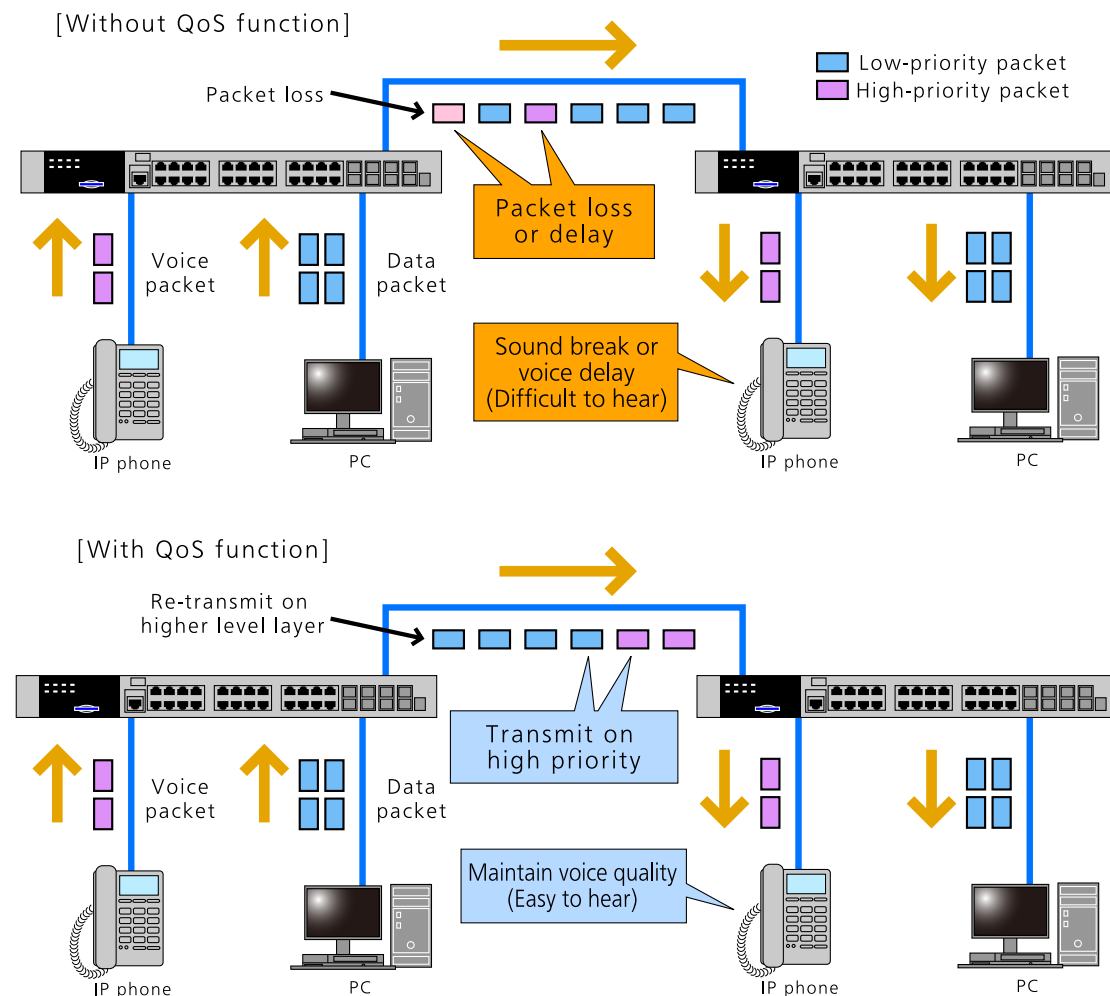


Figure 37-1 QoS overview

5.2.1 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.

Syntax

- **class** *NAME*
- **no class** *NAME*
- **class** class-default

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

This command enters the policy-map class configuration mode. All the traffic that does not match the proceeding defined class will be classified as class-default. If the specified name of class map does not exist, no traffic is classified to the class.

Example

This example shows how to define a policy map, policy1, which defines policies for the class "class-dscp-red". The packets that match DSCP 10, 12, or 14 will all be marked as DSCP 10 and be policed by a single rate policer.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# class-map class-dscp-red
ZEQUOxxxxRE(config-cmap)# match ip dscp 10,12,14
ZEQUOxxxxRE(config-cmap)# exit
ZEQUOxxxxRE(config)# policy-map policy1
ZEQUOxxxxRE(config-pmap)# class class-dscp-red
ZEQUOxxxxRE(config-pmap-c)# set ip dscp 10
ZEQUOxxxxRE(config-pmap-c)# police 1000000 2000 exceed-action set-dscp-transmit 0
ZEQUOxxxxRE(config-pmap-c)#

```

5.2.2 class-map

This command is used to create or modify a class-map that defines the criteria for packet matching, or enter the Class-map Configuration mode. Use the **no** form of this command to remove an existing class map from the Switch.

Syntax

- **class-map** [**match-all** | **match-any**] *NAME*
- **no class-map** *NAME*

Parameters

Parameters	description
match-all	(Optional) Specifies how to evaluate multiple match criteria. Multiple match statements in the class map will be evaluated based on the logical AND. If neither match-all nor match-any is specified, match-any is implied.
match-any	(Optional) Specifies how to evaluate multiple match criteria. Multiple match statements in the class map will be evaluated based on the logical OR. If neither match-all nor match-any is specified, match-any is implied.
<i>NAME</i>	Specifies the name of the class map with a maximum of 32 characters.

Default

By default, only class-default exists.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to create or modify a class-map that defines the criteria for matching packets. This command enters the Class-map Configuration mode where match commands are entered to define the match criteria for this class. When multiple match commands are defined for a class, use the **match-all** or **match-any** keyword to specify whether to evaluate the multiple match criteria based on either the logical AND or the logical OR.

Example

This example shows how to configure the "class_home_user" as the name of a class map. In this class map, a match statement specifies that the traffic that matches the access control list "acl_home_user" and matches the IPv6 protocol will be included under the class-map "class_home_user".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# class-map match-all class_home_user
ZEQUOxxxxRE(config-cmap)# match access-group name acl_home_user
ZEQUOxxxxRE(config-cmap)# match protocol ipv6
ZEQUOxxxxRE(config-cmap)#
```

5.2.3 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.

Syntax

- **match** { access-group name *ACCESS-LIST-NAME* | cos [inner] *COS-LIST* | [ip] dscp *DSCP-LIST* | [ip] precedence *IP-PRECEDENCE-LIST* | protocol *PROTOCOL-NAME* | vlan [inner] *VLAN-LIST* }
- **no match** { access-group name *ACCESS-LIST-NAME* | cos [inner] *COS-LIST* | [ip] dscp *DSCP-LIST* | [ip] precedence *IP-PRECEDENCE-LIST* | protocol *PROTOCOL-NAME* | vlan [inner] *VLAN-ID-LIST* }

Parameters

Parameters	description
access-group name <i>ACCESS-LIST-NAME</i>	Specifies an access list to be matched. Traffic that is permitted by the access list will be classified.
cos [inner] COS-LIST	Specifies a specific IEEE 802.1Q CoS value(s) to be matched. The <i>COS-LIST</i> parameter values are from 0 to 7. Enter one or more CoS values separated by commas or hyphen for a range list. inner - (Optional) Specifies to match the inner most CoS of QinQ packets on a Layer 2 class of service (CoS) marking.
[ip] dscp DSCP-LIST	Specifies differentiated service code point values to be matched. Enter one or more differentiated service code point (DSCP) values separated by commas or hyphen for a range list. The valid range is from 0 to 63. ip - (Optional) Specifies that the match is for IPv4 packets only. If not specified, the match is for both IPv4 and IPv6 packets.
[ip] precedence IP-PRECEDENCE-LIST	Specifies IP precedence values to be matched. Enter one or more precedence values separated by commas or hyphen for a range list. The valid range is from 0 to 7. ip - (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.
protocol PROTOCOL-NAME	Specifies the protocol name to be matched.
vlan [inner] VLAN-LIST	Specifies the VLAN identification number, numbers, or range of numbers to be matched. Valid VLAN identification numbers must be in the range of 1 to 4094. Enter one or more VLAN values separated by commas or hyphens for a range list. inner - (Optional) Specifies to match the inner-most VLAN ID in an 802.1Q double tagged frame.

Default

None.

Command Mode

Class-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

To use the **match** command, first enter the class-map command to specify the name of the class that will be used to establish the match criteria. The policy for handling these matched packets is defined in the policy-map class configuration mode.

The following lists the reference for the supported protocols for the match protocol command.

- **arp** - IP Address Resolution Protocol (ARP).
- **bgp** - Border Gateway Protocol.
- **dhc**p - 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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# class-map class-home-user
ZEQUOxxxxRE(config-cmap)# match access-group name acl-home-user
ZEQUOxxxxRE(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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# class-map cos
ZEQUOxxxxRE(config-cmap)# match cos 1,2,3
ZEQUOxxxxRE(config-cmap)#
```

This example shows how classes called voice and video-n-data are created to classify traffic based on the CoS values. QoS treatment is then given to the appropriate packets in the cos-based-treatment policy map (in this example, the QoS treatment is a single rate policer and a two rate policer for class voice and video-n-data respectively). The service policy configured in this example is attached to GigabitEthernet1/0/1.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# class-map voice
ZEQUOxxxxRE(config-cmap)# match cos 7
ZEQUOxxxxRE(config-cmap)# exit
ZEQUOxxxxRE(config)# class-map video-n-data
ZEQUOxxxxRE(config-cmap)# match cos 5
ZEQUOxxxxRE(config-cmap)# exit
ZEQUOxxxxRE(config)# policy-map cos-based-treatment
ZEQUOxxxxRE(config-pmap)# class voice
ZEQUOxxxxRE(config-pmap-c)# police 8000 1000 exceed-action drop
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# class video-n-data
ZEQUOxxxxRE(config-pmap-c)# police cir 500000 bc 10000 pir 1000000 be 10000 exceed-
action set-dscp-transmit 2 violate-action drop
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# exit
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# service-policy input cos-based-treatment
ZEQUOxxxxRE(config-if)#

```

5.2.4 mls qos aggregate-policer

This command is used to define a named aggregate policer for use in policy maps. Use the **no** form of this command to delete a named aggregate policer. The **mls qos aggregate-policer** command is for single rate policing and the **mls qos aggregate-policer cir** command is for two-rate policing.

Syntax

- **mls qos aggregate-policer** *NAME* *KBPS* [*BURST-NORMAL* [*BURST-MAX*]] [*conform-action ACTION*] *exceed-action ACTION* [*violate-action ACTION*] [*color-aware*]
- **mls qos aggregate-policer** *NAME* *cir CIR* [*bc CONFORM-BURST*] *pir PIR* [*be PEAK-BURST*] [*conform-action ACTION*] [*exceed-action ACTION*] [*violate-action ACTION*] [*color-aware*]
- **no mls qos aggregate-policer** *NAME*

Parameters

Parameters	description
<i>NAME</i>	Specifies the name of the aggregate policing rule. The <i>NAME</i> parameter can be up to 32 characters, is case sensitive. The policer names must start with an alphabetic character (not a digit) and must be unique across all aggregate policers.
<i>KBPS</i>	Specifies the average rate, in kilobits per second.
<i>BURST-NORMAL</i>	(Optional) Specifies the normal burst size in kilobytes.
<i>BURST-MAX</i>	(Optional) Specifies the maximum burst size, in kilobytes.
<i>CIR</i>	Specifies the committed information rate in Kbps. The committed packet rate is the first token bucket for the two-rate metering.
<i>PIR</i>	Specifies the peak information rate in Kbps. The peak information rate is the second token bucket for the two-rate metering.
<i>CONFORM-BURST</i>	(Optional) Specifies the burst size for the first token bucket in kilobytes.
<i>PEAK-BURST</i>	(Optional) Specifies the burst size for the second token bucket in kilobytes.
confirm-action	(Optional) Specifies the action to take on green color packets. If not specified, the default action is transmit .
exceed-action	Specifies the action to take on packets that exceed the rate limit. For two rate policer, if not specified, the default action is drop .
violation-action	(Optional) Specifies the action to take on packets that violate the normal and maximum burst sizes for single rate policing. Specifies the action to take for those packets that did not conform to both CIR and PIR. For a single rate policer, If violation-action is not specified, it will create a single rate two color policer. For a two rate policer, if not specified, the default action is the same as exceed-action .
<i>ACTION</i>	Specifies the action to take on packets. Specify one of the following keywords: drop - Drops the packet. set-dscp-transmit VALUE - Sets the IP DSCP value and transmits the packet with the new IP DSCP value. set-1p-transmit - Sets the 802.1p value and transmits the packet with the new value. transmit - Transmits the packet unaltered.
color-aware	(Optional) Specifies the option for the single rate three colors policer or two rates three colors policer. When color-aware is not specified, the policer works in the color blind mode. When color-aware is specified, the policer works in color aware mode.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

An aggregate policer can be shared by different policy map classes in a policy map. It cannot be shared by separate policy maps.

Example

This example shows how an aggregate policer named "agg-policer5" with a single rate two color policer is configured. This named aggregator policer is applied as the service policy for the class 1 and class 2 traffic class in the policy 2 policy map.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# mls qos aggregate-policer agg-policer5 10 1000 exceed-action drop
ZEQUOxxxxRE(config)# policy-map policy2
ZEQUOxxxxRE(config-pmap)# class class1
ZEQUOxxxxRE(config-pmap-c)# police aggregate agg_policer5
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# class class2
ZEQUOxxxxRE(config-pmap-c)# police aggregate agg_policer5
ZEQUOxxxxRE(config-pmap-c)#

```

5.2.5 mls qos cos

This command is used to configure the default Class of Service (CoS) value of a port. Use the **no** form of this command to revert to the default setting.

Syntax

- `mls qos cos { COS-VALUE | override }`
- `no mls qos cos`

Parameters

Parameters	description
<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.
override	Specifies to override the CoS of the packets. The default CoS will be applied to all incoming packets, tagged or untagged, received by the port.

Default

By default, this CoS value is 0.

By default, **override** is not specified.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the **override** option is not specified, the CoS of the packets will be the packet's CoS if the packets are tagged, and will be the port default CoS if the packet is untagged.

When the **override** option is specified, the port default CoS will be applied to all packets received by the port. Use the **override** keyword when all incoming packets on certain ports deserve a higher or lower priority than packets that enter from other ports. Even if a port was previously set to trust DSCP or CoS, this command overrides that trust state, and all CoS values on the incoming packets are changed to the default CoS value that is configured with the **mls qos cos** command. If an incoming packet is tagged, the CoS value of the packet is modified at the ingress port.

For packets arriving at the 802.1Q VLAN tunnel port, the port default CoS will be both the internal CoS assigned to the packet, and the CoS value in the tunnel VLAN tag of the transmitted packet.

Example

This example shows how the default CoS of GigabitEthernet1/0/1 is set to 3.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface g11/0/1
ZEQUOxxxxRE(config-if)# mls qos cos 3
ZEQUOxxxxRE(config-if)#
```

5.2.6 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.

Syntax

- `mls qos dscp-mutation DSCP-MUTATION-TABLE-NAME`
- `no mls qos dscp-mutation`

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

Use this command to attach an ingress DSCP mutation table to an interface. The ingress DSCP mutation will mutate the DSCP value right after the packet is received by the interface, and QoS handles the packet with this new value. The Switch sends the packet out the port with the new DSCP value.

Example

This example shows how to map DSCP 30 to the mutated DSCP value 8 and then attach the ingress-DSCP mutation map named “mutemap1” to GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# mls qos map dscp-mutation mutemap1 30 to 8
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# mls qos dscp-mutation mutemap1
ZEQUOxxxxRE(config-if)#
```

5.2.7 mls qos map cos-color

This command is used to define the CoS to color map for mapping a packet's initial color. Use the **no** form of this command to revert to the default setting.

Syntax

- `mls qos map cos-color COS-LIST to {green | yellow | red}`
- `no mls qos map cos-color`

Parameters

Parameters	description
<i>COS-LIST</i>	Specifies the list of CoS values to be mapped to a color. The range of CoS is from 0 to 7. The multiple CoS values in the list can be in the form separated by commas or a range list.
green	Specifies to be mapped to green.
yellow	Specifies to be mapped to yellow.
red	Specifies to be mapped to red.

Default

By default, all CoS values are mapped to the green color.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When packets enter the ingress port, they will be colored based on either the DSCP to color map (if the port is a trusted DSCP port) or the CoS to color map (if the port is a trusted CoS port).

Use the **mls qos map cos-color** command, in the interface configuration mode, to configure the CoS to color map. If the ingress port is set to trusted CoS ports, the received packet will be initialized to a color based on this map.

Example

This example shows how to define CoS value 1 to 7 as the red color and 0 as the green color for packets arriving at GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# mls qos map cos-color 1-7 to red
ZEQUOxxxxRE(config-if)#
```

5.2.8 mls qos map dscp-color

This command is used to define the DSCP to color map for the mapping of a packet's initial color. Use the **no** form of this command to revert to the default setting.

Syntax

- **mls qos map dscp-color** *DSCP-LIST* **to** {green | yellow | red}
- **no mls qos map dscp-color** *DSCP-LIST*

Parameters

Parameters	description
dscp <i>DSCP-LIST</i>	Specifies the list of DSCP code point to be mapped to a color. The range is from 0 to 63. The multiple DSCP values in the list can be in the form separated by commas or a range list.
green	Specifies to be mapped to green.
yellow	Specifies to be mapped to yellow.
red	Specifies to be mapped to red.

Default

There is no mapping. All DSCP code points are mapped to green color.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to define the DSCP to color map for the mapping of a packet's initial color.

Example

This example shows how to define DSCP 61 to 63 as the yellow color and any other IP packet is initialized with the green color at GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# mls qos map dscp-color 61-63 to yellow
ZEQUOxxxxRE(config-if)#
```

5.2.9 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.

Syntax

- **mls qos map dscp-cos** *DSCP-LIST* **to** *COS-VALUE*
- **no mls qos map dscp-cos** *DSCP-LIST*

Parameters

Parameters	description
dscp-cos <i>DSCP-LIST</i> to <i>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 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.

Command Default Level

Level: 12.

Usage Guideline

The DSCP to CoS map is used by a DSCP trust port to map a DSCP value to an internal CoS value. In turn this CoS value is then mapped to the CoS queue based on the CoS to queue map configured by the **priority-queue cos-map** command.

Example

This example shows how to configure the DSCP to CoS map for mapping DSCP 12, 16, and 18 to CoS 1 for GigabitEthernet1/0/6.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/6
ZEQUOxxxxRE(config-if)# mls qos map dscp-cos 12,16,18 to 1
ZEQUOxxxxRE(config-if)#
```

5.2.10 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.

Syntax

- **mls qos map dscp-mutation** *MAP-NAME* *INPUT-DSCP-LIST* **to** *OUTPUT-DSCP*
- **no mls qos map dscp-mutation** *MAP-NAME*

Parameters

Parameters	description
<i>MAP-NAME</i>	Specifies the name of the DSCP mutation map in a string length up to 32 characters (no space is allowed).

Parameters	description
<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. A series of DSCPs can be separated by commas (,) or hyphens (-). No space or hyphen is before and after.
<i>OUTPUT-DSCP</i>	Specifies the mutated DSCP value. The value is from 0 to 63.

Default

The output DSCP is equal to the input DSCP.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a packet is received by an interface, based on a DSCP mutation map, the incoming DSCP can be mutated to another DSCP immediately before any QoS operations. The DSCP mutation is helpful to integrate domains with different DSCP assignments.

When configuring a named DSCP mutation map, note the following:

- Enter multiple commands to map additional DSCP values to a mutated DSCP value.
- Enter a separate command for each mutated DSCP value.

The DSCP-CoS map and DSCP-color map will still be based on the packet's original DSCP. All the subsequent operations will base on the mutated DSCP.

Example

This example shows how to map DSCP 30 to the mutated DSCP value 8, DSCP 20 to the mutated DSCP 10, with the mutation map named "mutemap1".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# mls qos map dscp-mutation mutemap1 30 to 8
ZEQUOxxxxRE(config)# mls qos map dscp-mutation mutemap1 20 to 10
ZEQUOxxxxRE(config)#
```


5.2.11 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.

Syntax

- `mls qos scheduler {sp | rr | wrr | wdr}`
- `no mls qos scheduler`

Parameters

Parameters	description
sp	Specifies that all queues are in strict priority scheduling.
rr	Specifies that all queues are in round-robin scheduling.
wrr	Specifies the queues in the frame count weighted round-robin scheduling. If the weight of a queue be configured to zero, the queue is in the SP scheduling mode.
wdr	Specifies the queues of all ports in the frame length (quantum) weighted deficit round-robin scheduling. If the weight of a queue be configured to zero, the queue is in the SP scheduling mode.

Default

The default queue scheduling algorithm is WRR.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Specify schedule algorithms to WRR, SP, RR or WDRR for the output queue. By default, the output queue scheduling algorithm is WRR. WDRR operates by serving an accumulated set of backlogged credits in the transmit queue in a round robin order. Initially, each queue sets its credit counter to a configurable quantum value. Every time a packet from a CoS queue is sent, the size of the packet is subtracted from the corresponding credit counter and the service right

is turned over to the next lower CoS queue. When the credit counter drops below 0, the queue is no longer serviced until its credits are replenished. When the credit counters of all CoS queues reaches 0, the credit counters will be replenished at that time.

All packets are serviced until their credit counter is zero or negative and the last packet is transmitted completely. When this condition happens, the credits are replenished. When the credits are replenished, a quantum of credits are added to each CoS queue credit counter. The quantum for each CoS queue may be different based on the user configuration.

To set a CoS queue in the strict priority mode, any higher priority CoS queue must also be in the strict priority mode.

WRR operates by transmitting permitted packets into the transmit queue in a round robin order. Initially, each queue sets its weight to a configurable weighting. Every time a packet from a higher priority CoS queue is sent, the corresponding weight is subtracted by 1, and the packet in the next lower CoS queue will be serviced. When the weight of a CoS queue reaches zero, the queue will not be serviced until its weight is replenished. When weights of all CoS queues reach 0, the weights get replenished at a time.

Example

This example shows how to configure the queue scheduling algorithm to the strict priority mode.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# mls qos scheduler sp
ZEQUOxxxxRE(config-if)#
```

5.2.12 mls qos trust

This command is used to configure the trust state of a port to trust either the CoS field or the DSCP field of the arriving packet for subsequent QoS operation. Use the **no** form of this command to revert to the default setting.

Syntax

- **mls qos trust {cos | dscp}**
- **no mls qos trust**

Parameters

Parameters	description
cos	Specifies that the CoS bits of the arriving packets are trusted for subsequent QoS operations.
dscp	Specifies that the ToS/DSCP bits, if available in the arriving packets, are trusted for subsequent operations. For non-IP packet, Layer 2 CoS information will be trusted for traffic classification.

Default

By default, CoS is trusted.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the interface is set to trust DSCP, the DSCP of the arriving packet will be trusted for the subsequent QoS operations. First, the DSCP will be mapped to an internal CoS value, which will be subsequently used to determine the CoS queue. The DSCP to CoS map is configured by the **mls qos map dscp-cos** command. The CoS to queue map is configured by the **priority-queue cos-map** command. If the arriving packet is a non-IP packet, the CoS is trusted. The resulting CoS mapped from DSCP will also be the CoS in the transmitted packet.

When an interface is in the trust CoS state, the CoS of the arriving packet will be applied to the packet as the internal CoS and used to determine the CoS queue. The CoS queue is determined based on the CoS to Queue mapping table.

When a packet arrives at an 802.1Q VLAN tunnel port, the packet will be added with an outer VLAN tag in order to transmit through the VLAN tunnel. If the port is to trust CoS, then the inner tag CoS will be the internal CoS of the packet and the CoS value in the packet's outer VLAN tag. If the MLS QoS CoS override is configured, then the CoS specified by command **mls qos cos** will be the internal CoS of the packet and the CoS value in the packet's outer VLAN tag. If the port is to trust DSCP, then the CoS mapped from the DSCP code point will be the internal CoS of the packet and the CoS value in the packet's outer VLAN tag

When a packet is received by a port, it will be initialized to a color based on the **mls qos map dscp-color** command if the receiving port is to trust DSCP or MLS QoS mapped CoS color if the receiving port is to trust CoS.

Example

This example shows how to configure GigabitEthernet1/0/1 to trust the DSCP mode.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# mls qos trust dscp
ZEQUOxxxxRE(config-if)#
```

5.2.13 police

This command is used to configure traffic policing to use the single rate. Use the **no** form of this command to remove traffic policing.

Syntax

- **police** *KBPS* [*BURST-NORMAL* [*BURST-MAX*]] [*conform-action ACTION*] *exceed-action ACTION* [*violate-action ACTION*] [*color-aware*]
- **no police**

Parameters

Parameters	description
<i>KBPS</i>	Specifies the average rate, in kilobits per second.
<i>BURST-NORMAL</i>	(Optional) Specifies the normal burst size in kilobytes.
<i>BURST-MAX</i>	(Optional) Specifies the maximum burst size, in kilobytes.
confirm-action	(optional) Specifies the action to take on green color packets. If the action is not specified, the default action is to transmit.
exceed-action	Specifies the action to take on yellow color packets that exceed the rate limit.
violate-action	(Optional) Specifies the action to take on red color packets. When violate-action is not specified, the policer is a single rate two color policer. When violate-action is specified, the policer is a single rate three color policer.

Parameters	description
<i>ACTION</i>	Specifies the action to take on packets. Use one of the following keywords: drop - Drops the packet. set-dscp-transmit <i>VALUE</i> - Sets the IP differentiated services code point (DSCP) value and transmits the packet with the new IP DSCP value. set-1p-transmit - Sets the 802.1p value and transmits the packet with the new value. transmit - Transmits the packet. The packet is not altered.
color-aware	(Optional) Specifies the option for the single rate three colors policer. When color-aware is not specified, the policer works in the color blind mode. When color-aware is specified, the policer works in the color aware mode.

Default

None.

Command Mode

Policy-map Class Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **police** command to drop the packet or mark the packet with different quality of service (QoS) values based on conformance level of the packet.

Use the **police KBPS** command to create a single rate policer. Use the **police cir** command to create a two rate policer. There are two kinds of single rate policers (1) a single rate two color policer and (2) a single rate three color policer. If the violate action is specified in the **police KBPS** command, then the policer is three colors. If not specified, the policer is two colors.

As a packet arrives at a port, the packet will be initialized with a color. If the receive port trusts DSCP then the initial color of the packet is mapped from the incoming DSCP based on the DSCP to color map. If the receipt port trusts CoS then the initial color is mapped from the incoming CoS based on the CoS to color map.

A single rate two color policer can only work in color-blind mode. Both single rate three color policers and two rate three color policers can work in color aware mode. In color-blind mode, the final color of the packet is determined by the policer metering result alone. In color-aware mode, the final color of the packet is determined by the initial color of the packet and the policer metering result. In this case the policer may further downgrade the initial color.

After the policer metering action will be based on the final color. Conform action will be taken on green color packets, exceed-action will be taken on yellow color packets, and violate action will be taken on red color packets. When specifying actions, you cannot specify contradictory actions such as violate-action transmit and exceed-action drop.

The actions configured by the set command for a traffic class will be applied to all the packets belonging to the traffic class.

Example

This example shows how to define a traffic class and associate the policy with the match criteria for the traffic class in a policy map. The **service-policy** command is then used to attach this service policy to the interface. In this particular example, traffic policing is configured with an average rate of 8 kilobits per second and a normal burst size of 1 kilobyte for all ingress packets at GigabitEthernet1/0/1.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# class-map access-match
ZEQUOxxxxRE(config-cmap)# match access-group name acl_rd
ZEQUOxxxxRE(config-cmap)# exit
ZEQUOxxxxRE(config)# policy-map police-setting
ZEQUOxxxxRE(config-pmap)# class access-match
ZEQUOxxxxRE(config-pmap-c)# police 8 1 exceed-action drop
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# exit
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# service-policy input police-setting
ZEQUOxxxxRE(config-if)#

```

5.2.14 police aggregate

This command is used to configure a named aggregate policer as the policy for a traffic class in a policy map. Use the **no** form of this command to delete the name aggregate policer from a class policy.

Syntax

- **police aggregate** *NAME*
- **no police**

Parameters

Parameters	description
<i>NAME</i>	Specifies a previously defined aggregate policer name as the aggregate policer for a traffic class.

Default

None.

Command Mode

Policy-map Class Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **mls qos aggregate-policer** command in the global configuration mode to create a named aggregate policer. Then use the **police aggregate** command in the policy-map class configuration mode to configure the named aggregate policer as the policy for a traffic class. A named aggregate policer cannot be referenced from a different policy map. If a named aggregate policer is attached to multiple ingress ports, the metering operation of the policer will not be applied to the aggregate traffic but remains applied to the traffic received on the individual port.

Example

This example shows how to configure a named aggregate policer's parameters and apply the policer to multiple classes in a policy map: An aggregate policer with single rate policing named "agg_policer1" is created. This policer is configured as the policy for traffic class 1, 2, and 3.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# mls qos aggregate-policer agg_policer1 10000 16384 exceed-action drop
ZEQUOxxxxRE(config)# policy-map policy2
ZEQUOxxxxRE(config-pmap)# class class1
ZEQUOxxxxRE(config-pmap-c)# police aggregate agg_policer1
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# class class2
ZEQUOxxxxRE(config-pmap-c)# police aggregate agg_policer1
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# class class3
ZEQUOxxxxRE(config-pmap-c)# police aggregate agg_policer1
ZEQUOxxxxRE(config-pmap-c)#

```

5.2.15 police cir

This command is used to configure traffic policing for two rates, the CIR and the PIR. Use the **no** form of this command to remove two-rate traffic policing.

Syntax

- **police cir** *CIR* [**bc** *CONFORM-BURST*] **pir** *PIR* [**be** *PEAK-BURST*] [**conform-action** *ACTION*] [**exceed-action** *ACTION*] [**violate-action** *ACTION*] [**color-aware**]
- **no police**

Parameters

Parameters	description
<i>CIR</i>	Specifies the committed information rate in kilobits per second. The committed packet rate is the first token bucket for the two-rate metering.
<i>PIR</i>	Specifies the peak information rate in kilobits per second. The peak information rate is the second token bucket for the two-rate metering.
<i>CONFORM-BURST</i>	(Optional) Specifies the burst size for the first token bucket in kilobytes.
<i>PEAK-BURST</i>	(Optional) Specifies the burst size for the second token bucket in kilobytes.
confirm-action	(Optional) Specifies the action to take on green color packets. If not specified, the default action is transmit .

Parameters	description
exceed-action	(Optional) Specifies the action to take for those packets that conform to PIR but not to CIR. These packets are referred to as yellow color traffic. If not specified, the default action is drop .
violate-action	(Optional) Specifies the action to take for those packets that did not conform to both CIR and PIR. These packets are referred to as red color traffic. If not specified, the default action is the same as exceed-action .
<i>ACTION</i>	(Optional) Specifies the action to be taken. The actions can be: drop - Packets will be dropped. set-dscp-transmit <i>VALUE</i> - Sets the IP differentiated services code point (DSCP) value and transmits the packet with the new IP DSCP value. set-1p-transmit - Sets the 802.1p value and transmits the packet with the new value. transmit - Transmits the packet. The packet is not altered.
color-aware	(Optional) Specifies the option for a two rate three color policer. When color-aware is not specified, the policer works in the color blind mode. When color-aware is specified, the policer works in the color aware mode.

Default

None.

Command Mode

Policy-map Class Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

As a packet arrives at a port, the packet will be initialized with a color. The receiving port either trusts DSCP or CoS. The initial color of the packet is mapped from the DSCP in the incoming packet if the receiving port trusts DSCP. The initial color of the packet is mapped from the CoS in the incoming packet if the receiving port trusts CoS.

Both single rate three colors policers and two rate three color policers can work in color aware mode. In color-blind mode, the final color of the packet is determined by the policer metering result alone. In color-aware mode, the final color of the packet is determined by the initial color of the packet, and the policer metering result. The policer may further downgrade the initial color.

After the policer metering, and based on the final color, **conform-action** will be taken on green color packets, **exceed-action** will be taken on yellow color packets, and **violate-action** will be taken on red color packets. When specifying the actions, you cannot specify contradictory actions such as **violate-action transmit** and **exceed-action drop**.

The actions configured by the set command for the traffic class will be applied to all the packets belonging to the traffic class.

Example

This example shows how two-rate traffic policing is configured on a class called police to limit traffic to an average committed rate of 500 kbps and a peak rate of 1 Mbps, and the policy map named policy1 is attached to gi1/0/3.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# class-map police
ZEQUOxxxxRE(config-cmap)# match access-group name myAcl101
ZEQUOxxxxRE(config-cmap)# exit
ZEQUOxxxxRE(config)# policy-map policy1
ZEQUOxxxxRE(config-pmap)# class police
ZEQUOxxxxRE(config-pmap-c)# police cir 500 bc 10 pir 1000 be 10 exceed-action set-
dscp-transmit 2 violate-action drop
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# exit
ZEQUOxxxxRE(config)# interface gi1/0/3
ZEQUOxxxxRE(config-if)# service-policy output policy1
ZEQUOxxxxRE(config-if)#

```

5.2.16 policy-map

This command is used to enter the policy-map configuration mode and create or modify a policy map that can be attached to one or more interfaces as a service policy. Use the **no** form of this command to delete a policy map.

Syntax

- **policy-map** *NAME*
- **no policy-map** *NAME*

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

Use the **policy-map** command to enter the policy-map configuration mode from where the user can configure or modify the policy for the traffic class. A single policy map can be attached to more than one interface concurrently. The succeeding policy-map attaches overwrite the previous one.

Policy maps contain traffic classes. Traffic classes contain one or more match commands that can be used to match packets (and organize them into groups) on the basis of a protocol type or application.

Example

This example shows how to create a policy map called policy and configures two class policies within the policy map. The class policy called class1 specifies a policy for traffic that matches an access control list (ACL) "acl_rd". The second class is the default class, named class-default to include packets that do not match the defined classes.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# class-map class1
ZEQUOxxxxRE(config-cmap)# match access-group name acl_rd
ZEQUOxxxxRE(config-cmap)# exit
ZEQUOxxxxRE(config)# policy-map policy
ZEQUOxxxxRE(config-pmap)# class class1
ZEQUOxxxxRE(config-pmap-c)# set ip dscp 46
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# class class-default
ZEQUOxxxxRE(config-pmap-c)# set ip dscp 00
ZEQUOxxxxRE(config-pmap-c)#
```

5.2.17 priority-queue cos-map

This command is used to define a Class of Service (CoS) to queue map. Use the **no** form of this command to revert to the default setting.

Syntax

- **priority-queue cos-map** *QUEUE-ID COS1* [*COS2* [*COS3* [*COS4* [*COS5* [*COS6* [*COS7* [*COS8*]]]]]]]
- **no priority-queue cos-map**

Parameters

Parameters	description
<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</i> ... <i>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.

Command Default Level

Level: 12.

Usage Guideline

When a packet is received, the packet will be given an internal CoS. This internal CoS is used to select the transmit queue based on the CoS to queue map. The CoS queue with a higher number will receive a higher priority.

Example

This example shows how to assign CoS priority 3, 5 and 6 to queue 2.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# priority-queue cos-map 2 3 5 6
ZEQUOxxxxRE(config)#
```

5.2.18 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.

Syntax

- **queue** *QUEUE-ID* **rate-limit** { *MIN-BANDWIDTH-KBPS* | **percent** *MIN-PERCENTAGE* } { *MAX-BANDWIDTH-KBPS* | **percent** *MAX-PERCENTAGE* }
- **no queue** *QUEUE-ID* **rate-limit**

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the minimal and maximum bandwidth for a specified queue. When the minimal bandwidth is configured, the packet transmitted from the queue can be guaranteed. When the maximum bandwidth is configured, packets transmitted from the queue cannot exceed the maximum bandwidth even if the bandwidth is available.

When configuring the minimal bandwidth, the aggregate of the configured minimum bandwidth must be less than 75 percent of the interface bandwidth to make sure the configured minimal bandwidth can be guaranteed. It is not necessary to set the minimum guaranteed bandwidth for the highest strict priority queue. This is because the traffic in this queue will be serviced first if the minimal bandwidth of all queues is satisfied.

The configuration of this command can only be attached to a physical port but not a port-channel. That is the minimum guaranteed bandwidth of one CoS cannot be used across physical ports.

Example

This example shows how to configure the queue bandwidth, the minimum guaranteed bandwidth and maximum bandwidth of queue 1 of GigabitEthernet1/0/1 to 100Kbps and 2000Kbps respectively. Set the minimum guaranteed bandwidth and maximum bandwidth of queue 2 to 10% and 50% respectively.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# queue 1 rate-limit 100 2000
ZEQUOxxxxRE(config-if)# queue 2 rate-limit percent 10 percent 50
ZEQUOxxxxRE(config-if)#
```

5.2.19 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.

Syntax

- **rate-limit** {input | output} {*NUMBER-KBPS* | **percent** *PERCENTAGE*} [*BURST-SIZE*]
- **no rate-limit** {input | output}

Parameters

Parameters	description
input	Specifies the bandwidth limit for ingress packets.
output	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

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The specified limitation cannot exceed the maximum speed of the specified interface. For the ingress bandwidth limitation, the ingress will send a pause frame or a flow control frame when the received traffic exceeds the limitation.

Example

This example shows how the maximum bandwidth limits are configured on GigabitEthernet1/0/5. The ingress bandwidth is limited to 2000Kbps and 4096K bytes for burst traffic.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/5
ZEQUOxxxxRE(config-if)# rate-limit input 2000 4096
ZEQUOxxxxRE(config-if)#
```

5.2.20 service-policy

This command is used to attach a policy map to the input or output type on an interface. Use the **no** form of this command to remove a service policy from an input interface.

Syntax

- `service-policy {input | output} NAME`
- `no service-policy {input | output}`

Parameters

Parameters	description
<code>input</code>	Specifies to apply the policy map for ingress flow on the interface.
<code>output</code>	Specifies to apply the policy map for egress flow on the interface.
<code>NAME</code>	Specifies the name of a service policy map. The name can be a maximum of 32 alphanumeric characters.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to attach at most one policy map for each type (input or output) on an interface. This policy is attached to the interface for aggregate and controls the number or rate of packets. A packet arriving at a port will be treated based on the service policy attached to the interface.

Example

This example shows how two policy maps are defined: (1) `cust1-classes` and (2) `cust2-classes`.

For `cust1-classes`, `gold` is configured to match CoS 6 and be policed by a single rate policer with a committed rate of 800 Kbps. `Silver` is configured to match CoS 5 and be policed by a single rate policer with a committed rate of 2000Kbps, and `bronze` is configured to match CoS 0 and be policed by a single rate policer with a committed rate of 8000Kbps.

For cust2-classes, gold is configured to use Cos Queue 6 and be policed by a single rate policer with a committed rate of 1600 Kbps. Silver is policed by a single rate policer with a committed rate of 4000 Kbps, and bronze is policed by a single rate policer with a committed rate of 16000 Kbps.

The cust1-classes policy map is configured and then attached to interfaces GigabitEthernet1/0/1 and 1/0/2 for ingress traffic.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# class-map match-all gold
ZEQUOxxxxRE(config-cmap)# match cos 6
ZEQUOxxxxRE(config-cmap)# exit
ZEQUOxxxxRE(config)# class-map match-all silver
ZEQUOxxxxRE(config-cmap)# match cos 5
ZEQUOxxxxRE(config-cmap)# exit
ZEQUOxxxxRE(config)# class-map match-all bronze
ZEQUOxxxxRE(config-cmap)# match cos 0
ZEQUOxxxxRE(config-cmap)# exit
ZEQUOxxxxRE(config)# policy-map cust1-classes
ZEQUOxxxxRE(config-pmap)# class gold
ZEQUOxxxxRE(config-pmap-c)# police 800 2000 exceed-action set-dscp-transmit 0
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# class silver
ZEQUOxxxxRE(config-pmap-c)# police 2000 2000 exceed-action set-dscp-transmit 0
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# class bronze
ZEQUOxxxxRE(config-pmap-c)# police 8000 2000 exceed-action set-dscp-transmit 0
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# exit
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# service-policy input cust1-classes
ZEQUOxxxxRE(config-if)# exit
ZEQUOxxxxRE(config)# interface gil/0/2
ZEQUOxxxxRE(config-if)# service-policy input cust1-classes
ZEQUOxxxxRE(config-if)#

```

The cust2-classes policy map is configured and then attached to interface GigabitEthernet1/0/1 for ingress traffic.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# policy-map cust2-classes
ZEQUOxxxxRE(config-pmap)# class gold
ZEQUOxxxxRE(config-pmap-c)# police 1600 2000 exceed-action set-dscp-transmit 0
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# class silver
ZEQUOxxxxRE(config-pmap-c)# police 4000 2000 exceed-action set-dscp-transmit 0
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# class bronze
ZEQUOxxxxRE(config-pmap-c)# police 16000 2000 exceed-action set-dscp-transmit 0
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# exit
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# service-policy input cust2-classes
ZEQUOxxxxRE(config-if)#

```

5.2.21 set

This command is used to configure the new precedence field, DSCP field, and CoS field of the outgoing packet. The user can also specify the CoS queue for the packet.

Syntax

- **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

Parameters	description
precedence <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.
dscp <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.
cos <i>COS</i>	Specifies to assign a new CoS value to the packet. The range is from 0 to 7.
cos-queue <i>COS-QUEUE</i>	Specifies to assign the CoS queue to the packets. This overwrites the original CoS queue selection. Setting the CoS queue will not take effect if the policy map is applied for the egress flow on the interface.

Default

None.

Command Mode

Policy-map Class Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to set the DSCP field, CoS field, or precedence field of the matched packet to a new value. Use the **set cos-queue** command to directly assign the CoS queue to the matched packets.

Configure multiple set commands for a class if they are not conflicting.

The **set dscp** command will not affect the CoS queue selection. The **set cos-queue** command will not alter the CoS field of the outgoing packet. The user can use the **police** command and the **set** command for the same class. The **set** command will be applied to all colors of packets.

Example

This example shows how the policy map policy1 is configured with the policy for the class1 class. The packets that are included in the class1 class will be set to a DSCP of 10 and policed by a single rate policer with a committed rate of 1Mbps.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# policy-map policy1
ZEQUOxxxxRE(config-pmap)# class class1
ZEQUOxxxxRE(config-pmap-c)# set ip dscp 10
ZEQUOxxxxRE(config-pmap-c)# police 1000000 2000 exceed-action set-dscp-transmit 10
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)#
```

5.2.22 show class-map

This command is used to display the class map configuration.

Syntax

- **show class-map** [*NAME*]

Parameters

Parameters	description
<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.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display all class maps and their matching criteria.

Example

This example shows how two class maps are defined. Packets that match the access list "acl_home_user" belong to the class "c3", IP packets belong to the class "c2".

```
ZEQUOxxxxRE# 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

ZEQUOxxxxRE#
```

5.2.23 show mls qos aggregate-policer

This command is used to display the configured aggregated policer.

Syntax

- show mls qos aggregate-policer [*NAME*]

Parameters

Parameters	description
<i>NAME</i>	(Optional) Specifies the name of the aggregate policer.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the configured aggregated policer.

Example

This example shows how to display the aggregate policer.

```
ZEQUOxxxxRE# show mls qos aggregate-policer
```

```
mls qos aggregate-policer agg-policer5 10 1000 conform-action transmit exceed-action drop
mls qos aggregate-policer agg-policer5 cir 500 bc 10 pir 1000 be 10 conform-action transmit exceed-action set-dscp-transmit 2 violate-action drop
```

```
ZEQUOxxxxRE#
```

5.2.24 show mls qos interface

This command is used to display port level QoS configurations.

Syntax

- show mls qos interface *INTERFACE-ID* [, | -] {cos | scheduler | trust | rate-limit | queue-rate-limit | dscp-mutation | map {dscp-color | cos-color | dscp-cos}}

Parameters

Parameters	description
interface <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.

Parameters	description
cos	Specifies to display the port default CoS.
scheduler	Specifies to display the transmit queue scheduling settings.
trust	Specifies to display the port trust State.
rate-limit	Specifies to display the bandwidth limitation configured for the port.
queue-rate-limit	Specifies to display the bandwidth allocation configured for the queue.
dscp-mutation	Specifies to display the DSCP mutation map attached to the interface.
map dscp-color	Specifies to display the DSCP to color map.
map cos-color	Specifies to display the CoS to color map.
map dscp-cos	Specifies to display the mapping of DSCP to CoS

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display port level QoS configurations.

Example

This example shows how to display the default CoS for eth 1/0/2 to eth 1/0/5.

```
ZEQUOxxxxRE# show mls qos interface gil/0/2-5 cos
```

```
Interface  CoS   Override
-----  -
Gil/0/2    3       Yes
Gil/0/3    4       No
Gil/0/4    4       No
Gil/0/5    3       No
```

```
ZEQUOxxxxRE#
```

This example shows how to display the port trust state for eth 1/0/2 to eth 1/0/5.

```
ZEQUOxxxxRE# show mls qos interface gi1/0/2-1/0/5 trust
```

Interface	Trust State
-----	-----
Gi1/0/2	trust DSCP
Gi1/0/3	trust CoS
Gi1/0/4	trust DSCP
Gi1/0/5	trust CoS

```
ZEQUOxxxxRE#
```

This example shows how to display the scheduling configuration for gi1/0/1 to 1/0/2.

```
ZEQUOxxxxRE# show mls qos interface gi1/0/1-1/0/2 scheduler
```

Interface	Scheduler Method
-----	-----
Gi1/0/1	sp
Gi1/0/2	wrr

```
ZEQUOxxxxRE#
```

This example shows how to display the DSCP mutation maps attached to eth 1/0/1 to 1/0/2.

```
ZEQUOxxxxRE# show mls qos interface gi1/0/1-2 dscp-mutation
```

Interface	DSCP Mutation Map
-----	-----
Gi1/0/1	Mutate Map 1
Gi1/0/2	Mutate Map 2

```
ZEQUOxxxxRE#
```

This example shows how to display the bandwidth allocation for port 1/0/1 to 1/0/4.

```
ZEQUOxxxxRE# show mls qos interface gi1/0/1-4 rate-limit
```

Interface	Rx Rate	Tx Rate	Rx Burst	Tx Burst
-----	-----	-----	-----	-----
Gi1/0/1	1000 kbps	No Limit	64 kbyte	No Limit
Gi1/0/2	No Limit	2000 kbps	No Limit	2000 kbyte
Gi1/0/3	10%(100000 kbps)	20%(200000 kbps)	64 kbyte	64 kbyte
Gi1/0/4	2%	2000 kbps	64 kbyte	64 kbyte

```
ZEQUOxxxxRE#
```

This example shows how to display the CoS bandwidth allocation for eth 1/0/1 to 1/0/2.

```
ZEQUOxxxxRE# show ls qos interface gil/0/1-2 queue-rate-limit
```

```
Gil/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

```
Gil/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

```
ZEQUOxxxxRE#
```

This example shows how to display the DSCP to color map for port 1/0/1 to port 1/0/2.

```
ZEQUOxxxxRE# show mls qos interface gil/0/1-2 map dscp-color
```

```
Gil/0/1
```

```
DSCP 0-7 are mapped to green
DSCP 8-40 are mapped to red
DSCP 41-43 are mapped to yellow
```

```
Gil/0/2
```

```
DSCP 0 - 7 are mapped to green
```

```
ZEQUOxxxxRE#
```

This example shows how to display the CoS to color map for port 1/0/3 to port 1/0/4.

```
ZEQUOxxxxRE# show mls qos interface gil/0/3-4 map cos-color
```

```
Gil/0/3
```

```
CoS 0,1,2 are mapped to green
CoS 3-4 are mapped to yellow
CoS 6 are mapped to red
```

```
Gil/0/4
```

```
CoS 0,1-6 are mapped to green
```

```
ZEQUOxxxxRE#
```

This example shows how to display the DSCP to CoS map for port 1/0/1.


```
ZEQUOxxxxRE# show mls qos interface gil/0/1 map dscp-cos
```

```
Gil/0/1
  0  1  2  3  4  5  6  7  8  9
-----
00  00 00 00 00 00 00 00 00 01 01
10  01 01 01 01 01 01 02 02 02 02
20  02 02 02 02 03 03 03 03 03 01
30  03 03 04 04 04 04 04 04 04 04
40  05 05 05 05 05 05 05 05 06 06
50  06 06 06 06 06 06 07 07 07 07
60  07 07 07 07
```

```
ZEQUOxxxxRE#
```

5.2.25 show mls qos map dscp-mutation

This command is used to display the QoS DSCP mutation map configuration.

Syntax

- show mls qos map dscp-mutation [*MAP-NAME*]

Parameters

Parameters	description
<i>MAP-NAME</i>	(Optional) Specifies the name of the DSCP mutation map to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the QoS DSCP mutation map configuration.

Example

This example shows how to display the global DSCP mutation map.

```
ZEQUOxxxxRE#show mls qos map dscp-mutation
```

```
DSCP Mutation: mutation
```

```
Attaching interface:
```

```
Gi1/0/2-1/0/3,1/0/8-1/0/10
```

```

      0  1  2  3  4  5  6  7  8  9
-----
00  00 10 02 10 04 05 06 07 08 09
10  10 11 12 13 14 15 16 17 18 19
20  20 21 22 23 24 25 26 27 28 29
30  30 31 32 33 34 35 36 37 38 39
40  40 41 42 43 44 45 46 47 48 49
50  50 51 52 53 54 55 56 57 58 59
60  60 61 62 63
```

```
ZEQUOxxxxRE#
```

5.2.26 show mls qos queueing

This command is used to display the QoS queuing information and weight configuration for different scheduler algorithm on specified interface(s).

Syntax

- show mls qos queueing [interface *INTERFACE-ID* [, | -]]

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	(Optional) Specifies the interface ID on which the weight configuration of different scheduler.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

When the optional keyword **Interface** is entered, the weight configuration for different scheduler (WRR or WDRR) on the specified interface(s) will be displayed. If the interface is not specified, only the system-wide map of CoS to queue ID is displayed.

The scheduling mode which is configured by the **mls qos scheduler** command determines which weight configuration taking effect. Use the **show mls qos interface scheduler** command to get the scheduling mode of an interface.

Example

This example shows how to display the QoS queuing information.

```
ZEQUOxxxxRE#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

```
ZEQUOxxxxRE#
```

This example shows how to display the weight configuration for the different scheduler on GigabitEthernet1/0/3.

```
ZEQUOxxxxRE#show mls qos queueing interface gil/0/3
```

```
Interface: Gil/0/3
```

```
wrr bandwidth weights:
```

```
  QID  Weights
```

```
  ---  -
```

```
    0    1
```

```
    1    1
```

```
    2    1
```

```
    3    1
```

```
    4    1
```

```
    5    1
```

```
    6    1
```

```
    7    0
```

```
wdrr bandwidth weights:
```

```
  QID  Quantum
```

```
  ---  -
```

```
    0    1
```

```
    1    1
```

```
    2    1
```

```
    3    1
```

```
    4    1
```

```
    5    1
```

```
    6    1
```

```
    7    1
```

```
ZEQUOxxxxRE#
```

5.2.27 show policy-map

This command is used to display the policy map configuration.

Syntax

- show policy-map [*POLICY-NAME* | interface *INTERFACE-ID*]

Parameters

Parameters	description
<i>POLICY-NAME</i>	(Optional) Specifies the name of the policy map. If not specified, all policy maps will be displayed.
interface <i>INTERFACE-ID</i>	(Optional) Specifies the module and port number.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

The **show policy-map** command displays the class policies configured for the policy map. Use the **show policy-map** command to display the class policy configurations of any or all the existing service policy maps.

Example

This example shows how in the policy map called policy1, two-rate traffic policing has been configured for the class called police. Two-rate traffic policing has been configured to limit the traffic to an average committed rate of 500 kbps and a peak rate of 1 Mbps.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# class-map police
ZEQUOxxxxRE(config-cmap)# match access-group name acl_rd
ZEQUOxxxxRE(config-cmap)# exit
ZEQUOxxxxRE(config)# policy-map policy1
ZEQUOxxxxRE(config-pmap)# class police
ZEQUOxxxxRE(config-pmap-c)# police cir 500 bc 10 pir 1000 be 10 exceed-action set-
dscp-transmit 2 violate-action drop
ZEQUOxxxxRE(config-pmap-c)# exit
ZEQUOxxxxRE(config-pmap)# exit
ZEQUOxxxxRE(config)# interface gil/0/1
Router(config-if)# service-policy output policy1
Router(config-if)#
```

This example shows how to the display of the policy map called policy1, created above.

```
ZEQUOxxxxRE#show policy-map policy1

Policy Map policy1
Class Map police
police cir 500 bc 10 pir 1000 be 10 conform-action transmit exceed-action set-dscp-
transmit 2 violate-action drop

ZEQUOxxxxRE#
```

This example shows how to display all policy maps at GigabitEthernet 1/0/1.

```
ZEQUOxxxxRE#show policy-map interface gil/0/1
```

```
Policy Map: policy1 : output
Class Map police
police cir 500 bc 10 pir 1000 be 10 conform-action transmit exceed-action set-dscp-
transmit 2 violate-action drop
```

```
ZEQUOxxxxRE#
```

5.2.28 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.

Syntax

- **wdr queue bandwidth** *QUANTUM1*...*QUANTUM8*
- **no wdr queue bandwidth**

Parameters

Parameters	description
<i>QUANTUM1</i> ... <i>QUANTUM8</i>	Specifies the quantum (frame length count) value of every queue for weighted round-robin scheduling.

Default

By default, each quantum value is 1.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The configuration of this command takes effect when the scheduling mode is in the WDRR mode. Use the **mls qos scheduler wdr** command to change the scheduling mode to WDRR mode.

Example

This example shows how to configure the queue quantum of the WDRR scheduling mode, queue quantum of queue 0, queue 1, queue 2, queue 3, queue 4, queue 5, queue 6, queue 7 are 1, 2, 3, 4, 5, 6, 7, 8 respectively on GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# mls qos scheduler wdr
ZEQUOxxxxRE(config-if)# wdr-queue bandwidth 1 2 3 4 5 6 7 8
ZEQUOxxxxRE(config-if)#
```

5.2.29 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.

Syntax

- **wrr-queue bandwidth** *WEIGHT1...WEIGHT8*
- **no wrr-queue bandwidth**

Parameters

Parameters	description
<i>WEIGHT1 ...WEIGHT8</i>	Specifies the weight (frame count) value of every queue for weighted round-robin scheduling.

Default

By default, the weight value for *WEIGHT1* to *WIGHT7* is 1.
By default, the weight value for *WEIGHT8* is 0.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The configuration of this command takes effect when the scheduling mode is in the WRR mode. Use the **mls qos scheduler wrr** command to change the scheduling mode to WRR mode. To satisfy the behavior requirements of Expedited Forwarding (EF), the highest queue is always selected by the Per-hop Behavior (PHB) EF and the schedule mode of this queue should be strict priority scheduling. So the weight of the last queue should be zero while the Differentiate Service is supported.

Example

This example shows how to configure the queue weight of the WRR scheduling mode, queue weight of queue 0, queue 1, queue 2, queue 3, queue 4, queue 5, queue 6, queue 7 are 1, 2, 3, 4, 5, 6, 7, 8 respectively on GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# mls qos scheduler wrr
ZEQUOxxxxRE(config-if)# wrr-queue bandwidth 1 2 3 4 5 6 7 8
ZEQUOxxxxRE(config-if)#
```

5.3 WRED (Weighted Random Early Detection) Commands

5.3.1 random-detect

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

Syntax

- **random-detect** *COS-VALUE* [*profile ID*]
- **no random-detect** *COS-VALUE*

Parameters

Parameters	description
<i>COS-VALUE</i>	Specifies the CoS queues on which the WRED state will be set. The valid range is from 0 to 7.
<i>profile ID</i>	(Optional) Specifies the WRED profile that will be applied. If not specified, the default threshold setting is used.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a packet arrives, the current average queue size is calculated by hardware.

$$avg\_Qsize = current\_Qsize + \frac{old\_avg\_Qsize - current\_Qsize}{2^{weight}}$$

If the current average queue size is less than the minimum threshold value of the queue, the arriving packet is queued. If the current queue length is between the minimum threshold value and the maximum threshold value of the queue, the packet is either dropped or queued depending on the packet drop probability. The drop probability is calculated by the following formula.

$$\text{Drop Probability} = \frac{\text{avg\_Qsize} - \text{MinThreshold}}{\text{MaxThreshold} - \text{MinThreshold}} * \text{MaxDropRate}$$

If the average queue size is greater than the maximum threshold value of the queue, all packets will be dropped. If the specified profile does not exist, then default setting of the threshold will be associated.

Example

This example shows how to enable the WRED function on GigabitEthernet 1/0/1 queue 5 and apply the WRED profile 10.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# random-detect 5 profile 10
ZEQUOxxxxRE(config-if)#
```

5.3.2 random-detect exponential-weight

This command is used to configure the WRED exponential weight factor for the average queue size calculation for the queue. Use the **no** form of this command to revert to the default setting.

Syntax

- random-detect exponential-weight *COS-VALUE* exponent *VALUE*
- no random-detect exponential-weight *COS-VALUE*

Parameters

Parameters	description
<i>COS-VALUE</i>	Specifies CoS queues on which the exponent will be set. The valid range is from 0 to 7.
exponent <i>VALUE</i>	Specifies the exponent value from 0 to 15.

Default

The default exponential weight factor is 9.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the WRED exponential weight factor for the average queue size calculation for the queue.

Example

This example shows how to configure the exponent value to 10 on GigabitEthernet1/0/1 queue 5.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# random-detect exponential-weight 5 exponent 10
ZEQUOxxxxRE(config-if)#
```

5.3.3 random-detect profile

This command is used to configure the WRED profile. Use the **no** form of this command to revert to the default setting.

Syntax

- random-detect profile *ID* [tcp | non-tcp] [green | yellow | red] min-threshold *VALUE* max-threshold *VALUE* max-drop-rate *VALUE*
- no random-detect profile *ID*

Parameters

Parameters	description
<i>ID</i>	Specifies the ID of the WRED profile that will be set.
tcp	(Optional) Specifies the WRED drop parameters for the TCP packets to be set.
non-tcp	(Optional) Specifies the WRED drop parameters for non-TCP packets to be set.
green	(Optional) Specifies the WRED drop parameters for green packets to be set.

Parameters	description
yellow	(Optional) Specifies the WRED drop parameters for yellow packets to be set.
red	(Optional) Specifies the WRED drop parameters for red packets to be set.
min-threshold <i>VALUE</i>	Specifies the minimum queue size (in cells) to start WRED dropping.
max-threshold <i>VALUE</i>	Specifies the maximum queue size (in cells) over which WRED will drop all packets destined for this queue.
max-drop-rate <i>VALUE</i>	Specifies the drop probability when the average queue size reaches the maximum threshold. When this value is zero, then the packet will not be dropped or remarked for ECN.

Default

The minimum threshold is 20.
The maximum threshold is 80.
The maximum drop rate is 0.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Different types of packets can be queued in different bucket lists and different list can be specified with different threshold values.

Example

This example shows how to configure the WRED drop parameter for all types and color packets on profile 10.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# random-detect profile 10 min-threshold 30 max-threshold 50 max-
drop-rate 10
ZEQUOxxxxRE(config)#
```

This example shows how to configure the WRED drop parameter for TCP yellow and red packets on profile 10.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# random-detect profile 10 tcp yellow min-threshold 20 max-
threshold 40 max-drop-rate 5
ZEQUOxxxxRE(config)#
```

5.3.4 show queueing random-detect

This command is used to display the WRED configuration on the specified interface.

Syntax

- show queueing random-detect [interface *INTERFACE-ID* [, | -]]

Parameters

Parameters	description
interface <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.

Command Default Level

Level: 1.

Usage Guideline

This command will display the WRED configuration. If interface ID is not specified, the WRED configuration for all ports on the system will be displayed.

Example

This example shows how to display the WRED configuration and CoS queue status on GigabitEthernet 1/0/1.

```
ZEQUOxxxxRE#show queueing random-detect interface gil/0/1
```

Current WRED configuration:

```
Gil/0/1
CoS   WRED State   Exp-weight-constant   Profile
---   -
0     Disabled    9                     1
1     Disabled    9                     1
2     Disabled    9                     1
3     Disabled    9                     1
4     Disabled    9                     1
5     Enabled     10                    10
6     Disabled    9                     1
7     Disabled    9                     1
```

```
ZEQUOxxxxRE#
```

5.3.5 show random-detect profile

This command is used to display the WRED profile setting.

Syntax

- show random-detect profile [profile *ID*]

Parameters

Parameters	description
profile <i>ID</i>	(Optional) Specifies the WRED profile ID that will be displayed. If not specified, the configuration for all WRED profiles will be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the WRED profile setting.

Example

This example shows how to display the WRED profile 1 settings.

```
ZEQUOxxxxRE#show random-detect profile 1
```

WRED Profile 1			
Packet Type	Min-Threshold	Max-Threshold	Max-Drop-Rate
-----	-----	-----	-----
TCP-GREEN	20	80	1
TCP-YELLOW	20	80	5
TCP-RED	20	80	8
NON-TCP-GREEN	20	80	10
NON-TCP-YELLOW	20	80	10
NON-TCP-RED	20	80	10

```
ZEQUOxxxxRE#
```

5.4 Storm Control Commands

5.4.1 snmp-server enable traps storm-control

This command is used to enable and configure the sending of SNMP notifications for storm control. Use the no form of this command to disable the sending of SNMP notifications.

Syntax

- `snmp-server enable traps storm-control [storm-occur] [storm-clear]`
- `no snmp-server enable traps storm-control [storm-occur] [storm-clear]`

Parameters

Parameters	description
<code>storm-occur</code>	(Optional) Specifies to send a notification when a storm event is detected.
<code>storm-clear</code>	(Optional) Specifies to send a notification when a storm event is cleared.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

None.

Example

This example shows how to enable the sending of traps for storm control for both storm occurrences and clearances.

```
ZEQUO6600RE# configure terminal
ZEQUO6600RE(config)# snmp-server enable traps storm-control
ZEQUO6600RE(config)#
```

5.4.2 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.

Syntax

- **storm-control** { {**broadcast** | **multicast** | **unicast**} **level** {**pps** *PPS-RISE* [*PPS-LOW*] | **kpps** *KBPS-RISE* [*KBPS-LOW*] | *LEVEL-RISE* [*LEVEL-LOW*]} | **action** {**shutdown** | **drop** | **none**}}
- **no storm-control** {**broadcast** | **multicast** | **unicast** | **action**}

Parameters

Parameters	description
broadcast	Specifies to set the broadcast rate limit.
multicast	Specifies to set the multicast rate limit.
unicast	Specifies that when the action is configured as the shutdown mode, the unicast refers to both known and unknown unicast packet, that is, if the known and unknown unicast packets hit the specified threshold, the port will be shutdown. Otherwise, unicast refers to unknown unicast packets.
level pps <i>PPS-RISE</i> [<i>PPS-LOW</i>]	Specifies the threshold value in packets count per second. The range is from 1 to 2147483647. If the low PPS value is not specified, the default value is 80% of the specified risen PPS.
level kpps <i>KBPS-RISE</i> [<i>KBPS-LOW</i>]	Specifies the threshold value as a rate of bits per second at which traffic is received on the port. The range is from 1 to 2147483647. If the low KBPS is not specified, the default value is 80% of the specified risen KBPS.
level <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 1 to 100. If the low level is not specified, the default value is 80% of the specified risen level.

Parameters	description
action shutdown	Specifies to shut down the port when the value specified for rise threshold is reached.
action drop	Specifies to discards packets that exceed the risen threshold.
action none	Specifies not to filter the storm packets.

Default

By default, the broadcast, multicast, and unicast (DLF) storm controls are disabled.

The default action taken when a storm occurs is to drop storm packets.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the storm control function to protect the network from a 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.

When the upper threshold is exceeded, logging is performed and the assigned function is performed.

If it is below the lower threshold, only logging will be performed.

Example

This example shows how to enable broadcast storm control on GigabitEthernet1/0/1 and 1/0/2. It sets the threshold of GigabitEthernet1/0/1 to 500 packets per second with the shutdown action and sets the threshold of the interface port 3.2 to 70% with the drop action.

```
ZEQUO6600RE# configure terminal
ZEQUO6600RE(config)# interface gil/0/1
ZEQUO6600RE(config-if)# storm-control broadcast level pps 500
ZEQUO6600RE(config-if)# storm-control action shutdown
ZEQUO6600RE(config)# interface gil/0/2
ZEQUO6600RE(config-if)# storm-control broadcast level 70 60
ZEQUO6600RE(config-if)# storm-control action drop
ZEQUO6600RE(config-if)#
```

5.4.3 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.

Syntax

- storm-control polling {interval *SECONDS* | retries {*NUMBER* | infinite}}
- no storm-control polling {interval | retries}

Parameters

Parameters	description
interval <i>SECONDS</i>	Specifies the polling interval of received packet counts. This value must be between 1 and 300 seconds.
retries <i>NUMBER</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.

Command Default Level

Level: 12.

Usage Guideline

Use this to specify the sample interval of received packet counts.

Example

This example shows how to specify the polling interval as 15 seconds.

```
ZEQUO6600RE# configure terminal
ZEQUO6600RE(config)# storm-control polling interval 15
ZEQUO6600RE(config)#
```

5.4.4 show storm-control

This command is used to display the current storm control settings.

Syntax

- show storm-control interface *INTERFACE-ID* [, | -] [broadcast | multicast | unicast]

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	Specifies the port's 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.
broadcast	(Optional) Specifies to display the current broadcast storm setting.
multicast	(Optional) Specifies to display the current multicast storm setting.
unicast	(Optional) Specifies to display the current unicast (DLF) storm setting.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If the interface ID is not specified, all interfaces configurations will be displayed.
If the packet type is not specified, all types of storm control settings will be displayed.

Example

This example shows how to display the current broadcast storm control settings.

```
ZEQUO6600RE# show storm-control interface gil/0/1-1/0/6 broadcast
```

Interface	Action	Threshold	Current	State
Gil/0/1	Drop	500/300 pps	200 pps	Forwarding
Gil/0/2	Drop	80/64 %	20 %	Forwarding
Gil/0/3	Drop	80/64 %	70 %	Dropped
Gil/0/4	Shutdown	60/50 %	20 %	Forwarding
Gil/0/5	None	60000/50000 kbps	2000 kbps	Forwarding
Gil/0/6	None	-	-	Inactive

Total Entries: 6

```
ZEQUO6600RE#
```

This example shows how to display all interface settings for the range from GigabitEthernet 3/0/1 to port 3/0/2.

```
ZEQUO6600RE# show storm-control interface Gil/0/1-2
```

Polling Interval		: 15 sec	Shutdown Retries		: Infinite
Trap		: Disabled			
Interface	Storm	Action	Threshold	Current	State
Gil/0/1	Broadcast	Drop	80/64 %	50%	Forwarding
Gil/0/1	Multicast	Drop	80/64 %	50%	Forwarding
Gil/0/1	Unicast	Drop	80/64 %	50%	Forwarding
Gil/0/2	Broadcast	Shutdown	500/300 pps	-	Error Disabled
Gil/0/2	Multicast	Shutdown	500/300 pps	-	Error Disabled
Gil/0/2	Unicast	Shutdown	500/300 pps	-	Error Disabled

Total Entries: 6

```
ZEQUO6600RE#
```

Display Parameters

Parameters	description
Interface	The interface ID.
Action	The configured action, the possible actions are: Drop, Shutdown, None.
Threshold	The configured threshold.

Parameters	description
Current	The actual traffic rate which is currently flowing though the interface. Its unit may be percentage, kbps, PPS based on the configured meter mode. Because hardware can only counts by PPS, this value of this filed may be a rough value for percentage and kbps.
State	The current state of storm control on a given interface for a given traffic type. The possible states are: Forwarding: No storm event has been detected. Dropped: A storm event has occurred and the storm traffic exceeding the threshold is dropped. Error Disabled: The port is disabled due to a storm. Link Down: The port is physically linked down. Inactive: Indicates that storm control is not enabled for the given traffic type.

5.5 Filter NetBIOS Commands

5.5.1 deny netbios

This command is used to deny NetBIOS packets on the specified interface. Use the **no** form of this command to revert to the default setting.

Syntax

- deny netbios
- no deny netbios

Parameters

None.

Default

By default, NetBIOS packets are permitted.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Using this command to deny or permit NetBIOS packets on physical ports.

Example

This example shows how to deny NetBIOS packets on GigabitEthernet1/0/1.

```
ZEQUO6600RE#configure terminal
ZEQUO6600RE(config)#interface gil/0/1
ZEQUO6600RE(config-if)#deny netbios
ZEQUO6600RE(config-if)#
```

5.5.2 deny extensive-netbios

This command is used to deny NetBIOS packets over 802.3 frame on the specified interface. Use the **no** form of this command to revert to the default setting.

Syntax

- deny extensive-netbios
- no deny extensive-netbios

Parameters

None.

Default

By default, NetBIOS packets over 802.3 frame are permitted.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical ports. Using this command to deny or permit NetBIOS packets over 802.3 frame.

Example

This example shows how to deny NetBIOS packets over 802.3 frame on GigabitEthernet1/0/1.

```
ZEQUO6600RE#configure terminal
ZEQUO6600RE(config)#interface gil/0/1
ZEQUO6600RE(config-if)#deny extensive-netbios
ZEQUO6600RE(config-if)#
```

5.6 Egress buffer threshold

5.6.1 egress buffer threshold

This command is used to change the egress buffer threshold. Use the **no** form of this command to revert to the default setting.

Syntax

```
egress buffer threshold {high |mid |low}  
no egress buffer threshold
```

Parameter

パラメータ	概要
high	Set the egress buffer threshold to high.
mid	Set the egress buffer threshold to mid.
low	Set the egress buffer threshold to low.

Default

By default, egress buffer threshold are mid.

Command mode

Global Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

It is recommended to use the default settings for the egress buffer threshold. Change to high only in an environment where traffic that instantaneously exceeds the maximum traffic of the port occurs frequently.

Example

This example shows how a change to high for egress buffer threshold.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#egress buffer threshold high
```

5.6.2 show egress buffer threshold

This command is used to display the current egress buffer threshold.

Syntax

show egress buffer threshold

Parameter

None.

Default

None.

Command mode

User/Privileged EXEC Mode.

Command Default Level

Level : 1

Usage Guideline

This command is used to display the current egress buffer threshold.

Example

This example shows how to display the current egress buffer threshold.

```
ZEQUOxxxxRE#show egress buffer threshold

Egress Buffer Threshold State: High

ZEQUOxxxxRE#
```

6 Network Monitoring

6.1 SPAN

6.1.1 monitor session destination interface

This command is used to configure the destination interface for a monitor session, allowing packets on source ports to be monitored via a destination port. Use the **no** form of this command to remove the destination interface of the session.

Syntax

- **monitor session** *SESSION-NUMBER* **destination interface** *INTERFACE-ID*
- **no monitor session** *SESSION-NUMBER* **destination interface** *INTERFACE-ID*

Parameters

Parameters	description
<i>SESSION-NUMBER</i>	Specifies the session number for the monitor session. The valid range is 1 to 4.
<i>INTERFACE-ID</i>	Specifies the destination interface for the monitor session.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the destination interface for a local monitor session or the destination interface on the destination switch for an RSPAN 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. If you create multiple monitor sessions, you can create up to a total of four in the Tx and Rx directions.

To configure the destination switch of an RSPAN session, also use the **monitor session source remote vlan** command to configure the VLAN that the monitored source packets are tunneled to from the remote site.

Example

This example shows how to create a port monitor session with the session number 1. It assigns a physical port GigabitEthernet1/0/1 as the destination port and three physical source ports (GigabitEthernet1/0/2 to GigabitEthernet1/0/4) as monitor source ports.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# monitor session 1 destination interface gil/0/1
ZEQUOxxxxRE(config)# monitor session 1 source interface gil/0/2-4
ZEQUOxxxxRE(config)#
```

6.1.2 monitor session destination remote vlan

This command is used to configure the RSPAN VLAN and destination port for an RSPAN source session. Use the **no** form of this command to remove the configuration of the RSPAN VLAN.

Syntax

- **monitor session** *SESSION-NUMBER* **destination remote vlan** *VLAN-ID* **interface** *INTERFACE-ID*
- **monitor session** *SESSION-NUMBER* **destination remote vlan access-list** *ACCESS-LIST-NAME* **replace vlan** *VLAN-ID*
- **no monitor session** *SESSION-NUMBER* **destination remote vlan**

Parameters

Parameters	description
<i>SESSION-NUMBER</i>	Specifies the session number for the monitor session. The valid range is 1 to 4.

Parameters	description
<i>VLAN-ID</i>	Specifies the RSPAN VLAN used to tunnel the monitored packets to the remote site. The valid range is 2 to 4094.
interface <i>INTERFACE-ID</i>	Specifies the interface to transmit the monitored packets to the remote site.
access-list <i>ACCESS-LIST-NAME</i>	(Optional) Specifies the flow used to perform egress per flow RSPAN VLAN replacement. The flow will still be configured even if the access list does not exist.
replace vlan <i>VLAN-ID</i>	(Optional) Specifies the VLAN ID used to replace the RSPAN VLAN ID for the matched flow of packets transmitted out from the destination port on a RSPAN source switch. The valid range is from 1 to 4094.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command on the source switch of an RSPAN session.

The **monitor session destination remote vlan** command configures the destination port used to transmit the monitor packets and the RSPAN VLAN used to tag the monitored packets to the remote site. For each session, only one destination interface can be configured. The destination port does not need to be a member port of the RSPAN VLAN. The destination port can be either a physical port or a port channel.

Each session should be configured with a unique RSPAN VLAN. An interface cannot be specified for the command to transmit the monitored packets for multiple RSPAN sessions.

A flow can be defined by specifying an access list to be matched against the packets monitored by the session. The RSPAN VLAN ID is used to tunnel these packets and will be replaced by the Replace VLAN ID. For an RSPAN source session, multiple VLAN replacement flows can be configured. For remote sessions, it is suggested that the RSPAN VLAN is configured for dedicated use to monitor traffic only.

Use the **monitor session source interface** command to configure the source ports whose packets will be monitored.

Use the **remote-span** command in the VLAN configuration mode to specify a VLAN as an RSPAN VLAN. The monitored packet will be tunneled over the trunk member port of the RSPAN VLAN in the subsequent switches.

Example

This example shows how to create an RSPAN session on the source switch. It assigns VLAN 100 as the RSPAN VLAN with the destination GigabitEthernet1/0/6 and three source ports (GigabitEthernet1/0/2, GigabitEthernet1/0/3 and GigabitEthernet1/0/4) as the port being monitored.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# monitor session 2 source interface gil/0/2-4
ZEQUOxxxxRE(config)# monitor session 2 destination remote vlan 100 interface gil/0/6
ZEQUOxxxxRE(config)#
```

6.1.3 monitor session source interface

This command is used to configure the source port of a monitor session. Use the **no** form of this command to remove a source port from the monitor session.

Syntax

- **monitor session** *SESSION-NUMBER* **source interface** { *INTERFACE-ID* [, | -] [both | rx | tx] | cpu rx }
- **no monitor session** *SESSION-NUMBER* **source interface** { *INTERFACE-ID* [, | -] | cpu rx }

Parameters

Parameters	description
<i>SESSION-NUMBER</i>	Specifies the session number for the monitor session. The valid range is 1 to 4.
interface <i>INTERFACE-ID</i>	Specifies the source interface for a 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.
both	(Optional) Specifies to monitor the packets transmitted and received on the port.

Parameters	description
rx	(Optional) Specifies to monitor the packets received on the port.
tx	(Optional) Specifies to monitor the packets transmitted on the port.
cpu rx	Specifies the CPU receiving mirror. All packets received by the CPU are mirrored.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Both physical ports and port channels are valid as source interfaces of monitor sessions.

For a monitor session, multiple source interfaces can be specified, but only one destination interface can be specified. An interface cannot be a source interface of one session and destination port of another session simultaneously. An interface can be configured as destination interface of multiple sessions, but it can be a source interface of only one session.

If the direction is not specified, both transmitted and received traffic are monitored. This is the same as specifying **both**.

NOTE

For mirror packets in the Tx direction, the VLAN tag of the received VLAN ID is added.

Example

This example shows how to create a port monitor session with session number 1. It assigns a physical port gi1/0/1 as a destination port and three source physical ports (gi1/0/2 to gi1/0/4) as monitor source ports.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# monitor session 1 destination interface gi1/0/1
ZEQUOxxxxRE(config)# monitor session 1 source interface gi1/0/2-4
ZEQUOxxxxRE(config)#
```


6.1.4 monitor session source acl

This command is used to configure an access list for flow-based monitoring. Use the **no** form of this command to remove an access list for flow-based monitoring.

Syntax

- **monitor session** *SESSION-NUMBER* **source acl** *ACCESS-LIST-NAME*
- **no monitor session** *SESSION-NUMBER* **source acl** *ACCESS-LIST-NAME*

Parameters

Parameters	description
<i>SESSION-NUMBER</i>	Specifies the session number for the monitor session. The valid range is 1 to 4.
<i>ACCESS-LIST-NAME</i>	Specifies the flow-based mirror. Only the ingress mirror is supported and only MAC, IP, or IPv6 access lists can be monitored. Even if the access list does not exist, the flow-based mirror can still be configured.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only one access list can be monitored on a session at a time (One access list can include multiple flows). When an access list is monitored, the packet filtered by the access list that is applied to the hardware via the **access-group** or **vlan map** command will be monitored.

Example

This example shows how to create a monitor session with the session number 2. It assigns the MAC access list "MAC-Monitored-flow" as the monitor source.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# monitor session 2 destination interface gil/0/1
ZEQUOxxxxRE(config)# monitor session 2 source acl MAC-Monitored-flow
ZEQUOxxxxRE(config)#
```

6.1.5 monitor session source remote vlan

This command is used to configure the RSPAN VLAN for an RSPAN destination session. Use the **no** form of this command to remove the configuration.

Syntax

- **monitor session** *SESSION-NUMBER* **source remote vlan** *VLAN-ID*
- **no monitor session** *SESSION-NUMBER* **source remote vlan**

Parameters

Parameters	description
<i>SESSION-NUMBER</i>	Specifies the session number of the monitor session. The valid range is 1 to 4.
<i>VLAN-ID</i>	Specifies the VLAN that the monitored source packets are tunneled over from the remote site. The valid range is 2 to 4094.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command on the destination switch of an RSPAN session.

The **monitor session source remote vlan** command configures the VLAN that the monitored source packets are tunneled to from the remote site. Use the **monitor session destination interface** command to configure the destination port to transmit the monitored packets to.

Each session should be configured with a unique RSPAN VLAN. Use the **remote-span** command in the VLAN configuration mode to specify a VLAN as an RSPAN VLAN.

Example

This example shows how to create an RSPAN session on the destination switch. It assigns VLAN 100 as the RSPAN VLAN and GigabitEthernet1/0/4 as the destination port. It also assigns VLAN 100 as the RSPAN VLAN. The monitored packets arrive at GigabitEthernet2/0/1 and will be transmitted out from port GigabitEthernet2/0/4.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 100
ZEQUOxxxxRE(config-vlan)# remote-span
ZEQUOxxxxRE(config-vlan)# exit
ZEQUOxxxxRE(config)# interface gi2/0/1
ZEQUOxxxxRE(config-if)# switchport mode trunk
ZEQUOxxxxRE(config-if)# switchport trunk allowed vlan 100
ZEQUOxxxxRE(config-if)# exit
ZEQUOxxxxRE(config)# interface gi1/0/4
ZEQUOxxxxRE(config-if)# switchport mode access
ZEQUOxxxxRE(config-if)# switchport access vlan 100
ZEQUOxxxxRE(config-if)# exit
ZEQUOxxxxRE(config)# monitor session 2 source remote vlan 100
ZEQUOxxxxRE(config)# monitor session 2 destination interface gi2/0/4
ZEQUOxxxxRE(config)#
```

6.1.6 remote-span

This command is used to specify a VLAN as an RSPAN VLAN. Use the **no** form of this command to revert to a non-RSPAN VLAN.

Syntax

- **remote-span**
- **no remote-span**

Parameters

None.

Default

By default, 802.1Q VLAN is used.

Command Mode

VLAN Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **remote-span** command in the VLAN configuration mode to specify a VLAN as an RSPAN VLAN. When a VLAN is specified as an RSPAN VLAN, the MAC address learning option on the RSPAN VLAN is disabled. Use this command on any of the intermediate switches and the destination switch involved in the RSPAN session.

For any of the intermediate switches involved in a RSPAN session, the port that the monitored packets arrive on and the port that the monitored packets leave from need to be configured as tagged member ports of the RSPAN VLAN.

Example

This example shows how to assign VLAN 100 as the RSPAN VLAN on an intermediate switch in the RSPAN session. Interface GigabitEthernet1/0/1 is where the monitored packets arrive on and GigabitEthernet1/0/5 is where the monitored packets leave from.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface ethernet1/0/1
ZEQUOxxxxRE(config-if)# switchport mode trunk
ZEQUOxxxxRE(config-if)# switchport trunk allowed vlan 100
ZEQUOxxxxRE(config-if)# exit
ZEQUOxxxxRE(config)# interface ethernet1/0/5
ZEQUOxxxxRE(config-if)# switchport mode trunk
ZEQUOxxxxRE(config-if)# switchport trunk allowed vlan 100
ZEQUOxxxxRE(config-if)# exit
ZEQUOxxxxRE(config)# vlan 100
ZEQUOxxxxRE(config-vlan)# remote-span
ZEQUOxxxxRE(config-vlan)#
```

6.1.7 no monitor session

This command is used to delete a monitor session.

Syntax

- no monitor session *SESSION-NUMBER*

Parameters

Parameters	description
<i>SESSION-NUMBER</i>	Specifies the session number of the monitor session to be deleted. The valid range is from 1 to 4.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If a monitor session is deleted, all configuration for the session is removed.

Example

This example shows how to delete the monitor session with session number 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# no monitor session 1
ZEQUOxxxxRE(config)#
```

6.1.8 show monitor session

This command is used to display all or a specific monitor session.

Syntax

- show monitor session [*SESSION-NUMBER* | remote | local]

Parameters

Parameters	description
<i>SESSION-NUMBER</i>	(Optional) Specifies the session number which you want to display.
local	(Optional) Specifies to display the local session.
remote	(Optional) Specifies to display the remote RSPAN session.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If this command is used without specifying a session number, all monitor sessions are displayed.

Example

This example shows how to display a port monitor session with the session number 1.

```
ZEQUOxxxxRE#show monitor session

Session 1
  Session Type: local session
  Destination Port: Ethernet1/0/1
  Source Ports:
    Both:
      Ethernet1/0/2
      Ethernet1/0/3
      Ethernet1/0/4

Total Entries: 1

ZEQUOxxxxRE#
```

6.2 Remote Network MONitoring (RMON) Commands

6.2.1 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.

Syntax

- **rmon collection stats** *INDEX* [*owner NAME*]
- **no rmon collection stats** *INDEX*

Parameters

Parameters	description
<i>INDEX</i>	Specifies the 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.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration. 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 GigabitEthernet1/0/2.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/2
ZEQUOxxxxRE(config-if)# rmon collection stats 65 owner guest
ZEQUOxxxxRE(config-if)#
```

6.2.2 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.

Syntax

- **rmon collection history** *INDEX* [*owner NAME*] [*buckets NUM*] [*interval SECONDS*]
- **no rmon collection history** *INDEX*

Parameters

Parameters	description
<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.
<i>buckets 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.
<i>interval 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.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration. 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 GigabitEthernet1/0/8.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/8
ZEQUOxxxxRE(config-if)# rmon collection history 101 owner it@domain.com interval 2000
ZEQUOxxxxRE(config-if)#
```

6.2.3 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.

Syntax

- **rmon alarm** *INDEX VARIABLE INTERVAL* { **delta** | **absolute** } **rising-threshold** *VALUE* [*RIISING-EVENT-NUMBER*] **falling-threshold** *VALUE* [*FALLING-EVENT-NUMBER*] [**owner** *STRING*]
- **no rmon alarm** *INDEX*

Parameters

Parameters	description
<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 4294967295.
delta	Specifies that the delta of two consecutive sampled values is monitored.
absolute	Specifies that the absolute sampled value is monitored.
rising-threshold <i>VALUE</i>	Specifies the rising threshold. The valid range is from 0 to 4294967295.

Parameters	description
<i>RISING-EVENT-NUMBER</i>	(Optional) Specifies the index of the event entry that is used to notify the ringing threshold crossing event. The valid range is from 1 to 65535. If not specified, no action is taken while crossing the ringing threshold.
falling-threshold <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.
owner <i>STRING</i>	(Optional) Specifies the owner string. The maximum length is 127.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The RMON alarm facility periodically takes samples of the value of variables and compares them against the configured threshold.

Example

This example shows how to configure an alarm entry to monitor an interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(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
ZEQUOxxxxRE(config)#
```

6.2.4 rmon event

This command is used to configure an event entry. Use the **no** form of this command to remove an event entry.

Syntax

- `rmon event INDEX [log] [[trap COMMUNITY] [owner NAME] [description TEXT]`
- `no rmon event INDEX`

Parameters

Parameters	description
<i>INDEX</i>	Specifies the index of the alarm entry. The valid range is from 1 to 65535.
log	(Optional) Specifies to generate log message for the notification.
trap <i>COMMUNITY</i>	(Optional) Specifies to generate SNMP trap messages for the notification. The maximum length is 30.
owner <i>NAME</i>	(Optional) Specifies the owner string. The maximum length is 30.
description <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.

Command Default Level

Level: 12.

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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# rmon event 13 log owner it@domain.com description ifInNUcastPkts
is too much
ZEQUOxxxxRE(config)#
```

6.2.5 show rmon alarm

This command is used to display the alarm configuration.

Syntax

- show rmon alarm

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the RMON alarm table.

Example

This example shows how to display the RMON alarm table.

```
ZEQUOxxxxRE# 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
```

```
ZEQUOxxxxRE#
```

6.2.6 show rmon events

This command is used to display the RMON event table.

Syntax

- show rmon events

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the RMON event table.

Example

This example shows how to display the RMON event table.

```
ZEQUOxxxxRE# 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, 2017-03-02

Event 2, owned by manager2
  Description is Errors
  Event trigger action: log & trap
  Last triggered time:

ZEQUOxxxxRE#
```

6.2.7 show rmon history

This command is used to display RMON history statistics information.

Syntax

- show rmon history

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the history of the statistics for all of the configured entries.

Example

This example shows how to display RMON Ethernet history statistics.

```
ZEQUOxxxxRE# show rmon history

Index 23, owned by Manager, Data source is gigabitgi1/0/2
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

ZEQUOxxxxRE#
```

6.2.8 show rmon statistics

This command is used to display RMON Ethernet statistics.

Syntax

- show rmon statistics

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Statistics for all of the configured entries are displayed.

Example

This example shows how to display the RMON statistics.

```
ZEQUOxxxxRE# show rmon statistics
```

```
Index 32, owned by it@domain.com, Data Source is  gigabitgi1/0/2
  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
```

```
ZEQUOxxxxRE#
```

7 IP Setting

7.1 Basic IPv4 Commands

7.1.1 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.

Syntax

- **arp** *IP-ADDRESS HARDWARE-ADDRESS*
- **no arp** *IP-ADDRESS HARDWARE-ADDRESS*

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

7.1.2 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.

Syntax

- **arp timeout** *MINUTES*
- **no arp timeout**

Parameters

Parameters	description
<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. If this value is configured as 0, then ARP entries will never age out.

Default

The default value is 240 minutes.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

7.1.3 clear arp-cache

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

Syntax

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

Parameters

Parameters	description
all	Specifies to clear the dynamic ARP cache entries associated with all interfaces.
<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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE# clear arp-cache all
ZEQUOxxxxRE#
```

7.1.4 ip address

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

Syntax

- `ip address { IP-ADDRESS SUBNET-MASK [secondary] | dhcp}`
- `no ip address [IP-ADDRESS SUBNET-MASK | dhcp]`

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IP address.
<i>SUBNET-MASK</i>	Specifies the subnet mask for the associated IP address.
secondary	(Optional) Specifies that the configured address is a secondary IP address. If this keyword is not specified, the configured address is the primary IP address.
dhcp	Specifies to acquire an IP address configuration on an interface from the DHCP protocol.

Default

The default IP address for VLAN 1 is 0.0.0.0/0.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

This example shows how to set 10.108.1.27 is the primary address and 192.31.7.17 and 192.31.8.17 are secondary addresses for VLAN 100.

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

7.1.5 ip proxy-arp

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

Syntax

- ip proxy-arp
- no ip proxy-arp

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

7.1.6 ip local-proxy-arp

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

Syntax

- ip local-proxy-arp
- no ip local-proxy-arp

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

7.1.7 ip mtu

This command is used to set the MTU value. Use the **no** form of this command to revert to the default setting.

Syntax

- **ip mtu** *BYTES*
- **no ip mtu**

Parameters

Parameters	description
<i>BYTES</i>	Specifies to set the IP MTU value. The range is 512 to 16383 bytes.

Default

By default, the MTU value is 1500 bytes.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Some routing protocols, such as OSPF, will advertise this setting in the routing updates.

Example

This example shows how to set the IP MTU value as 6000 bytes for VLAN 4.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan4
ZEQUOxxxxRE(config-if) ip mtu 6000
ZEQUOxxxxRE(config-if)#
```

7.1.8 show arp

This command is used to display the ARP cache.

Syntax

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

Parameters

Parameters	description
<i>ARP-TYPE</i>	(Optional) Specifies the ARP type. dynamic – Specifies to display only dynamic ARP entries. static – Specifies to display only static ARP entries.
<i>IP-ADDRESS</i> [<i>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 network.
<i>HARDWARE-ADDRESS</i>	(Optional) Specifies to display ARP entries whose hardware address equal to this address

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

This example shows how to display the ARP cache.

```
ZEQUOxxxxRE# show arp
```

```
S - Static Entry
```

IP Address	Hardware Addr	IP Interface	Age (min)
S 10.108.42.112	00-50-40-10-4b-af	vlan100	forever
10.108.42.114	00-50-40-10-85-9b	vlan200	forever
10.108.42.121	00-50-40-10-68-cd	vlan300	125

```
Total Entries: 3
```

```
ZEQUOxxxxRE#
```

7.1.9 show arp timeout

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

Syntax

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

Parameters

Parameters	description
<code>interface <i>INTERFACE-ID</i></code>	(Optional) Specifies the interface ID.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

This example shows how to display the ARP aging time.

```
ZEQUOxxxxRE# show arp timeout

Interface                Timeout (minutes)
-----
vlan100                  30
vlan200                  40

Total Entries: 2

ZEQUOxxxxRE#
```

7.1.10 show ip interface

This command is used to display the IP interface information.

Syntax

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

Parameters

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

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE#show ip interface brief
```

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

Total Entries: 21

```
ZEQUOxxxxRE#
```

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

```
ZEQUOxxxxRE#show ip interface vlan 1
```

```
Interface vlan1 is enabled, Link status is up
IP address is 10.90.90.90/8 (Manual)
ARP timeout is 240 minutes.
IP MTU is 1500 bytes
Helper Address is not set
Proxy ARP is disabled
IP Local Proxy ARP is disabled
IP Directed Broadcast is disabled
gratuitous-send is disabled, interval is 0 seconds
```

Total Entries: 1

```
ZEQUOxxxxRE#
```

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

```
ZEQUOxxxxRE#show ip interface loopback 1
```

```
Interface loopback1 is enabled
IP address is 192.168.1.1/24 (Manual)
```

Total Entries: 1

```
ZEQUOxxxxRE#
```

7.1.11 ip directed-broadcast

This command is used to enable the conversion of IP directed broadcasts received by the interface to physical broadcasts when the destination network is directly connected to the Switch. Use the **no** form of this command to disable the conversion.

Syntax

- ip directed-broadcast
- no ip directed-broadcast

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the IP directed broadcast state for an interface. This command does not affect unicast routing of the IP directed broadcast, forwarding of the IP directed broadcast packet whose destination networks are not subnets local to the Switch.

This command only affects the forwarding of IP directed broadcast packets whose destination networks are subnets local to the Switch. If the IP directed broadcast option is enabled, then these packets are translated to broadcast and forwarded to all the hosts in the destination subnet. The forwarded interface can be the receiving interface or other interfaces of the Switch.

Example

This example shows how to enable the IP directed broadcast feature on the interface of VLAN 100.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan100
ZEQUOxxxxRE(config-if)# ip directed-broadcast
ZEQUOxxxxRE(config-if)#
```

7.2 Basic IPv6 Commands

7.2.1 clear ipv6 neighbors

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

Syntax

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

Parameters

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

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level : 12

Usage Guideline

This command will only clear dynamic neighbor cache entries.

Example

This example shows hoe to clear IPv6 neighbor cache entries associated with interface VLAN1.

```
ZEQUOxxxxRE# clear ipv6 neighbors interface vlan1  
ZEQUOxxxxRE#
```

7.2.2 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.

Syntax

- **ipv6 address** { *IPv6-ADDRESS/PREFIX-LENGTH* | *PREFIX-NAME SUB-BITS/PREFIX-LENGTH* | *IPv6-ADDRESS link-local* }
- **no ipv6 address** { *IPv6-ADDRESS/PREFIX-LENGTH* | *PREFIX-NAME SUB-BITS/PREFIX-LENGTH* | *IPv6-ADDRESS link-local* }

Parameters

Parameters	description
<i>IPv6-ADDRESS</i>	Specifies the IPv6 address and the length of prefix for the subnet.
<i>PREFIX-LENGTH</i>	Specifies the length of the prefix. The prefix of the IPv6 address is also a local subnet on the interface.
<i>PREFIX-NAME</i>	Specifies the name of the prefix with a maximum of 12 characters. The syntax allows characters for general string, but does not allow spaces.
<i>SUB-BITS</i>	Specifies the sub-prefix part and host part of the IPv6 address.
link-local	Specifies a link-local address to be configured.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

The IPv6 address can directly be specified by the user or configured based on a general prefix. The general prefix can be acquired by the DHCPv6 client. The general prefix does not need to exist before it can be used in the ipv6 address

command. The IPv6 address will not be configured until the general prefix is acquired. The configured IPv6 address will be removed when the general prefix is timeout or removed. The general prefix IPv6 address is formed by the general prefix in the leading part of bits and the sub-bits excluding the general prefix part in the remaining part of bits.

An interface can have multiple IPv6 addresses assigned using a variety of mechanisms, including manual configuration, stateless address configuration, and stateful address configuration.

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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan2
ZEQUOxxxxRE(config-if)# ipv6 address 3ffe:22:33:44::55/64
```

This example shows hoe to remove an IPv6 address.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan2
ZEQUOxxxxRE(config-if)# no ipv6 address 3ffe:22:3:44::55/64
```

7.2.3 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 formaed by the EUI-64 interface ID.

Syntax

- **ipv6 address** *IPIPv6-PREFIX/PREFIX-LENGTH* **eui-64**
- **no ipv6 address** *IPIPv6-PREFIX/PREFIX-LENGTH* **eui-64**

Parameters

Parameters	description
<i>IPV6-PREFIX</i>	Specified 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

Command Default Level

Level : 12

Usage Guideline

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

Example

This example shows hoe to add an IPv6 address incidence.

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

7.2.4 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.

Syntax

ipv6 address dhcp [rapid-commit]

no ipv6 address dhcp

Parameters

Parameters	description
rapid-commit	(Optional) Specifies to use a two-message exchange instead of the standard four-message exchange between the Requesting Router (RR) and the Delegating Router (DR) to obtain the network configuration settings from the DHCP Server.

Default

None.

Command Mode

Interface Configuration Mode

Command Default Level

Level : 12

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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 address dhcp
ZEQUOxxxxRE(config-if)#
```

7.2.5 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.

Syntax

ipv6 enable
no ipv6 enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 enable
ZEQUOxxxxRE(config-if)#
```

7.2.6 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.

Syntax

- **ipv6 hop-limit** *VALUE*
no ipv6 hop-limit

Parameters

Parameters	description
<i>VALUE</i>	Specifies the IPv6 hop limit range. Using the value 0 means to use the default value to send packets. The valid range is 0 to 255.

Default

The default value is 64.

Command Mode

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

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

Example

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

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

7.2.7 ipv6 mtu

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

Syntax

- **ipv6 mtu** *BYTES*

no ipv6 mtu

Parameters

Parameters	description
<i>BYTES</i>	Specifies to set the IPv6 MTU value. The range is 1280 to 65534 bytes.

Default

By default, the IPv6 MTU value is 1500 bytes.

Command Mode

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

The command is available for Layer 3 capable interface configuration. Use this command to configure the MTU to be advertised in RA messages. The IPv6 packet originated at the system will be transmitted based on this value. The check is done in the egress direction. Oversized packets will be sent to the supervisor blade for further processing.

Example

This example shows how to set the IPv6 MTU value as 6000 bytes at VLAN 4.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan4
ZEQUOxxxxRE(config-if) ip mtu 6000
ZEQUOxxxxRE(config-if) #
```

This example shows how to restore the default IPv6 MTU value.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan4
ZEQUOxxxxRE(config-if) # no ipv6 mtu
ZEQUOxxxxRE(config-if) #
```

7.2.8 ipv6 nd managed-config-flag

This command is used to turn on the management configuration flag in the advertised RA message. Use the **no** form of this command to turn off the flag.

Syntax

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

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

When the neighbor host receives the RA which has flag turned on, the host should use a stateful configuration protocol to obtain IPv6 addresses.

Example

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

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

7.2.9 ipv6 nd other-config-flag

This command is used to turn on the other configuration flag in the advertised RA message. Use the **no** form of this command to turn off the flag.

Syntax

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

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

By setting the other configuration flag on, the router instructs the connected hosts to use a stateful configuration protocol to obtain auto-configuration information other than the IPv6 address.

Example

This example show how to turn on the other configuration flag.

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

7.2.10 ipv6 nd prefix

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

Syntax

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

- **no ipv6 nd prefix** *IPV6-PREFIX/PREFIX-LENGTH*

Parameters

Parameters	description
<i>IPV6-PREFIX/PREFIX-LENGTH</i>	Specifies the IPv6 prefix to be created or advertised in the RA on the interface.
<i>VALID-LIFETIME</i> <i>PREFERRED-LIFETIME</i>	(Optional) Specifies the valid lifetime in seconds. This value must be between 0 and 4294967295. If not specified, the default valid lifetime value is 2592000 seconds (30 days).
<i>PREFERRED-LIFETIME</i>	(Optional) Specifies the preferred lifetime in seconds. This value must be between 0 and 4294967295. If not specified, the default preferred lifetime value is 604,800 seconds (7 days)
off-link	(Optional) Specifies to turn off the on-link flag. If not specified, the default off-link flag is ON.
no-autoconfig	(Optional) Specifies to turn off the auto-configure flag. If not specified, the default auto-configure flag is ON.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

The status of a prefix can be in one of the following combinations:

- Combination 1: Both the off-link and no-autoconfig options are not specified.
The prefix is inserted in the routing table.
L bit = 1, A bit = 1.
- Combination 2: The no-autoconfig option is specified.
The prefix is inserted in the routing table.
L bit = 1, A bit = 0.
- Combination 3: The off-link option is specified.
The prefix is not inserted in the routing table.
L bit = 0, A bit = 1.

For a prefix, the valid lifetime should be greater than the preferred lifetime. They are meaningful for a prefix that has the A bit ON. The received host will do the stateless address configuration based on the prefix. If the lifetime of a prefix has exceeded the preferred life time, 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.

Example

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

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

7.2.11 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.

Syntax

- ipv6 nd ra interval** *MAX-SECS* [*MIN-SECS*]
- no ipv6 nd ra interval**

Parameters

Parameters	description
<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

The default maximum interval is 200 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

The minimum interval time will never be less than 3 seconds.

Example

This example shows how to configure the IPv6 RA interval timer value.

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

7.2.12 ipv6 nd ra lifetime

This command is used to specify the lifetime value in the advertised RA. Use the **no** form of this command to revert to the default setting.

Syntax

- **ipv6 nd ra lifetime** *SECONDS*
no ipv6 nd ra lifetime

Parameters

Parameters	description
<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.

Command Default Level

Level : 12

Usage Guideline

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

Example

This example shows how to specify the lifetime value in the advertised RA.

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

7.2.13 ipv6 nd suppress-ra

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

Syntax

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

Parameters

None.

Default

RA is disabled on the VLAN interface.

Command Mode

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

Use this command to enable or disable the sending of RA messages on the interface.

Example

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

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

7.2.14 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.

Syntax

- **ipv6 nd reachable-time** *MILLI-SECONDS*
no ipv6 nd reachable-time

Parameters

Parameters	description
<i>MILLI-SECONDS</i>	Specifies the IPv6 router advertisement reachable time range in milliseconds. This value must be between 0 and 3600000 milliseconds, in multiples of 1000.

Default

The default value advertised in RA is 1200000.
The default value used by the router is 1200000 (1200 seconds).

Command Mode

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

The configured time is used by the router on the interface and is also advertised in the RA message. If the specified time is 0, the router will use 1200 seconds on the interface and advertise 1200 (unspecified) in the RA message. The reachable time is used by the IPv6 node in determining the reachability of the neighbor nodes.

Example

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

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

7.2.15 ipv6 nd ns-interval

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

Syntax

- **ipv6 nd reachable-time** *MILLI-SECONDS*
no ipv6 nd reachable-time *description*

Parameters

Parameters	description
<i>MILLI-SECONDS</i>	Specifies the amount of time between retransmissions of NS message in milliseconds. This value must be between 0 and 4294967295 milliseconds, in multiples of 1000.

Default

The default value advertised in RA is 0.

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

Command Mode

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

The configured time is used by the router on the interface and is also advertised in the 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 secondscc

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

7.2.16 ipv6 neighbor

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

Syntax

- **ipv6 neighbor** *IPV6-ADDRESS INTERFACE-ID MAC-ADDRESS*
- **no ipv6 neighbor** *IPV6-ADDRESS INTERFACE-ID*

Parameters

Parameters	description
<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

Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

Use this command to create a static IPv6 neighbor cache entry on an interface. 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 neighbor entry.

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 neighbor fe80::1 vlan1 00-50-40-11-22-99
ZEQUOxxxxRE(config)#
```

7.2.17 show ipv6 general-prefix

This command is used to display IPv6 general prefix information.

Syntax

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

Parameters

Parameters	description
<i>PREFIX-NAME</i>	(Optional) Specifies the name of the general prefix to be displayed. If the general prefix name is not specified, all general prefixes will be displayed. The general prefix name can be up to 12 characters.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level : 1

Usage Guideline

Use this command to display information of IPv6 general prefixes.

Example

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

```
ZEQUOxxxxRE# show ipv6 general-prefix

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

Total Entries: 1

ZEQUOxxxxRE#
```

7.2.18 show ipv6 interface

This command is used to display IPv6 interface information.

Syntax

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

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface for display.
brief	(Optional) Specifies to display brief information.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level : 1

Usage Guideline

Use this command to display IPv6 interface related configurations.

Example

This example shows how to display IPv6 interface information.

```
ZEQUOxxxxRE# show ipv6 interface vlan2

vlan2 is up, Link status is down
  IPv6 is enabled,
  link-local address:
    FE80::201:1FF:FE02:305
  Global unicast address:
    200::2/64 (DHCPv6 PD)
  IPv6 MTU is 1500 bytes
  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

ZEQUOxxxxRE#
```

This example shows how to display brief IPv6 interface information.

```
ZEQUOxxxxRE# 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

ZEQUOxxxxRE#
```

7.2.19 show ipv6 neighbors

This command is used to display IPv6 neighbor information.

構文

- **show ipv6 neighbors** [*INTERFACE-ID*] [*IPv6-ADDRESS*]

Parameters

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

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level : 1

Usage Guideline

Use this command to display the IPv6 neighbor cache entry.

Example

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

```
ZEQUOxxxxRE# show ipv6 neighbors

IPv6 Address                               Link-Layer Addr  Interface Type State
-----
FE80::200:11FF:FE22:3344                  00-50-40-22-33-44  vlan1      D    REACH

Total Entries: 1

ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Type	D - Dynamic learning entry. S - Static neighbor entry.

Parameters	description
State	INCOMP (Incomplete) - Address resolution is being performed on the entry, but the corresponding neighbor advertisement message has not yet been received. REACH (Reachable) - Corresponding neighbor advertisement message was received and the reachable time (in milliseconds) has not elapsed yet. It indicates that the neighbor was functioning properly. STALE - More than the reachable time (in milliseconds) have elapsed since the last confirmation was received. PROBE - Sending the neighbor solicitation message to confirm the reachability. DELAY - 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.

7.3 ARP Refresh Commands

7.3.1 arp refresh before-time-out

This command is used to enable the sending of ARP packets before ARP timeout. Use the **no** form of this command to disable the function.

Syntax

arp refresh before-time-out
no arp refresh before-time-out

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level : 15

Usage Guideline

Use this command to enable the sending of ARP packets before ARP timeout.

実行例

This example shows how to enable the sending of ARP packets before ARP timeout.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#arp refresh before-time-out
ZEQUOxxxxRE(config)#
```

7.3.2 show arp refresh before-time-out

This command is used to display the status of the ARP refresh before timeout.

Syntax

show arp refresh before-time-out

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level : 1

Usage Guideline

Use this command to display the status of the ARP refresh before timeout.

Example

This example shows how to display the status of the ARP refresh before timeout.

```
ZEQUOxxxxRE#show arp refresh before-time-out
```

```
Arp refresh timeout state is : Enabled
```

```
ZEQUOxxxxRE#
```

7.4 Gratuitous ARP Commands

7.4.1 ip arp gratuitous

This command is used to enable the learning of gratuitous ARP packets in the ARP cache table. Use the **no** form of this command to disable ARP control.

Syntax

- ip arp gratuitous
- no ip arp gratuitous

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The system will learn gratuitous ARP packets in the ARP cache table by default.

Example

This example shows how to disable the learning of gratuitous ARP request packets.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# no ip arp gratuitous
ZEQUOxxxxRE(config)#
```


7.4.2 ip gratuitous-arps

This command is used to enable the transmission of gratuitous ARP request packets. Use the **no** form of this command to disable the transmission.

Syntax

- `ip gratuitous-arps [dad-reply]`
- `no ip gratuitous-arps [dad-reply]`

Parameters

Parameters	description
<code>dad-reply</code>	(Optional) Specifies control whether the system will reply with another gratuitous ARP request packet with the broadcast DA, when receiving a gratuitous ARP request packet and detecting the duplicate IP address.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A gratuitous ARP request packet is an ARP request packet where the source and the destination IP address are both set to the IP address of the sending device and the destination MAC address is the broadcast address.

Generally, a device use the gratuitous ARP request packet to discover whether the IP address is duplicated by other hosts or to preload or reconfigure the ARP cache entry of hosts connected to the interface.

Use the **ip gratuitous-arps** command to enable transmission of gratuitous ARP request. The device will send out the packet when an IP interface becomes link-up or when the IP address of an interface is configured or modified.

Use the **ip gratuitous-arps dad-reply** command to enable the transmission of gratuitous ARP requests. The device will send out the packet while a duplicate IP address is detected

Example

This example shows how to sending of gratuitous ARP messages.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip gratuitous-arps dad-reply
ZEQUOxxxxRE(config)#
```

7.4.3 arp gratuitous-send interval

This command is used to set the interval for regularly sending of gratuitous ARP request messages on the interface. Use the **no** form of this command to disable this function on the interface.

Syntax

- **arp gratuitous-send interval** *SECONDS*
- **no arp gratuitous-send**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the time interval to send the gratuitous ARP request message. The value is from 0 to 3600. 0 represents that this option is disabled.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If an interface on the Switch is used as the gateway of its downlink devices and counterfeit gateway behavior occurs in the downlink devices, administrators can configure to send gratuitous ARP request messages regularly on this interface to notify that the Switch is the real gateway.

Example

This example shows how to enable the sending of gratuitous ARP messages.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip gratuitous-arps
ZEQUOxxxxRE(config)# interface vlan100
ZEQUOxxxxRE(config-if)# arp gratuitous-send interval 1
ZEQUOxxxxRE(config-if)#
```

7.4.4 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.

Syntax

- 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.

Command Default Level

Level: 12.

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.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#snmp-server enable traps gratuitous-arp
ZEQUOxxxxRE(config)#
```

7.5 Dynamic ARP Inspection Commands

7.5.1 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.

Syntax

- `arp access-list NAME`
- `no arp access-list NAME`

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

7.5.2 clear ip arp inspection log

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

Syntax

- clear ip arp inspection log

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear the ARP inspection log buffer.

Example

This example shows how to clear the inspection log.

```
ZEQUOxxxxRE# clear ip arp inspection log
ZEQUOxxxxRE#
```

7.5.3 clear ip arp inspection statistics

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

Syntax

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

Parameters

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

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

7.5.4 ip arp inspection filter vlan

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

Syntax

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

Parameters

Parameters	description
<i>ARP-ACL-NAME</i>	Specifies the access control list name with a maximum of 32 characters.
vlan <i>VLAN-ID</i>	Specifies the VLAN associated with the ARP access 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 and after the hyphen.
static	(Optional) Specifies to drop the packet if the IP-to-Ethernet MAC binding pair is not permitted by the ARP ACL.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

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

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

Example

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

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

7.5.5 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.

Syntax

- ip arp inspection limit {rate *VALUE* [burst interval *SECONDS*] | none}
- no ip arp inspection limit

Parameters

Parameters	description
rate <i>VALUE</i>	Specifies the maximum number per second of the ARP packets that can be processed. The valid range is from 1 to 150 seconds.
burst interval <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.
none	Specifies that there is no limit on the ARP packet rate.

Default

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

For DAI trusted interfaces, the rate has no limit.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/10
ZEQUOxxxxRE(config-if)# ip arp inspection limit rate 30 burst interval 5
ZEQUOxxxxRE(config-if)#
```

7.5.6 ip arp inspection log-buffer

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

Syntax

- ip arp inspection log-buffer entries *NUMBER*
- no ip arp inspection log-buffer entries

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

7.5.7 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.

Syntax

- **ip arp inspection trust**
- **no ip arp inspection trust**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When an interface is in the trust state, the ARP packets arriving at the interface will not be inspected. When an interface is in the untrusted state, ARP packets arriving at the port and belongs to the VLAN that is enabled for inspection will be inspected.

Example

This example shows how to configure GigabitEthernet1/0/3 to be trusted for DAI.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/3
ZEQUOxxxxRE(config-if)# ip arp inspection trust
ZEQUOxxxxRE(config-if)#
```

7.5.8 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.

Syntax

- **ip arp inspection validate** [src-mac] [dst-mac] [ip]
- **no ip arp inspection validate** [src-mac] [dst-mac] [ip]

Parameters

Parameters	description
src-mac	(Optional) Specifies to check for ARP requests and response packets and the consistency of the source MAC address in the Ethernet header against the sender MAC address in the ARP payload.
dst-mac	(Optional) Specifies to check for ARP response packets and the consistency of the destination MAC address in the Ethernet header against the target MAC address in the ARP payload.
ip	(Optional) Specifies to check the ARP body for invalid and unexpected IP addresses. Specifies to check the validity of IP address in the ARP payload. The sender IP in both the ARP request and response and target IP in the ARP response are validated. Packets destined for the IP addresses 0.0.0.0, 255.255.255.255, and all IP multicast addresses are dropped. Sender IP addresses are checked in all ARP requests and responses, and target IP addresses are checked only in ARP responses.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the additional checks to be performed during the dynamic ARP inspection check. The specified check will be performed on packets arriving at the untrusted interface and belong to the VLANs that are enabled for IP ARP inspection. If no parameters are specified, all options are enabled or disabled. Use the **no** form of the command with the specific option to disable the specific type of check.

Example

This example shows how to enable source MAC validation.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip arp inspection validate src-mac
ZEQUOxxxxRE(config)#
```

7.5.9 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.

Syntax

- **ip arp inspection vlan** *VLAN-ID* [, | -]
- **no ip arp inspection vlan** *VLAN-ID* [, | -]

Parameters

Parameters	description
<i>VLAN-ID</i>	Specifies the VLAN to enable or disable the ARP inspection function.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

By default, ARP inspection is disabled on all VLANs.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a VLAN is enabled for ARP inspection, the ARP packets, including both the ARP request and response packet belonging to the VLAN arriving at the untrusted interface will be validated. If the IP-to-MAC address binding pair of the source MAC address and the source IP address is not permitted by the ARP ACL or the DHCP snooping binding database, the ARP packet will be dropped. In addition to the address binding check, the additional check defined by the IP ARP inspection validate command will also be checked.

Example

This example shows how to enable ARP inspection on VLAN 2.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip arp inspection vlan 2
ZEQUOxxxxRE(config)#
```

7.5.10 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.

Syntax

- `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

Parameters	description
<i>VLAN-ID</i>	Specifies the VLAN to enable or disable the logging control function.

Parameters	description
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.
acl-match	Specifies the logging criteria for packets that are dropped or permitted based on ACL matches.
permit	Specifies logging when permitted by the configured ACL.
all	Specifies logging when permitted or denied by the configured ACL.
none	Specifies that ACL-matched packets are not logged.
dhcp-bindings	Specifies the logging criteria for packets dropped or permitted based on matches against the DHCP bindings.
permit	Specifies logging when permitted by DHCP bindings.
all	Specifies logging when permitted or denied by DHCP bindings.
none	Specifies to prevent the logging of all packets permitted or denied by DHCP bindings.

Default

All denied or dropped packets are logged.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **no** form of this command to reset some of the logging criteria to their defaults.

Example

This example shows how to configure an ARP inspection on VLAN 1 to add packets to a log that matches the ACLs.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip arp inspection vlan 1 logging acl-match all
ZEQUOxxxxRE(config)#
```


7.5.11 permit | deny (arp access-list)

This command is used to define the ARP permit entry. Use the **deny** command to define the ARP deny entry. Use the **no** form of this command to remove an entry

Syntax

- {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

Parameters	description
ip	Specifies the source IP address.
any	Specifies to match any source IP address.
host <i>SENDER-IP</i>	Specifies to match a single source IP address.
<i>SENDER-IP SENDER-IP-MASK</i>	Specifies to match a group of source IP addresses by using a bitmap mask. The bit corresponding to bit value 1 will be checked. The input format is the same as IP address.
mac	Specifies the MAC address.
any	Specifies to match any source MAC address.
host <i>SENDER-MAC</i>	Specifies to match a single source MAC address.
<i>SENDER-MAC SENDER-MAC-MASK</i>	Specifies to match a group of source MAC addresses by using a bitmap mask. The bit corresponding to bit value 1 will be checked. The input format is the same as MAC address.

Default

None.

Command Mode

ARP Access-list Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Using the **permit any** option will permit the rest of the packets that do not match any previous rule.

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# arp access-list static-arp-list
ZEQUOxxxxRE(config-arp-nacl)# permit ip 10.20.0.0 255.255.0.0 mac any
ZEQUOxxxxRE(config-arp-nacl)# permit ip 10.30.0.0 255.255.0.0 mac any
ZEQUOxxxxRE(config-arp-nacl)#
```

7.5.12 show ip arp inspection

This command is used to display the status of DAI for a specific range of VLANs.

Syntax

- show ip arp inspection [interfaces [*INTERFACE-ID* [, | -]] | statistics [vlan *VLAN-ID* [, | -]]]

Parameters

Parameters	description
interfaces <i>INTERFACE-ID</i>	(Optional) Specifies a port, range of ports or all ports to configure.
,	(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.
statistics	(Optional) Specifies the DAI statistics.
vlan <i>VLAN-ID</i>	(Optional) Specifies a VLAN or range of VLANs.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

None.

Command Mode

User EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the status of DAI for a specific range of VLANs.

Example

This example shows how to display the statistics of packets that have been processed by DAI for VLAN 10.

```
ZEQUOxxxxRE# 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

ZEQUOxxxxRE#
```

This example shows how to display the statistics of packets that have been processed by DAI for all active VLANs.

```
ZEQUOxxxxRE# 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

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
VLAN	The VLAN ID that is enabled for ARP inspection.
Forwarded	The number of ARP packets that are forwarded by ARP inspection.
Dropped	The number of ARP packets that are dropped by ARP inspection.
DHCP Drops	The number of ARP packets that are dropped by DHCP snooping binding database.
ACL Drops	The number of ARP packets that are dropped by ARP ACL rule.
DHCP Permits	The number of ARP packets that are permitted by DHCP snooping binding database.
ACL Permits	The number of ARP packets that are permitted by ARP ACL rule.
Source MAC Failures	The number of ARP packets that fail source MAC validation.
Dest MAC Failures	The number of ARP packets that fail destination MAC validation.

Parameters	description
IP Validation Failures	The number of ARP packets that fail the IP address validation.

Example

This example shows how to display the configuration and operating state of DAI.

```

ZEQUOxxxxRE#show ip arp inspection

Source MAC Validation      : Enabled
Destination MAC Validation: Disabled
IP Address Validation      : Disabled
VLAN State      ACL Match      Static ACL
-----
10  Disabled static-arp-list      No
VLAN ACL Logging DHCP Logging
-----
10  Deny      Deny
ZEQUOxxxxRE#

```

Display Parameters

Parameters	description
VLAN	The VLAN ID that enables ARP inspection.
State	The configuration state of ARP inspection. Enabled: ARP inspection is enabled. Disabled: ARP inspection is disabled.
ACL Match	The name of ARP ACL that is specified.
Static ACL	The configuration of the static ACL. Yes: Static ARP ACL is configured. No: Static ARP ACL is not configured.
ACL logging	The state of logging for packets dropped or permitted based on ACL matches. None: ACL-matched packets are not logged. Permit: Logging when packets are permitted by the configured ACL. Deny: Logging when packets are dropped by the configured ACL. All: ACL-matched packets are always logged.

Parameters	description
DHCP Logging	The state of logging for packets dropped or permitted based on DHCP bindings. None: Prevent logging when packets are dropped or permitted by the DHCP bindings. Permit: Logging when packets are permitted by the DHCP bindings. Deny: Logging when packets are dropped by the DHCP bindings. All: Logging when packets are dropped or permitted by the DHCP bindings.

Example

This example shows how to display the trust state of GigabitEthernet1/0/10.

```
ZEQUOxxxxRE#show ip arp inspection interfaces gil/0/10
```

```

Interface      Trust State Rate(pps) Burst Interval
-----
Gil/0/10       trusted    None        1
Total Entries: 1

```

```
ZEQUOxxxxRE#
```

This example shows how to display the trust state of interfaces on the Switch.

```
ZEQUOxxxxRE#show ip arp inspection interfaces
```

```

Interface      Trust State Rate(pps) Burst Interval
-----
Gil/0/1        untrusted  15          1
Gil/0/2        untrusted  15          1
Gil/0/3        untrusted  15          1
Gil/0/4        untrusted  15          1
Gil/0/5        untrusted  15          1
Gil/0/6        untrusted  15          1
Gil/0/7        untrusted  15          1
Gil/0/8        untrusted  15          1
Gil/0/9        untrusted  15          1
Gil/0/10       trusted    None        1
Gil/0/11       untrusted  15          1
Gil/0/12       untrusted  15          1
Gil/0/13       untrusted  15          1
Gil/0/14       untrusted  15          1
Gil/0/15       untrusted  15          1
Gil/0/16       untrusted  15          1
Gil/0/17       untrusted  15          1
Gil/0/18       untrusted  15          1
Gil/0/19       untrusted  15          1
Gil/0/20       untrusted  15          1
Gil/0/21       untrusted  15          1
CTRL+C ESC q Quit SPACE n Next Page ENTER Next Entry a All

```

Display Parameters

Parameters	description
Interface	The name of interface that enable ARP inspection.
Trust State	The state of the interface. trusted: This interface is ARP inspection trusted port, all ARP packet will be legal and not be authorized. untrusted: This interface is ARP inspection untrusted port, all ARP packet will be authorized.
Rate (pps)	The upper limit on the number of incoming packets processed per second.
Burst Interval	The consecutive interval in seconds over which the interface is monitored for the high rate of the ARP packets.

7.5.13 show ip arp inspection log

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

Syntax

- show ip arp inspection log

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the content of the inspection log buffer.

Example

This example shows how to display the inspection log-buffer.

```
ZEQUOxxxxRE#show ip arp inspection log
Total log buffer size: 64
```

Interface	VLAN	Sender IP	Sender MAC	Occurrence
Gi1/0/1	100	10.20.1.1	00-50-40-40-50-60	1 (2017-12-28 23:08:66)
Gi1/0/2	100	10.5.10.16	00-50-40-30-40-50	2 (2017-12-02 00:11:54)
Gi1/0/3	100	10.58.2.30	00-50-43-44-50-60	1 (2017-12-30 12:01:38)

Total Entries: 3

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Interface	The name of interface that logging occurred.
VLAN	The VLAN that logging occurred.
Sender IP	The logging ARP's sender IP address.
Sender MAC	The logging ARP's sender MAC address.
Occurrence	The counter of logging entries occurred and the last time of logging entry occurred.

7.6 IP Setup Interface commands

7.6.1 ip setup interface

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

Syntax

- **ip setup interface**
no ip setup interface

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

The command is used to enable or disable the IP setup interface function.

Example

This example shows how to enable IP setup interface.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#ip setup interface
ZEQUOxxxxRE(config)#
```

7.6.2 show ip_setup_interface

This command is used to display the IP setup interface status.

Syntax

- **show ip_setup_interface**

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level : 1

Usage Guideline

This command is used to display the IP setup interface status.

Example

This example shows how to display the IP setup interface status.

```
ZEQUOxxxxRE#show ip_setup_interface
IP Setup Interface: Enabled
```

```
ZEQUOxxxxRE#
```

7.7 IP setup forwarding commands

7.7.1 ipsetup_forward

This command is used to enable the global status of the IP setup forward function. Use the **no** form of this command to disable the function.

Syntax

ipsetup_forward
no ipsetup_forward

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

Use this command to enable or disable the global status of the IP setup forward function.

実行例

This example shows how to enable the global status of the IP setup forward function.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#ipsetup_forward
ZEQUOxxxxRE(config)#
```

7.7.2 ipsetup_forward sender_ip

This command is used to forward packets to all ports at the destination VLAN interface. Use the **no** form of this command to disable the function.

Syntax

- **ipsetup_forward sender_ip** *IP-ADDRESS* **dest_vlan** *VLAN-ID*
- **no ipsetup_forward sender_ip** *IP-ADDRESS* **dest_vlan** *VLAN-ID*

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IP address to receive the IP setup packets.
<i>VLAN-ID</i>	Specifies the destination VLAN interface.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

This command is used to forward packets to all ports at the destination interface. When the Switch receives a packet, it checks if the source IP of the packet is the same as the configured sender IP. When the source IP is the same as the configured sender IP, the Switch forwards the packet to all ports at the destination VLAN interface. Multiple destination VLAN interfaces can be configured.

If the Switch forwards Unicast, it does not send Broadcast to the same member port.

Up to 1024 entries can be configured.

Example

This example shows how to add a destination interface for the sender IP of 192.168.100.1.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#ipsetup_forward sender_ip 192.168.100.1 dest_vlan vlan1
ZEQUOxxxxRE(config)#
```

7.7.3 ipsetup_forward

This command is used to configure the destination IP address or interface to forward packets to other network. Use the **no** form of this command to disable this control.

Syntax

- **ipsetup_forward** {**src_ip** *IP-ADDRESS* **dest_ip** *IP-ADDRESS* | **dest_vlan** *VLAN-ID*}
- **no ipsetup_forward** {**src_ip** *IP-ADDRESS* **dest_ip** *IP-ADDRESS* | **dest_vlan** *VLAN-ID*}

Parameters

Parameters	description
src_ip <i>IP-ADDRESS</i>	Specifies the source IP address to forward other IP network.
dest_ip <i>IP-ADDRESS</i>	Specifies the destination IP address to forward other IP network.
dest_vlan <i>VLAN-ID</i>	Specifies the destination VLAN interface.

Default

By default, this option is disabled.

Command Mode

VLAN Interface Configuration Mode.

Command Default Level

Level : 12

Usage Guideline

This command is used to configure the destination IP address or interface to forward packets to other network on the Switch

Example

This example shows how to add a destination IP address and a destination VLAN interface for vlan10 interface

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface vlan10
ZEQUOxxxxRE(config-if)# ipsetup_forward src_ip 192.168.100.1 dest_ip 192.168.200.1
ZEQUOxxxxRE(config-if)#ipsetup_forward dest_vlan vlan20
ZEQUOxxxxRE(config-if)#
```

7.7.4 show ipsetup_forward

This command is used to display the current IP setup forward settings

Syntax

- show ipsetup_forward [{vlan {*VLAN-ID* | all} | sender_ip [*IP-ADDRESS*}]}**

Parameters

Parameters	description
all	Specifies the VLAN interface that receives the IP address setup protocol.
<i>IP-ADDRESS</i>	Specifies to display the IP setup forward settings on all VLAN interfaces.
<i>VLAN-ID</i>	Specifies the sender IP address.

Default

By default, this option is disabled.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level : 1

Usage Guideline

Use this command to display the current IP setup forward settings.

Example

This example shows how to display the current IP setup forward settings

The first setting shows the setting for forwarding to the destination IP address 192.168.200.1 when the source IP address of the IP setup packet received on the VLAN 10 interface is 192.168.100.1.

The second configuration shows the configuration for forwarding the IP setup packet received on the VLAN10 interface to the VLAN20 interface.

The third setting shows the setting for forwarding to the VLAN1 interface when the source IP address of the IP setup packet is 192.168.100.1.

```
ZEQUOxxxxRE#show ipsetup_forward
```

```
IPsetup protocol forward status : Enabled
```

VLAN name	Src IP address	Dest IP address
-----	-----	-----
vlan10	192.168.100.1	192.168.200.1

VLAN name	Dest VLAN
-----	-----
vlan10	vlan20

Sender ip address	Dest VLAN
-----	-----
192.168.100.1	vlan1

```
ZEQUOxxxxRE#
```

8 IP Unicast Routing

8.1 Protocol Independent Commands

8.1.1 distance

This command is used to define an administrative distance for routing protocols including RIP and BGP. Use the **no** form of this command to revert to the default setting.

Syntax

- **distance** *DISTANCE*
- **no distance**

Parameters

Parameters	description
<i>DISTANCE</i>	Specifies the administrative distance. The range is from 1 to 255.

Default

The default distance of a connected route is 0.
The default distance of an Open Shortest Path First (OSPF) intra-area route is 80.
The default distance of an OSPF inter-area route is 90.
The default distance of an OSPF type-1 AS external route is 110.
The default distance of an OSPF type-2 AS external route is 115.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the distance is an integer from 1 to 255 representing the trust rating of the route. The route with a lower distance value is preferred over the route with a higher distance value. A route with the distance 255 will not be installed for routing of packets since it indicates that the route is not trusted. If the distance command is used without parameters, the specified distance becomes the default value for routes of the configured protocol.

Example

This example shows how to configure the distance of the RIP route to be 75.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#router rip
ZEQUOxxxxRE(config-router)#distance 75
ZEQUOxxxxRE(config-router)#
```

8.1.2 distance default

This command is used to define an administrative distance for static default route. Use the **no** form of this command to revert to the default setting.

Syntax

- distance default *DISTANCE*
- no distance default

Parameters

Parameters	description
<i>DISTANCE</i>	Specifies the administrative distance. The range is from 1 to 255.

Default

The default distance of a static default route is 1.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the distance is an integer from 1 to 255 representing the trust rating of the route. The route with a lower distance value is preferred over the route with a higher distance value. A route with the distance 255 will not be installed for routing of packets since it indicates that the route is not trusted. If the distance command is used without parameters, the specified distance becomes the default value for routes of the configured protocol.

Example

This example shows how to configure the static default route distance to be 150.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#distance default 150
ZEQUOxxxxRE(config)#
```

8.1.3 distance static

This command is used to define an administrative distance for static routes. Use the **no** form of this command to revert to the default setting.

Syntax

- distance static *DISTANCE*
- no distance static

Parameters

Parameters	description
<i>DISTANCE</i>	Specifies the administrative distance. The range is from 1 to 255.

Default

The default distance of a static route is 60.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the distance is an integer from 1 to 255 representing the trust rating of the route. The route with a lower distance value is preferred over the route with a higher distance value. A route with the distance 255 will not be installed for routing of packets since it indicates that the route is not trusted. If the distance command is used without parameters, the specified distance becomes the default value for routes of the configured protocol.

Example

This example shows how to configure the static route distance to 100.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# distance static 100
ZEQUOxxxxRE(config)#
```

8.1.4 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.

Syntax

[ZEQUO6700RE/ZEQUO6600RE]

- **ip route** *NETWORK-PREFIX* *NETWORK-MASK* { *IP-ADDRESS* [**primary** | **backup** | **weight** *NUMBER*] | **null0**}
- **no ip route** *NETWORK-PREFIX* *NETWORK-MASK* { *IP-ADDRESS* | **null0**}

[ZEQUO4600RE]

- **ip route** *NETWORK-PREFIX* *NETWORK-MASK* { *IP-ADDRESS* [**primary** | **backup**] | **null0**}
- **no ip route** *NETWORK-PREFIX* *NETWORK-MASK* { *IP-ADDRESS* | **null0**}

Parameters

Parameters	description
<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.
primary	(Optional) Specifies the route as the primary route to the destination.

Parameters	description
backup	(Optional) Specifies the route as the backup route to the destination.
weight <i>NUMBER</i>	(Optional) Specifies the weight number greater than zero, but less than maximum paths number. This number is used to replicate identical route path (multiple copies) in routing table, so the path get more chance to be hit for traffic routing.
null0	Specifies a black hole route.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use **0.0.0.0 0.0.0.0** to specify the default route.

Floating state route is supported. This means that there could have two routes with the same destination network address but different next hop. If none of the **primary** or **backup** parameter is specified, the static route will be automatically determined to be a primary route or a backup route. Primary route is preferable, and is always be used for forwarding when it is active. When the primary route 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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip route 20.0.0.0 255.0.0.0 10.1.1.254
ZEQUOxxxxRE(config)#
```

8.1.5 ipv6 route

This command is used to create an IPv6 static route entry. Use the **no** command to remove an IPv6 static route entry.

Syntax

[ZEQUO6700RE/6600RE]

- **ipv6 route** { **default** | *NETWORK-PREFIX/PREFIX-LENGTH* } {[*INTERFACE-ID*] *NEXT-HOP-ADDRESS* [{**primary** | **backup**}] [*DISTANCE*]}
- **no ipv6 route** { **default** | *NETWORK-PREFIX/PREFIX-LENGTH* } {[*INTERFACE-ID*] *NEXT-HOP-ADDRESS*}

[ZEQUO4600RE]

- **ipv6 route** { **default** | *NETWORK-PREFIX/PREFIX-LENGTH* } {[*INTERFACE-ID*] *NEXT-HOP-ADDRESS* [{**primary** | **backup**}] [*DISTANCE*]}
- **no ipv6 route** { **default** | *NETWORK-PREFIX/PREFIX-LENGTH* } {[*INTERFACE-ID*] *NEXT-HOP-ADDRESS*}

Parameters

Parameters	description
default	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>	Specifies the IPv6 address of the next hop to reach the destination network. If the address is a link-local address, then the interface ID also need to be specified.
primary	(Optional) Specifies the route as the primary route to the destination.
backup	(Optional) Specifies the route as the backup route to the destination.
<i>DISTANCE</i>	(Optional) Specifies the administrative distance of the static route. The range of distance is 1 to 254. The lower value represents better route. If not specified, the default administrative distance for a static route is 1.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Floating state route is supported. This means that there could have two routes with the same destination network address but different next hop. If none of the **primary** or **backup** parameter is specified, the static route will be automatically determined to be a primary route or a backup route. Primary route is preferable, and is always be used for forwarding when it is active. When the primary route is down, the backup route will be used.

Example

This example shows how to create a static route destined for the network where proxy server resides.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 route 2001:0101::/32 vlan1 fe80::0000:00ff:1111:2233
ZEQUOxxxxRE(config)#
```

8.1.6 ip route ecmp load-balance[ZEQUO6700RE/6600RE]

This command is used to configure the hash load balancing algorithm to determine the next hop entry from the different paths to be destined for the same destination. Use the **no** form of this command to revert to the default setting.

Syntax

- ip route ecmp load-balance [{sip | crc32_lower | crc32_upper} | dip | port]
- no ip route ecmp load-balance [{sip | crc32_lower | crc32_upper} | dip | port]

Parameters

Parameters	description
sip	Specifies that the load-balancing algorithm will include the lower 5 bits of the source IP address. This attribution is mutually exclusive with crc32_lower and crc32_upper . If it is set, crc32_lower and crc32_upper will be excluded.
crc32_lower	Specifies that the load-balancing algorithm will include the lower 5 bits of the CRC. This attribution is mutually exclusive with crc32_upper and sip . If it is set, crc32_upper and sip will be excluded.
crc32_upper	Specifies that the load-balancing algorithm will include the upper 5 bits of the CRC. This attribution is mutually exclusive with crc32_lower and sip . If it is set, crc32_lower and sip will be excluded.
dip	Specifies that the load-balancing algorithm will include the destination IP address.
port	Specifies that the load-balancing algorithm will include the TCP or UDP port.

Default

By default, sip is used.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the hash load balancing algorithm to determine the next hop entry from the different paths to be destined for the same destination.

Example

This example shows how to configure the load-balance algorithm to be dip.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#ip route ecmp load-balance dip
ZEQUOxxxxRE(config)#
```


8.1.7 maximum-paths[ZEQUO6700RE/6600RE]

This command is used to specify the maximum number of parallel routes of the configured routing protocol which can be installed in the routing table simultaneously. Use the **no** form of this command to revert to the default setting.

Syntax

- **maximum-paths** *NUMBER-PATHS*
- **no maximum-paths**

Parameters

Parameters	description
<i>NUMBER-PATHS</i>	Specifies the maximum number of parallel routes.

Default

By default, the value is 1.

Command Mode

OSPF Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

There are various sources that a route can be learned from. Each route is associated with a distance. The route with the least distance will be installed in routing table.

The value of **maximum-paths** determines the maximum number of parallel routes to the same destination network learned from the configured protocol that can be installed in the routing table simultaneously. The installed parallel routes must belong to the same source.

Example

This example shows how to configure the maximum paths of OSPF to 4.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#router ospf
ZEQUOxxxxRE(config-router)#maximum-paths 4

ERROR:The ip route maximum paths changed, can't change the ospf maximum paths until
after the next reboot.
ZEQUOxxxxRE(config-router)#
```

8.1.8 show ip protocols

This command is used to display the state of the routing process.

Syntax

- show ip protocols [rip | ospf]

Parameters

Parameters	description
rip	(Optional) Specifies to display the RIP protocol overall configuration.
ospf	(Optional) Specifies to display the OSPF protocol overall configuration.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the status of the routing processes. If no option is specified, all running routing processes are displayed.

Example

This example shows how to display the routing protocol information.

```
ZEQUOxxxxRE#show ip protocols
```

```
Routing Protocol is RIP
  Sending updates every 30 seconds, next due in 23 seconds
  Invalid 180 secs, flush 120 secs
  Default redistribution metric is 0
  Default version control: send version 1, receive any version
  Interface      Send      Recv
Maximum path: 1
Routing for Networks:
Routing Information Sources:
  Gateway          Last Update
Distance:75
```

```
ZEQUOxxxxRE#
```

8.1.9 show ip route

This command is used to display the entry in the routing table.

Syntax

- show ip route [*IP-ADDRESS* [*MASK*] | *PROTOCOL*] | hardware]

Parameters

Parameters	description
<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.
<i>PROTOCOL</i>	(Optional) Specifies the routing protocol, or the following keywords: static, connected.
hardware	(Optional) Specifies to display the routes that have been written into chip.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

The routing table gathers routes learned from different protocols. If multiple routes can reach the same network, the one with the best distance and the next hop is reachable will be chosen as the best and set to hardware for routing of packets. They are the route entry currently at work. That is, if the route with the best distance is with the unreachable next hop, then the route with the next preferred distance will be chosen.

Example

This example shows how to display the routing table.

```
ZEQUOxxxxRE#show ip route
Code: C - connected, S - static, R - RIP, O - OSPF,
      IA - OSPF inter area,
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2,
      E1 - OSPF external type 1, E2 - OSPF external type 2,
      * - candidate default

Gateway of last resort is not set

C    192.168.70.0/24 is directly connected, vlan1

Total Entries: 1

ZEQUOxxxxRE#
```

8.1.10 show ip route summary

This command is used to display the brief information for the working routing entries.

Syntax

- show ip route summary

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the brief information for the working routing entries.

Example

This example shows how to display the brief information for the working routing entries.

```
ZEQUOxxxxRE#show ip route summary
```

```
Route Source      Networks
Connected         3
Static            1
RIP               2
OSPF              8
Total             14
Multi-path        0
```

```
ZEQUOxxxxRE#
```

8.1.11 show ipv6 route

This command is used to display the entry in routing table.

Syntax

- `show ipv6 route` *[[IPV6-ADDRESS | NETWORK-PREFIX/PREFIX-LENGTH | INTERFACE-ID | PROTOCOL] [database] | hardware]*

Parameters

Parameters	description
<i>IPV6-ADDRESS</i>	(Optional) Specifies an IPv6 address to find a longest prefix matched IPv6 route.
<i>NETWORK-PREFIX</i>	(Optional) Specifies the network address of which routing information should be displayed.
<i>PREFIX-LENGTH</i>	(Optional) Specifies the prefix length for the specified network

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface type.
<i>PROTOCOL</i>	(Optional) Specifies the routing protocol.
database	(Optional) Specifies to display all the related entries in the routing database instead of just the best route.
hardware	(Optional) Specifies to display the routes that have been written into chip.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

The routing table gathers routes learned from different protocols. If multiple routes can reach the same network, the one with the best distance and the next hop is reachable will be chosen as the best and set to hardware for routing of packets. They are the route entry currently at work. That is, if the route with the best distance is with the unreachable next hop, then the route with the next preferred distance will be chosen.

Example

This example shows how to display the routing entries for IPv6.

```

ZEQUOxxxxRE#show ipv6 route

IPv6 Routing Table
Code: C - connected, S - static, O - OSPF,
      IA - OSPF inter area
      E1 - OSPF external type 1, E2 - OSPF external type 2

C    2000:410:1::/64 [0/1] is directly connected, vlan1
S    2001:0101::/64 [1/1] via fe80::0000:00ff:1111:2233, vlan1
S    2001:0102::/64 [1/1] via fe80::0000:00ff:1111:2233, vlan1

Total Entries: 3 entries, 3 routes
ZEQUOxxxxRE#

```

8.1.12 show ipv6 route summary

This command is used to display the current state of the IPv6 routing table.

Syntax

- `show ipv6 route summary`

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

When the system provides forwarding services for IPv6 traffic, it is very important and helpful to check the forwarding/routing table to understand what the traffic path will be currently in the network.

Example

This example shows how to display the current state of the IPv6 routing table.

```
ZEQUOxxxxRE#show ipv6 route summary
```

Route Source	Networks
Connected	1
Static	2
OSPF	0
Total	3

```
ZEQUOxxxxRE#
```

8.2 Route Map Commands [ZEQUO6700RE/6600RE]

8.2.1 match ip address

This command is used to define a clause to match the route based on the standard IP access list or IP prefix list. Use the **no** form of this command to remove the clause.

Syntax

- **match ip address** { *ACCESS-LIST-NAME* | **prefix-list** *PREFIX-LIST-NAME* }
- **no match ip address** { *ACCESS-LIST-NAME* | **prefix-list** *PREFIX-LIST-NAME* }

Parameters

Parameters	description
<i>ACCESS-LIST-NAME</i>	Specifies a standard or an extended IP access list name.
prefix-list <i>PREFIX-LIST-NAME</i>	Specifies an IP prefix list name.

Default

None.

Command Mode

Route-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command in the route map configure mode to define a rule for matching routes against an IP access list.

Example

This example shows how to create an IP access list "myacl" first and create a route map entry to match against the IP access list.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip access-list myacl
ZEQUOxxxxRE(config-ip-acl)# permit 10.20.0.0 0.0.255.255 any
ZEQUOxxxxRE(config-ip-acl)# exit
ZEQUOxxxxRE(config)# route-map myPolicy permit 1
ZEQUOxxxxRE(config-route-map)# match ip address myacl
ZEQUOxxxxRE(config-route-map)#
```

8.2.2 route map

This command is used to create a route map rule entry. Use the **no** form of this command to remove a route map rule entry.

Syntax

- **route-map** *MAP-NAME* {**permit** | **deny**} *SEQ-NUMBER*
- **no route-map** *MAP-NAME* {**permit** | **deny**} *SEQ-NUMBER*

Parameters

Parameters	description
<i>MAP-NAME</i>	Specifies the name of the route map.
permit	Specifies that routes that match the rule entry are permitted.
deny	Specifies that routes that match the rule entry are denied.
<i>SEQ-NUMBER</i>	Specifies the sequence number for the route map entry. The value range is from 1 to 65535.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A route map can contain multiple route map entries, which is either a permit entry or a deny entry. When a route is checked against a route map, the entry in the route map will be checked whether match the route based on its sequence number in the route map. If an entry matches, the action associated with the entry will be taken and no further check will be done against the remaining entry in the route map.

A route map entry can contain multiple match and set statements. To match a route against a route map entry, all of the match statements in the route map rule must be satisfied. When a route map entry is matched, all the set statements in the rule will be performed if the entry is a permit entry. The route will be denied if the matched rule is a deny entry.

Example

This example shows how to create a rule entry with the sequence number 1 for route map "myPolicy".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# route-map myPolicy permit 1
ZEQUOxxxxRE(config-route-map)#
```

8.2.3 show route-map

This command is used to display information about the route map.

Syntax

- **show route-map** [*ROUTE-MAP-NAME*]

Parameters

Parameters	description
<i>ROUTE-MAP-NAME</i>	(Optional) Specifies the route map to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the route map information.

Example

This example shows how to display the route map information.

```
ZEQUOxxxxRE# show route-map

Route Map mypolicy, permit, sequence 1
  Match clauses:
    ip address myacl
  Set clauses:
    next-hop 100.1.1.1

Total Entries: 1

Total Route Map Counts : 1

ZEQUOxxxxRE#
```

8.2.4 set ip default next-hop

This command is used to configure the default next-hop of routers to route the packets that passes the match clauses of the configured route-map sequences. Use the **no** form of this command to remove specific default next-hops.

Syntax

- **set ip default next-hop** *IP-ADDRESS* [*...IP-ADDRESS*]
- **no set ip default next-hop** *IP-ADDRESS* [*...IP-ADDRESS*]

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IP address for the default next-hop to route the packet.

Default

None.

Command Mode

Route-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command can be used to specify multiple default next hop routers. If default next hops are already configured, the default next hops configured later will be added to the default next hop list. When the first default next hop router specified is down, the next default next hop router specified is tried in turn to route the packet.

Example

This example shows how to configure that PBR will policy route the packets to the next-hop 120.1.2.2 when the source ip is 10.1.1.0/24. The receiving interface is VLAN 100 and cannot find the route in routing table to route the packet. At first, create an IP basic access list, named "Strict-Control" which permits the prefix 10.1.1.0/24. Secondly, create a route map, named "myPolicy" which defines a match rule to associate the IP address prefix-list to the previously created access list, Strict-Control. Lastly, in the VLAN interface configuration mode set the IP policy base route to use the route-map, myPolicy.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip access-list Strict-Control
ZEQUOxxxxRE(config-ip-acl)# permit 10.1.1.0 0.0.0.255 any
ZEQUOxxxxRE(config-ip-acl)# exit
ZEQUOxxxxRE(config)# route-map myPolicy permit 1
ZEQUOxxxxRE(config-route-map)# match ip address Strict-Control
ZEQUOxxxxRE(config-route-map)# set ip default next-hop 120.1.2.2
ZEQUOxxxxRE(config-route-map)# exit
ZEQUOxxxxRE(config)# interface vlan100
ZEQUOxxxxRE(config-if)# ip policy route-map myPolicy
ZEQUOxxxxRE(config-if)#
```

8.2.5 set ip next-hop

This command is used to configure the next-hop router to route the packet that passes the match clauses of the configured route map sequence. Use the **no** form of this command to remove the specified next-hop.

Syntax

- **set ip next-hop** { *IP-ADDRESS* [*...IP-ADDRESS*] | **recursive** *IP-ADDRESS* }
- **no set ip next-hop** { *IP-ADDRESS* [*...IP-ADDRESS*] | **recursive** *IP-ADDRESS* }

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IP address of the next-hop to route the packet.
recursive	Specifies the IP address of the recursive as the next-hop router.

Default

None.

Command Mode

Route-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command can be used to specify multiple next-hop routers. If next hops are already configured, the next hops configured later will be added to the next hop list. When the first next hop router specified is down, the next next-hop router specified is tried in turn to route the packet.

Example

This example shows how to configure that PBR will policy route the packets to the next-hop 120.1.2.2 when the source IP is 10.1.1.0/24. The receiving interface is VLAN 100. At first, create an IP basic access list, named "Strict-Control" which permits the prefix 10.1.1.0/24. Secondly, create a route map, named "myPolicy" which defines a match rule to associate the IP address prefix-list to the previously created access list, Strict-Control. Lastly, in the VLAN interface configuration mode set the IP policy base route to use the route-map, myPolicy.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip access-list Strict-Control
ZEQUOxxxxRE(config-ip-acl)# permit 10.1.1.0 0.0.0.255 any
ZEQUOxxxxRE(config-ip-acl)# exit
ZEQUOxxxxRE(config)# route-map myPolicy permit 1
ZEQUOxxxxRE(config-route-map)# match ip address Strict-Control
ZEQUOxxxxRE(config-route-map)# set ip next-hop 120.1.2.2
ZEQUOxxxxRE(config-route-map)# exit
ZEQUOxxxxRE(config)# interface vlan100
ZEQUOxxxxRE(config-if)# ip policy route-map myPolicy
ZEQUOxxxxRE(config-if)#
```

8.2.6 set ip precedence

This command is used to configure the precedence value in the IP header. Use the **no** form of this command to remove the setting.

Syntax

- **set ip precedence** { *NUMBER* | *NAME* }
- **no set ip precedence**

Parameters

Parameters	description
<i>NUMBER</i>	Specifies the number of the precedence value to use in the IP header. The following numbers represent the following names: • 0 - Routine. • 1 - Priority. • 2 - Immediate. • 3 - Flash. • 4 - Flash-override. • 5 - Critical. • 6 - Internet. • 7 - Network.
<i>NAME</i>	Specifies the name of the precedence value to use in the IP header.

Default

None.

Command Mode

Route-map Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to set the precedence value in the IP header. This command only takes effect when policy routing involves the IPv4 packet. The precedence can be set using either a number or the corresponding name.

Example

This example shows how to configure the IP precedence value to 5 (critical) for packets that pass the route map match.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# route-map example permit 10
ZEQUOxxxxRE(config-route-map)# match ip address IPACL_01
ZEQUOxxxxRE(config-route-map)# set ip precedence 5
ZEQUOxxxxRE(config-route-map)#
```

8.3 RIP (Routing Information Protocol) Commands

RIP is a function to determine packet destinations dynamically.
RIP exchanges routing tables with adjacent routers and determines a route based on the number of routers (hops) passed through to reach the destination.

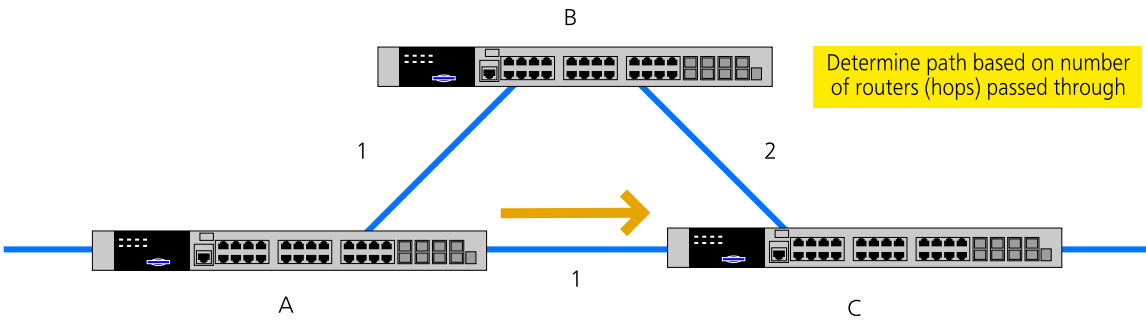


Figure 53-1 RIP overview

8.3.1 default-metric (RIP)

This command is used to configure the value to be used as the default metric for routes redistributed to RIP. Use the **no** form of this command to revert to the default setting.

Syntax

- **default-metric** *METRIC-VALUE*
- **no default-metric**

Parameters

Parameters	description
<i>METRIC-VALUE</i>	Specifies the default metric value. The valid range of values is from 0 to 16.

Default

By default, this value is 0.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The default metric is used in redistributing routes from other routing protocols. The routes being redistributed are learned by other protocols and have incompatible metric as RIP. The specifying of the metric allows the metric to be synced.

Example

This example shows how to configure the default metric 5 for redistribute the OSPF routes. In other words, assigns the OSPF-derived routes a RIP metric of 5.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router rip
ZEQUOxxxxRE(config-router)# default-metric 5
ZEQUOxxxxRE(config-router)# redistribute ospf
ZEQUOxxxxRE(config-router)#
```

8.3.2 distance (RIP)

This command is used to define an administrative distance of routes learned by IPv4 routing protocols. Use the **no** form of this command to revert to the default setting.

Syntax

- distance *DISTANCE*
- no distance

Parameters

Parameters	description
<i>DISTANCE</i>	Specifies the administrative distance. The range is from 1 to 255. The lower value represents a better route.

Default

By default, the RIP distance is 100.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the distance is an integer from 1 to 255 representing the trust rating of the route. The route with lower distance value is preferred over the route with the higher distance value. Routes with the distance 255 will not be installed for the routing of packets since it indicates that the route is not trusted.

Example

This example shows how to configure the distance of RIP routes to 100.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router rip
ZEQUOxxxxRE(config-router)# distance 100
ZEQUOxxxxRE(config-router)#
```

8.3.3 ip rip authentication mode

This command is used to specify the type of authentication used in RIP version 2 packets. Use the **no** form of this command to revert to the default setting.

Syntax

- ip rip authentication mode text
- no ip rip authentication mode

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

RIP version 1 does not support authentication. This command only takes effect for RIP version 2.

Example

This example shows how to enable the authentication at interface VLAN 2.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan2
ZEQUOxxxxRE(config-if)# ip rip authentication mode text
ZEQUOxxxxRE(config-if)#
```

8.3.4 ip rip authentication text-password

This command is used to enable authentication for RIP version 2 packets and to specify the key that can be used on an interface. Use the **no** form of this command to disable authentication.

Syntax

- ip rip authentication text-password *PASSWORD*
- no ip rip authentication text-password

Parameters

Parameters	description
<i>PASSWORD</i>	Specifies a password string.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enable authentication for RIP version 2 packets and to specify the key that can be used on an interface.

Example

This example shows how to configure authentication on interface VLAN 3.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan3
ZEQUOxxxxRE(config-if)# ip rip authentication mode text
ZEQUOxxxxRE(config-if)# ip rip authentication text-password test1
ZEQUOxxxxRE(config-if)#
```

8.3.5 ip rip receive version

This command is used to specify a RIP version to receive on an interface basis. Use the **no** form of this command to revert to the default setting.

Syntax

- ip rip receive version [1] [2]
- no ip rip receive version

Parameters

Parameters	description
1	(Optional) Specifies to accept RIP version 1 packets.
2	(Optional) Specifies to accept RIP version 2 packets.

Default

By default, the global setting will be used.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the version of the receive RIP version for an interface. If not specified, the global setting is followed.

Example

This example shows how to configure the interface (VLAN 1) to accept both RIP version 1 and version 2 packets.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip rip receive version 1 2
ZEQUOxxxxRE(config-if)#
```

8.3.6 ip rip send version

This command is used to specify a RIP version to send on an interface basis. Use the **no** form of this command to revert to the default setting.

Syntax

- ip rip send version [1 | 2]
- no ip rip send version

Parameters

Parameters	description
1	(Optional) Specifies to send RIP version 1 packets.
2	(Optional) Specifies to send RIP version 2 packets.

Default

By default, the global setting will be used.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the send RIP version for an interface. If not specified, the global setting is followed.

Example

This example shows how to configure the interface VLAN 100 to send RIP version 1 packets.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan100
ZEQUOxxxxRE(config-if)# ip rip send version 1
ZEQUOxxxxRE(config-if)#
```

8.3.7 ip rip v2-broadcast

This command is used to enable the sending of version 2 RIP update packets as broadcast packets instead of multicast packets. Use the **no** form of this command to revert to the default setting.

Syntax

- ip rip v2-broadcast
- no ip rip v2-broadcast

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

RIP version 2 improves version 1 by sending multicast packets instead of broadcast packets in order to reduce the load on unnecessary hosts on the LAN to process the broadcast packet.

Use this command to broadcast RIP version 2 updates to devices that do not listen to multicast packets. If enabled, version 2 packets will be sent to the IP broadcast address instead of the IP multicast address 224.0.0.9.

Example

This example shows how to configure the interface VLAN 100 to broadcast version 2 RIP packets.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan100
ZEQUOxxxxRE(config-if)# ip rip send version 2
ZEQUOxxxxRE(config-if)# ip rip v2-broadcast
ZEQUOxxxxRE(config-if)#
```

8.3.8 network

This command is used to specify a network as one that runs RIP. Use the **no** form of this command to remove an entry.

Syntax

- **network** *NETWORK-PREFIX*
- **no network** *NETWORK-PREFIX*

Parameters

Parameters	description
<i>NETWORK-PREFIX</i>	Specifies the subnet prefix of the network.

Default

None.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify networks in which routing updates will be sent and received. The interface that has a subnet defined belonging to a network specified by this command will be activated with RIP.

Example

This example shows how to define RIP as the routing protocol to be used on all interfaces connected to networks 192.168.70.0/24 and network 10.99.0.0/16.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router rip
ZEQUOxxxxRE(config-router)# network 192.168.70.0
ZEQUOxxxxRE(config-router)# network 10.99.0.0
ZEQUOxxxxRE(config-router)#
```

8.3.9 passive-interface

This command is used to disable the sending of routing updates on an interface. Use the **no** form of this command to revert to the default setting.

Syntax

- passive-interface {default | *INTERFACR-ID*}
- no passive-interface {default | *INTERFACR-ID*}

Parameters

Parameters	description
default	Specifies the global default passive state for all interfaces.
<i>INTERFACR-ID</i>	Specifies the interface identifier for setting the passive state. If passive state of an interface is not specified, it follows the global default passive state.

Default

By default, routing updates are sent.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If you disable the sending of routing updates on an interface, the router will not send multicast RIP packets out through the interface, however, the RIP packet from other routers received on this interface continue to be processed.

Example

This example shows how to disable the sending of routing updates on the interface VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router rip
ZEQUOxxxxRE(config-router)# passive-interface vlan1
ZEQUOxxxxRE(config-router)#
```

8.3.10 redistribute (RIP)

This command is used to redistribute routes from other routing domains into RIP. Use the **no** command to disable route redistribution from a specific protocol.

Syntax

- **redistribute** *PROTOCOL* [**metric** *METRIC-VALUE*]
- **no redistribute** *PROTOCOL* [**metric** *METRIC-VALUE*]

Parameters

Parameters	description
<i>PROTOCOL</i>	Specifies the protocol whose routes are to be redistributed. It can be one of the following keywords: bgp , connected , ospf , and static . The static keyword means to redistribute IP static routes. The connected keyword refers to routes that are established automatically by virtue of configuring IP address on an interface.
metric <i>METRIC-VALUE</i>	(Optional) Specifies the value to be used as metric for the redistributed routes. The range is from 0 to 16.

Default

By default, this option is disabled.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If the metric option is not specified or is specified as 0, the following rules are applied:

- The metric of the redistributed static route or connected route will be 1, if the metric option is not specified, or is specified as 0.
- The metric of the redistributed route from other protocols to the RIP process will be determined by the default metric command if the metric option is not specified.
- The metric of the redistributed route from other protocols to RIP process will be 1 if the metric option is specified as 0.

If the default metric is not specified, then the original metric from the redistributed protocol will be transparently carried through.

If a route map is configured but the route map doesn't exist, it means all routes are not permitted. If a route map sequence has no match entry defined, then all routes will match this sequence.

Example

This example shows how to configure that the specified OSPF process routes will be redistributed into an RIP domain. The OSP-derived metric will be remapped to 10.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router rip
ZEQUOxxxxRE(config-router)# redistribute ospf metric 10
ZEQUOxxxxRE(config-router)#
```

8.3.11 router rip

This command is used to configure the RIP routing process. Use the **no** form of this command to disable the RIP routing process.

Syntax

- **router rip**
- **no router rip**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enter the Router Configuration Mode of the RIP protocol and enable the RIP function. The **no** command will remove the configuration in the RIP router mode and disable RIP process.

Example

This example shows how to begin the RIP routing process.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router rip
ZEQUOxxxxRE(config-router)#
```

8.3.12 show ip rip database

This command is used to display the Routing Information Protocol (RIP) routing database.

Syntax

- **show ip rip database** [*IP-ADDRESS MASK* | *NETWORK-PREFIX/PREFIX-LENGTH*]

Parameters

Parameters	description
<i>IP-ADDRESS MASK</i>	(Optional) Specifies the address of the routing information that should be displayed.
<i>NETWORK-PREFIX/PREFIX-LENGTH</i>	(Optional) Specifies the subnet prefix and the prefix length of the network to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to display the entry in the RIP routing database.

Example

This example shows how to display the RIP routing database.

```
ZEQUOxxxxRE#show ip rip database
```

Codes: R - RIP, Rc - RIP connected, K - Kernel,
C - Connected, S - Static, O - OSPF, B - BGP, I-IS-IS, A - Aggregate

	Network	Next Hop	Metric	From	If	Time
Rc	11.0.0.0/8		1		vlan11	
R	105.100.0.0/24	11.0.0.5	2	11.0.0.5	vlan11	0DT0H0M2S
Rc	107.100.0.0/16		1		vlan1	
R	212.254.254.0/24	11.0.0.254	2	11.0.0.254	vlan11	0DT0H0M10S

Total Entries: 4 entries, 4 routes
ZEQUOxxxxRE#

8.3.13 show ip rip interface

This command is used to display interface specific information for RIP.

Syntax

- show ip rip interface

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to display interface specific information for RIP.

Example

This example shows how to display interface specific information for RIP.

```
ZEQUOxxxxRE#show ip rip interface

vlan11 is up, line protocol is up:
  Routing Protocol: RIP
    Receive RIP packets
    Send RIP packets
    Send v2-broadcast: Disable
    Authentication Mode: none
    Passive interface: Disable
    BFD Status: Disable
    IP interface address:
      11.0.0.3/8:

vlan1 is up, line protocol is up:
  Routing Protocol: RIP
    Receive RIP packets
    Send RIP packets
    Send v2-broadcast: Disable
    Authentication Mode: none
    Passive interface: Disable
    BFD Status: Disable
    IP interface address:
      107.100.0.1/16:

Total Entries : 2

ZEQUOxxxxRE#
```

8.3.14 timers basic

This command is used to configure the RIP network timers. Use the **no** form of this command to revert to the default setting.

Syntax

- timers basic *UPDATE INVALID FLUSH*
- no timers basic

Parameters

Parameters	description
<i>UPDATE</i>	Specifies the update interval in seconds at which the update message is sent. The range is from 1 to 65535.
<i>INVALID</i>	Specifies the invalidate timer in seconds. The range is from 1 to 65535.

Parameters	description
<i>FLUSH</i>	Specifies the flush timer in seconds. The range is from 1 to 65535.

Default

The default update time: 30 seconds.
The default invalid time: 180 seconds.
The default flush time: 120 seconds.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to modify the RIP protocol timers.

Example

This example shows how to configure the RIP timers. Timers of update, invalid, and flush timers are set to 10, 80, and 160 respectively.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router rip
ZEQUOxxxxRE(config-router)# timers basic 10 80 160
ZEQUOxxxxRE(config-router)#
```

8.3.15 version

This command is used to specify a RIP version globally as the default version for all interfaces. Use the **no** form of this command to revert to the default setting.

Syntax

- version {1 | 2}
- no version

Parameters

Parameters	description
1	Specifies to only receive and transmit RIP version 1 packets.
2	Specifies to only receive and transmit RIP version 2 packets.

Default

By default, RIP version 1 and 2 packets are received, but only RIP version 1 packets are sent.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command defines the default RIP version. This version will be overridden if the version is explicitly specified for the interface by using the **ip rip send version** and **ip rip receive version** commands.

Example

This example shows how to configure the RIP version to version 2.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router rip
ZEQUOxxxxRE(config-router)# version 2
ZEQUOxxxxRE(config-router)#
```


8.4 Policy-based Routing (PBR) Commands[ZEQUO6700RE/6600RE]

8.4.1 ip policy route-map

This command is used to specify a route map as the routing policy on an interface. Use the **no** form of this command to disable policy routing on the interface.

Syntax

- `ip policy route-map MAP-NAME`
- `no ip policy route-map`

Parameters

Parameters	description
<i>MAP-NAME</i>	Specifies the name of the route map to be used for the routing policy.

Default

By default, this option is disabled.

Command Mode

VLAN Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration.
The maximum number of VLAN interface that can be set using this command is 100.

Specify one route map as the routing policy on an interface. The policy will be applied to packets received by the interface.

Use the **match ip-address** command in the route map to define the matching criteria for packets with specific characteristics. If the IP access list is used with the **match ip-address** command, all of the matching criteria in the access list will be checked. The packet that matches that permit statement will be acted on based on the route map. The packet that is denied by the access list will be routed based on the routing table.

Use the following set of commands to define the action to take for policy based routing:

- set ip precedence
- set ip next-hop
- set ip default next-hop

If the **no match ip-address** command is used in the specified route-map or if the IP access list configured for the **match ip-address** command of the route-map doesn't exist or exists but contains no rule, the set commands above won't be executed, so the policy on the interface won't take effect.

Example

This example shows how to set up the routing policy to route the packets that match the IP access list name "pbr-acl" to the next-hop 20.1.1.254.

```
ZEQUO6600RE# configure terminal
ZEQUO6600RE(config)# route-map pbr-map permit 1
ZEQUO6600RE(config-route-map)# match ip address pbr-acl
ZEQUO6600RE(config-route-map)# set ip next-hop 20.1.1.254
ZEQUO6600RE(config-route-map)# exit
ZEQUO6600RE(config)# interface vlan100
ZEQUO6600RE(config-if)# ip policy route-map pbr-map
ZEQUO6600RE(config-if)#
```

8.4.2 show ip policy

This command is used to display the route map used for policy-based routing.

Syntax

- show ip policy

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use the command to display the policy-based routing information configured on interfaces.

Example

This example shows how to display policy-based information configured on interfaces.

```
ZEQUO6600RE#show ip policy
```

Interface	Route Map
-----	-----
vlan1	pbr-map1
vlan2	pbr-map2
vlan100	pbr-map3

```
Total Entries: 3  
ZEQUO6600RE#
```

8.5 OSPFv2 (Open Shortest Path First Version 2) Commands [ZEQUO6700RE/6600RE]

OSPF is a function to determine packet destinations dynamically. While RIP decides a route based on the number of routers passed through, OSPF determines an optimum route from the total number of cost values based on the route bandwidth. This allows for efficient routing even in a large-size network.

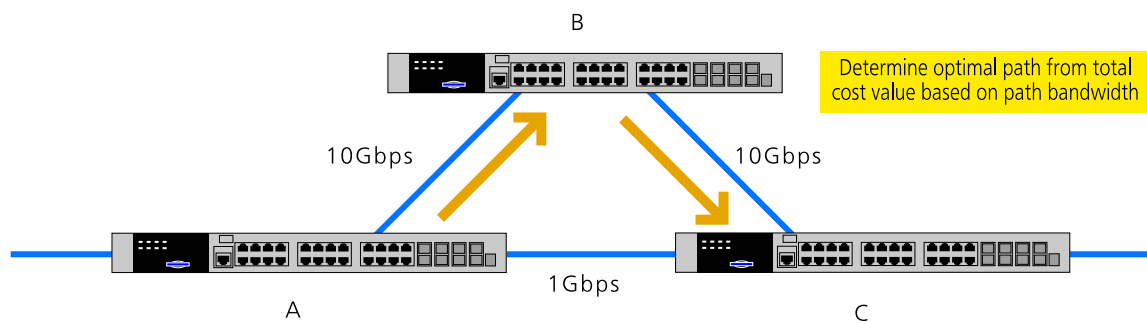


Figure 55-1 OSPF overview

You need to configure the cost value for each output port of a L3 switch or router. It can be configured manually, as well as automatically based on bandwidth. Manual configuration allows you to set up distributing traffic to multiple routes according to the conditions.

The cost value is calculated based on a network configuration created by exchanging route information (LSA) with neighbor switches. The larger a configuration becomes, the higher a calculation load becomes. If a configuration is too large, configure "areas" - multiple regions into which the network is divided.

8.5.1 area default-cost

This command is used to specify the cost associated with the type-3 default route that will be automatically injected into the stub area and the not-so-stubby area. Use the **no** form of this command to revert to the default setting.

Syntax

- **area** *AREA-ID* **default-cost** *COST*

- no area *AREA-ID* default-cost

Parameters

Parameters	description
<i>AREA-ID</i>	Specifies the ID of the area. The ID can be specified as either a decimal value or an IP address.
<i>COST</i>	Specifies the cost for the default route. The acceptable value is a 24-bit number from 0 to 65535.

Default

By default, this value is 1.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command on the Area Border Router (ABR) that is attached to the stub-area or NSSA area to specify the cost associated with the type-3 default route generated to the area.

Example

This example shows how to assign a default cost of 20 to the stub area 10.0.0.0.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# area 10.0.0.0 default-cost 20
ZEQUOxxxxRE(config-router)#
```

8.5.2 area nssa

This command is used to assign an area as an NSSA area. Use the **no** form of this command to remove the NSSA related settings associated with the area.

Syntax

- area *AREA-ID* nssa [no-summary]

- **no area** *AREA-ID* **nssa** [**no-summary**]

Parameters

Parameters	description
<i>AREA-ID</i>	Specifies the ID of the area to be assigned as an NSSA area.
no-summary	(Optional) Specifies that this function only takes effect when the router is an ABR.

Default

No NSSA area is defined.

If **no-summary** is not specified, the summary route will be advertised to the NSSA area.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command **no area** *AREA-ID* **nssa** removes all NSSA related settings associated with the area. The area remains as an NSSA area.

There are no external routes in an OSPF stub area, so routes cannot be redistributed from another protocol into a stub area.

An NSSA allows external routes to be advertised to the area in the type-7 LSA.

These routes are then leaked into other areas. Although, the external routes from other areas still do not enter the NSSA.

Use the **area nssa** command to simplify administration if connecting a central site using OSPF to a remote site that is using a different routing protocol. Extend OSPF to cover the remote connection by defining the area between the central router and the remote router as a NSSA.

For ASBR NSSA redistribution, external routes will only be redistributed to the NSSA area when redistribution is configured for the associated OSPF process.

The external routes from other areas within the same AS will not be injected to the NSSA area.

If there are multiple default routes generated into the NSSA area, the following priority will be followed: intra-route > inter-route > external route.

Example

This example shows how to configure the NSSA area.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# area 1 nssa
ZEQUOxxxxRE(config-router)#
```

8.5.3 area range

This command is used to summarize OSPF routes at an area border router. Use the **no** form of this command to remove the defined summarization of routes.

Syntax

- **area** *AREA-ID range NETWORK-PREFIX NETWORK-MASK* [**advertise** | **no-advertise**]
- **no area** *AREA-ID range NETWORK-PREFIX NETWORK-MASK*

Parameters

Parameters	description
<i>AREA-ID</i>	Specifies the area from which the routes will be summarized.
<i>NETWORK-PREFIX</i>	Specifies the network prefix of the summary route.
<i>NETWORK-MASK</i>	Specifies the network mask of the summary route.
advertise	(Optional) Specifies to advertise a Type-3 summary LSA for the specified range of addresses.
not-advertise	(Optional) Specifies to suppress the advertising of Type-3 summary LSAs. Component routes are still hidden behind it.

Default

By default, this option is disabled.
By default, **advertise** is specified.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command can be applied to the same area multiple times. Use this command on the ABR to summarize the intra-area routes. This command can be used to specify the summarized route for area 0 or for the non-zero area. Multiple area range commands can be configured. Thus, OSPF can summarize addresses for multiple sets of address ranges.

Example

This example shows how to configure one summary route to be advertised by the ABR to other areas for all subnets on network 192.168.0.0.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# area 1 range 192.168.0.0 255.255.0.0
ZEQUOxxxxRE(config-router)#
```

8.5.4 area stub

This command is used to specify an area as a stub area. Use the **no** form of this command to remove the stub related settings associated with the area.

Syntax

- **area** *AREA-ID* **stub** [**no-summary**]
- **no area** *AREA-ID* **stub** [**no-summary**]

Parameters

Parameters	description
<i>AREA-ID</i>	Specifies the ID of the area to be assigned as a stub area.
no-summary	(Optional) Specifies that the stub area is a total stub area.

Default

By default, an area is a normal area.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The **no area AREA-ID stub** command removes all stub related settings associated with the area. The area remains as a stub area. Use this command on all routers in the stub area.

Use the **no-summary** parameter to specify the area as a total stubby area. Routers in the area do not require knowing the inter-area routes except a type-3 default route.

Example

This example shows how to configure area 3 as stub area.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# area 3 stub
ZEQUOxxxxRE(config-router)#
```

8.5.5 area virtual-link

This command is used to configure the link between the backbone area and a non-backbone area that is physically separated from the backbone area. Use the **no** form of this command to remove a virtual link or reset the specific parameter to the default value.

Syntax

- **area AREA-ID virtual-link ROUTER-ID** [authentication [message-digest | null]] [hello-interval SECONDS] [dead-interval SECONDS] [[authentication-key PASSWORD] | [message-digest-key KEY-ID md5 KEY]]
- **no area AREA-ID virtual-link ROUTER-ID** [authentication] [hello-interval] [dead-interval] [message-digest-key KEY-ID]

Parameters

Parameters	description
<i>AREA-ID</i>	Specifies the identifier of the area to establish the virtual link. It can be specified as either a decimal value or as an IPv4 address.
<i>ROUTER-ID</i>	Specifies the router ID of the virtual link neighbor.
authentication	(Optional) Specifies the authentication type. If the authentication type is not specified for the virtual link, the password authentication type for the area will be used.
message-digest	(Optional) Specifies that message-digest authentication is used for the virtual link.

Parameters	description
null	(Optional) Specifies that no authentication is used.
hello-interval <i>SECONDS</i>	(Optional) Specifies the hello packet interval that the router sends on the virtual link. This value must be between 1 and 65535 seconds. If not specified, the default value is 10 seconds.
dead-interval <i>SECONDS</i>	(Optional) Specifies the dead interval time that a neighbor is regarded as off-line if no hello packets are received within that time. This value must be between 1 and 65535 seconds. If not specified, the default value is 40 seconds.
authentication-key <i>PASSWORD</i>	(Optional) Specifies an up to 8 bytes long password used for password authentication.
message-digest-key <i>KEY-ID</i> md5 <i>KEY</i>	(Optional) Specifies an up to 16 bytes long MD key for MD5 message digest authentication.

Default

By default, no OSPF virtual link is defined.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If a non-zero area is not physically connected to the zero area, it must be connected to the zero area via a virtual link. The virtual link is a point-to-point link. The router will send the OSPF message to the neighbor router as unicast IP packet.

Example

This example shows how to establish a virtual link with a hello-interval and dead-interval of 5 and 10 seconds respectively.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# area 1 virtual-link 10.10.11.50 hello-interval 5 dead-
interval 10
ZEQUOxxxxRE(config-router)#
```

This example shows how to configure the parameters for a virtual link at area 1 and remote ID of 192.168.255.1. The key is defined is a simple password authentication, defined as “yourpass” and the authentication type is set to simple password.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# area 1 virtual-link 192.168.255.1 authentication
ZEQUOxxxxRE(config-router)# area 1 virtual-link 192.168.255.1 authentication-key
yourpass
ZEQUOxxxxRE(config-router)#
```

8.5.6 clear ip ospf

This command is used to restart the IPv4 OSPF process.

Syntax

- clear ip ospf process

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

When an OSPF process is cleared, the OSPF routing database will be cleared and the process is restarted.

Example

This example shows how to clear the OSPF process.

```
ZEQUOxxxxRE# clear ip ospf process
ZEQUOxxxxRE#
```

8.5.7 default-information originate

This command is used to advertise a default route to the OSPF routing domain. Use **no** command to disable the function.

Syntax

- **default-information originate** [**always**] [**metric** *METRIC-VALUE*]
- **no default-information originate** [**always**] [**metric**]

Parameters

Parameters	description
always	(Optional) Specifies to always generate the default route regardless of existence of a default route in the routing table.
metric <i>METRIC-VALUE</i>	(Optional) Specifies the cost associated the generated default route. If not specified, the default metric cost is 1. The valid value is from 1 to 65535.

Default

By default, this feature is disabled.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The **default-information originate** command is used in the ASBR to configure a routing process to advertise a default route (network 0.0.0.0) to the routing domain. If **always** is specified, the default route is generated all the time. If **always** is not specified, the default route will only be generated when the default route exists in the routing table.

Example

This example shows how to advertise the default route regardless of the existence of a default route in the software.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# default-information originate always
ZEQUOxxxxRE(config-router)#
```

8.5.8 default-metric

This command is used to configure the default metric value for the routing protocol. Use the **no** form of this command to remove the default metric setting.

Syntax

- **default-metric** *METRIC-VALUE*
- **no default-metric**

Parameters

Parameters	description
<i>METRIC-VALUE</i>	Specifies the default metric value for the redistributed routes. The valid value is from 1 to 16777214.

Default

By default, this value is 20.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The **default-metric** command is used in conjunction with the **redistribute** command to cause the current routing protocol to use the default metric value for the redistributed routes that have no metric specified.

Example

This example shows how to configure router redistributes RIP-derived routes into the OSPF domain and that all redistributed routes are advertised with an OSPF metric of 10.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# default-metric 10
ZEQUOxxxxRE(config-router)# redistribute rip
ZEQUOxxxxRE(config-router)#
```

8.5.9 distance ospf

This command is used to configure the distance for specific OSPF routes. Use the **no** form of the command to remove the assignment.

Syntax

- distance ospf {inter-area | intra-area | external-1 | external-2} *DISTANCE*
- no distance ospf

Parameters

Parameters	description
inter-area	Specifies the distance for OSPF inter-area routes.
intra-area	Specifies the distance for OSPF intra-area routes.
external-1	Specifies the distance for OSPF external type-5 and type-7 routes with a type-1 metric.
external-2	Specifies the distance for OSPF external type-5 and type-7 routes with a type-2 metric.
<i>DISTANCE</i>	Specifies the administrative distance. This value must be between 1 and 255.

Default

By default, the Intra-area distance is 80.
By default, the Inter-area distance is 90.
By default, the External-1 distance is 110.
By default, the External-2 distance is 115.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **distance ospf** command to set the administrative distance for specific OSPF routes. The **distance ospf** command acts as the distance command which determines which routes will be installed in routing information base. If the distance of specific OSPF routes is not configured, the distance follows the value specified by the distance command.

Numerically, an administrative distance is an integer from 1 to 255. In general, the higher the value is, the lower the rating of trustworthiness is. An administrative distance of 255 means that the routing information source cannot be trusted and should be ignored.

Example

This example shows how to configure the distance of external routes type-1 metric to 50.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# distance ospf external-1 50
ZEQUOxxxxRE(config-router)#
```

8.5.10 host area

This command is used to configure a stub host entry belonging to a particular area. Use the **no** form of this command to remove the host area configuration.

Syntax

- **host** *IP-ADDRESS* **area** *AREA-ID* [**cost** *COST*]
- **no** **host** *IP-ADDRESS* **area** *AREA-ID*

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IP address of the host.
<i>AREA-ID</i>	Specifies the identifier of the area that contains the stub host entry.
cost <i>COST</i>	(Optional) Specifies cost for the stub host entry. The range is from 1 to 65535. The default value is 1.

Default

By default, no host is configured.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The router will advertise specific host routes as the router's LSA for a stub link.

Example

This example shows how to configure a stub host 172.16.10.100 at area 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# host 172.16.10.100 area 1
ZEQUOxxxxRE(config-router)#
```

8.5.11 ip ospf authentication

This command is used to define the authentication mode for OSPF. Use the **no** form of this command to disable the authentication.

Syntax

- **ip ospf authentication [message-digest]**
- **no ip ospf authentication**

Parameters

Parameters	description
message-digest	(Optional) Specifies to use the message digest authentication.

Default

By default, no authentication is applied.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When it is specified to use the authentication key but the key is not configured, then NULL key will be used. When it is specified to use message digest but the digest key is not configured, the NULL key (with key ID 0) will be used.

Example

This example shows how to enable message authentication on interface VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip ospf authentication message-digest
ZEQUOxxxxRE(config-if)#
```

8.5.12 ip ospf authentication-key

This command is used to specify an OSPF authentication password for the authentication with the neighboring routers. Use the **no** form of this command to remove an OSPF authentication password.

Syntax

- ip ospf authentication-key *PASSWORD*
- no ip ospf authentication-key

Parameters

Parameters	description
<i>PASSWORD</i>	Specifies the authentication password of up to 8 bytes. The syntax is general string that does not allow spaces.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command creates a password (key) that is inserted into the OSPF header when the router originates routing protocol packets. Assign a separate password to each network for different interfaces. Routers on the same network must use the same password to be able to exchange OSPF routing data. Configure the routers in the same routing domain with the same password.

Example

This example shows how an authentication key test is created on interface VLAN 1 in area 0. Note that first authentication is enabled for area 0.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip ospf authentication
ZEQUOxxxxRE(config-if)# ip ospf authentication-key test
ZEQUOxxxxRE(config-if)#
```

8.5.13 ip ospf cost

This command is used to specify the cost of sending packets on an interface. Use the **no** form of this command to remove the assignment.

Syntax

- **ip ospf cost** *COST*
- **no ip ospf cost**

Parameters

Parameters	description
<i>COST</i>	Specifies the value of the link-state metric. The range of value is from 1 to 65535.

Default

By default, the value is 1.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The interface cost reflects the overhead for sending the packet across the interface. This cost is advertised as the link cost in the router link advertisement.

Example

This example shows how to configure the interface cost value to 10 on interface VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip ospf cost 10
ZEQUOxxxxRE(config-if)#
```

8.5.14 ip ospf dead-interval

This command is used to configure the interval during which at least one hello packet from a neighbor must be received before it is declared offline. Use the **no** form of this command to revert to the default setting.

Syntax

- **ip ospf dead-interval** *SECONDS*
- **no ip ospf dead-interval**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval in seconds. The range of value is from 1 to 65535. A neighbor is regarded as offline if no packets are received during the interval.

Default

By default, this value is 40 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The dead-interval is the amount of time that the router waits to receive an OSPF hello packet from the neighbor before declaring the neighbor down. This value is advertised in the router's hello packets. It must be the same for all routers on a specific network. Specifying a smaller dead interval ensures faster detection of topology changes but might cause more routing instability.

Example

This example shows how to configure the dead interval value to 10 seconds on the VLAN 1 interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip ospf dead-interval 10
ZEQUOxxxxRE(config-if)#
```

8.5.15 ip ospf hello-interval

This command is used to specify the interval between hello packets. Use the **no** form of this command to revert to the default setting.

Syntax

- **ip ospf hello-interval** *SECONDS*
- **no ip ospf hello-interval**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval in seconds. This value must be between 1 and 65535 seconds.

Default

By default, this value is 10 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The hello-interval is advertised in the hello packets. Configure the same hello-interval for all routers on a specific network. A shorter hello interval ensures faster detection of topological changes but generates more routing traffic and might cause routing instability.

Example

This example shows how to configure the hello-interval to 3 seconds on interface VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip ospf hello-interval 3
ZEQUOxxxxRE(config-if)#
```

8.5.16 ip ospf message-digest-key

This command is used to configure the MD5 digest key for OSPF MD5 authentication. Use the **no** form of this command to remove an MD5 key.

Syntax

- ip ospf message-digest-key *KEY-ID* md5 *KEY*
- no ip ospf message-digest-key *KEY-ID*

Parameters

Parameters	description
<i>KEY-ID</i>	Specifies the key identifier. The range is from 1 to 255.

Parameters	description
<i>KEY</i>	Specifies the OSPF MD5 message digest key. The syntax is general string that does not allow spaces. This key can be up to 16 characters long.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The authentication for OSPF messages can be either operated in the password mode or MD5 digest mode. This command defines the message digest key used by the MD5 digest mode.

In MD5 digest mode, the OSPF message sender will compute a message digest based on the message digest key for the TX message. The message digest and the key ID will be encoded in the packet. The receiver of the packet will verify the digest in the message against the digest computed based on the locally defined message digest key corresponding to the same key ID.

The same key ID on the neighboring router should be defined with the same key string.

All the neighboring routers on the same interface must use the same key to exchange the OSPF packet with each other. Normally, all neighboring routers on the interface use the same key.

With the MD5 digest mode, the user can rollover to a new key without disrupting the current message exchange using the new key. Supposed that a router is currently using an old key to exchange OSPF packets with the neighbor router, as the user configures a new key, the router will start the roll over process by sending duplicated packets for both of the old and the new key. The router will stop sending duplicated packets until it find that all routers on the network have learned the new key. After the rollover process completed, the user should delete the old key to prevent the router from communicating with router using the old key.

Example

This example shows how to configure a new key 10 with the password “yourpass” on the interface VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip ospf authentication message-digest
ZEQUOxxxxRE(config-if)# ip ospf message-digest-key 10 md5 yourpass
ZEQUOxxxxRE(config-if)#
```

8.5.17 ip ospf priority

This command is used to configure the router priority that is used to determine the designated router for the network. Use the **no** form of this command to revert to the default setting.

Syntax

- ip ospf priority *PRIORITY*
- no ip ospf priority

Parameters

Parameters	description
<i>PRIORITY</i>	Specifies the priority of the router on the interface. This value must be between 0 and 255.

Default

By default, this value is 1.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The OSPF router will determine a designated router for the multi-access network.

This command sets the priority used to determine the OSPF Designated Router (DR) for a network. If two routers attempt to become the DR, the router with the higher router priority will be elected the DR. If the routers have the same priority, the router with the higher router ID takes precedence.

Only routers with non-zero router priority values are eligible to become the designated or backup designated router.

Example

This example shows how to configure the OSPF priority value to 3 on the VLAN 1 interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip ospf priority 3
ZEQUOxxxxRE(config-if)#
```

8.5.18 network area

This command is used to enable OSPF routing with the specified area ID on interfaces with IP addresses that match or belong to the specified network address. Use the **no** form of this command to remove the configuration.

Syntax

- **network** *NETWORK-PREFIX NETWORK-MASK* **area** *AREA-ID*
- **no network** *NETWORK-PREFIX NETWORK-MASK* **area** *AREA-ID*

Parameters

Parameters	description
<i>NETWORK-PREFIX</i> <i>NETWORK-MASK</i>	Specifies the subnet prefix and subnet mask of the network.
<i>AREA-ID</i>	Specifies the identifier of the area to be created.

Default

None.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to create an OSPF area on the interfaces. The area will be created on an interface if the subnet configured on the interface falls in the range of the network specified by the command. The interface that has a subnet defined that belongs to the network specified, by this command, will be activated.

Example

This example shows how to define the OSPF area 3 on interfaces with the IP address that starts with the octet value of 10.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# network 10.0.0.0 255.0.0.0 area 3
ZEQUOxxxxRE(config-router)#
```

8.5.19 no area

This command is used to remove the settings associated with an area.

Syntax

- **no area** *AREA-ID*

Parameters

Parameters	description
<i>AREA-ID</i>	Specifies the area ID.

Default

None.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to remove the settings associated with an area.

Example

This example shows how to remove area 3 and all options associated with the area 3.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# no area 3
ZEQUOxxxxRE(config-router)#
```

8.5.20 passive-interface

This command is used to disable the sending and receiving of the OSPF routing updates on an interface. Use the **no** form of this command to enable the sending and receiving of routing updates.

Syntax

- passive-interface {default | *INTERFACE-ID*}
- no passive-interface {default | *INTERFACE-ID*}

Parameters

Parameters	description
default	Specifies that all interfaces will operate in the passive mode.
<i>INTERFACE-ID</i>	Specifies the ID of the interface that will operate in the passive mode.

Default

By default, no interface is configured to operate in the passive mode.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If an interface is passive, the OSPF routing update packets are not sent nor received through the specified interface.

Example

This example shows how to configure the interface VLAN 1 to the passive mode.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# passive-interface vlan1
ZEQUOxxxxRE(config-router)#
```

8.5.21 redistribute

This command is used to redistribute routes from one routing domain into another routing domain. Use the **no** command to disable redistribution.

Syntax

- **redistribute** *PROTOCOL* [**metric** *METRIC-VALUE*] [**metric-type** *TYPE-VALUE*] [**route-map** *MAP-NAME*]
- **no redistribute** *PROTOCOL* [**metric**] [**metric-type**] [**route-map**]

Parameters

Parameters	description
<i>PROTOCOL</i>	Specifies the source protocol from which routes are being redistributed. It can be one of the following keywords: bgp , connected , static , or rip . For routing protocols such as Open Shortest Path First (OSPF), these routes will be redistributed as external to the autonomous system.
metric <i>METRIC-VALUE</i>	(Optional) Specifies a metric for the redistributed routes. The valid value is from 1 to 16777214.
metric-type <i>TYPE-VALUE</i>	(Optional) Specifies the metric type of the external route being redistributed into the OSPF routing domain. It can be one of two values: 1 : Specifies to use the OSPF external metric type 1. 2 : Specifies to use the OSPF external metric type 2. If a metric type is not specified, the Switch will adopt a type 2.

Parameters	description
route-map <i>MAP-NAME</i>	(Optional) Specifies the route map that filters the imported routes from this source routing protocol. If not specified, all routes are redistributed.

Default

By default, route redistribution is disabled.

By default, the metric type is type 2 for external routes.

By default, the route map is set to redistribute all routes.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12, 15.

Usage Guideline

External routes can be redistributed to normal areas as type-5 external routes and redistributed to NSSA stub areas as type-7 external routes by the ASBR.

The external route type can be type-1 or type-2. If the redistributed external route is of type-1, the metric represents the internal metric. If the redistributed external route is of type-2, the metric represents the external metric. An internal metric will consider the cost of the route from itself to the redistributing router plus the advertised cost to reach the destination. An external metric only considers the advertised metric to reach the destination.

Use the **redistribute** or the **default-information** command only on the ASBR

If a metric is not specified, the metric will be the value set by the **default metric** command. If no value is specified by the default metric, routes redistributed from other protocols will get 20 as the metric value with the following exception. BGP will get 1 as the metric value.

Example

This example shows how BGP routes are redistributed into an OSPF domain.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# redistribute bgp metric 100
ZEQUOxxxxRE(config-router)#
```

8.5.22 router ospf

This command is used to configure the OSPF routing process. Use the **no** form of this command to remove the OSPF routing process.

Syntax

- router ospf
- no router ospf

Parameters

None.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enter the router configuration mode to configure parameters needed by OSPF.

Example

This example shows how to enable OSPF and enter the OSPF router configuration mode.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)#
```

8.5.23 router-id

This command is used to specify a router ID for the OSPF process. Use the **no** form of this command to revert to the default setting.

Syntax

- **router-id** *ROUTER-ID*
- **no router-id**

Parameters

Parameters	description
<i>ROUTER-ID</i>	Specifies the router ID in the IPv4 address format.

Default

By default, the router ID is automatically selected.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The router ID is a 32-bit number assigned to each router running the OSPF protocol. This number uniquely identifies the router within an autonomous system. Each router has a unique router ID.

Example

This example shows how to configure the router ID to 10.10.10.60.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# router ospf
ZEQUOxxxxRE(config-router)# router-id 10.10.10.60
ZEQUOxxxxRE(config-router)#
```

8.5.24 show ip ospf

This command is used to display general information about the OSPF routing process.

Syntax

- show ip ospf

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display general OSPF protocol information. It provides system wide statistics and per-area statistics for OSPF. The LSDB database overflow limit is the capacity for the LSA table size.

Example

This example shows how to display general OSPF protocol information.

```
ZEQUOxxxxRE#show ip ospf

Operational Router ID 222.200.23.1
  Process uptime is 0DT0H18M54S
  Conforms to RFC2328, and RFC1583 Compatibility flag is disabled
  This router is an ABR, ABR Type is Standard (RFC2328)
  This router is an ASBR (injecting external routing information)
  SPF schedule Hold time between two SPF's 3 secs
  Number of external LSA 2010. Checksum 0x3ef91d0
  Number of LSA originated 261
  Number of LSA received 2131
  Number of current LSA 2184
  LSDB database overflow limit is 49152
  Number of areas attached to this router : 5
    Area 0.0.0.0 (BACKBONE)
      Number of interface in this area is 15 active interface number is 15
      Number of fully adjacent neighbors in this area is 15
      SPF algorithm executed 19 times
      Number of LSA 37
    Area 0.0.0.1
      Number of interface in this area is 1 active interface number is 1
      Number of fully adjacent neighbors in this area is 1
      SPF algorithm executed 19 times
      Number of LSA 53
    Area 0.0.0.3
      Number of interface in this area is 2 active interface number is 2
      Number of fully adjacent neighbors in this area is 2
      Number of fully adjacent virtual neighbors through this area is 1
      SPF algorithm executed 19 times
      Number of LSA 28
    Area 0.0.0.5
      Number of interface in this area is 1 active interface number is 1
      Number of fully adjacent neighbors in this area is 1
      SPF algorithm executed 19 times
      Number of LSA 27
    Area 0.0.0.7
      Number of interface in this area is 1 active interface number is 1
      Number of fully adjacent neighbors in this area is 2
      SPF algorithm executed 19 times
      Number of LSA 29

ZEQUOxxxxRE#
```

8.5.25 show ip ospf database

This command is used to display the database summary for OSPF information.

Syntax

- show ip ospf database

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information about the database summary for OSPF information.

Example

This example shows how to display information about the database summary for OSPF information.

```
ZEQUOxxxxRE#show ip ospf database
```

```
    OSPF Router with ID (107.100.0.1)
```

```
        Router Link States (Area 0.0.0.11)
```

Link ID	ADV Router	Age	Seq#	CkSum	Link Count
107.100.0.1	107.100.0.1	3	0x80000001	0x1092	1

```
        Summary Link States (Area 0.0.0.11)
```

Link ID	ADV Router	Age	Seq#	CkSum	Route
107.100.0.0	107.100.0.1	2	0x80000001	0x5c5f	107.100.0.0/16

```
        Router Link States (Area 0.0.0.107)
```

Link ID	ADV Router	Age	Seq#	CkSum	Link Count
107.100.0.1	107.100.0.1	3	0x80000001	0x21af	1

```
        Summary Link States (Area 0.0.0.107)
```

Link ID	ADV Router	Age	Seq#	CkSum	Route
11.0.0.0	107.100.0.1	2	0x80000001	0x146e	11.0.0.0/8

```
        NSSA-external Link States (Area 0.0.0.107)
```

Link ID	ADV Router	Age	Seq#	CkSum	Route	Tag
0.0.0.0	107.100.0.1	2	0x80000001	0x5d22	N1 0.0.0.0/0	0

```
Total Entries: 5
```

```
ZEQUOxxxxRE#
```

8.5.26 show ip ospf database adv-router

This command is used to display all of the LSAs generated by the advertising router.

Syntax

- `show ip ospf database adv-router ROUTER-ID`

Parameters

Parameters	description
<i>ROUTER-ID</i>	Specifies the router ID in IPv4 address format.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display all of the LSAs generated by the advertising router.

Example

This example shows how to display all of the LSAs generated by the advertising router.

```
ZEQUOxxxxRE#show ip ospf database adv-router 40.90.90.90
```

```
      OSPF Router with ID (107.100.0.1)
```

```
      Router Link States (Area 0.0.0.0)
```

```
LS age: 51
Options: 0x2 (*|---|---|E|)
Flags: 0x2 ASBR
LS Type: router-LSA
Link State ID: 40.90.90.90
Advertising Router: 40.90.90.90
LS Seq Number: 0x80000014
Checksum: 0x53A8
Length: 108
Number of Links: 7
  Link connected to Stub Network
    (Link ID) Network/subnet number: 18.0.0.0
    (Link Data) Network Mask: 255.0.0.0
    Number of TOS metrics: 0
      TOS 0 Metric: 1
  Link connected to a Transit Network
    (Link ID) Designated Router address: 2.0.0.1
    (Link Data) Router Interface address: 2.0.0.1
    Number of TOS metrics: 0
      TOS 0 Metric: 1
  Link connected to Stub Network
    (Link ID) Network/subnet number: 17.0.0.0
    (Link Data) Network Mask: 255.0.0.0
    Number of TOS metrics: 0
      TOS 0 Metric: 1
  Link connected to Stub Network
    (Link ID) Network/subnet number: 13.0.0.0
    (Link Data) Network Mask: 255.0.0.0
    Number of TOS metrics: 0
      TOS 0 Metric: 1
  Link connected to Stub Network
    (Link ID) Network/subnet number: 12.0.0.0
    (Link Data) Network Mask: 255.0.0.0
    Number of TOS metrics: 0
      TOS 0 Metric: 1
  Link connected to a Transit Network
    (Link ID) Designated Router address: 1.0.0.1
    (Link Data) Router Interface address: 1.0.0.1
    Number of TOS metrics: 0
      TOS 0 Metric: 1
```

```

Link connected to Stub Network
(Link ID) Network/subnet number: 40.0.0.0
(Link Data) Network Mask: 255.0.0.0
Number of TOS metrics: 0
TOS 0 Metric: 1

Net Link States (Area 0.0.0.0)

LS age: 57
Options: 0x2 (*|---|E|)
LS Type: network-LSA
Link State ID: 1.0.0.1 (address of Designated Router)
Advertising Router: 40.90.90.90
LS Seq Number: 0x80000001
Checksum: 0x4775
Length: 32
Network Mask: /8
    Attached Router: 40.90.90.90
    Attached Router: 30.90.90.90

LS age: 57
Options: 0x2 (*|---|E|)
LS Type: network-LSA
Link State ID: 2.0.0.1 (address of Designated Router)
Advertising Router: 40.90.90.90
LS Seq Number: 0x80000001
Checksum: 0x3A81
Length: 32
Network Mask: /8
    Attached Router: 40.90.90.90
    Attached Router: 30.90.90.90

Total Entries: 3

ZEQUOxxxxRE#

```

8.5.27 show ip ospf database asbr-summary

This command is used to display information about the Autonomous System Boundary Router (ASBR) summary LSAs.

Syntax

- show ip ospf database asbr-summary [*LINK-STATE-ID* | self-originate | adv-router *IP-ADDRESS*]

Parameters

Parameters	description
<i>LINK-STATE-ID</i>	(Optional) Specifies the link state ID (as an IP address).
self-originate	(Optional) Specifies the self-originated link states.

Parameters	description
adv-router	(Optional) Specifies to display all the LSAs of the specified router.
<i>IP-ADDRESS</i>	(Optional) Specifies the advertise router IP address.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information about the ASBR summary LSAs.

Example

This example shows how to display information about the ASBR summary LSAs.

```
ZEQUOxxxxRE#show ip ospf database asbr-summary

      OSPF Router with ID (107.100.0.1)

      ASBR-Summary Link States (Area 0.0.0.0)

LS age: 119
Options: 0x2 (*|-|-|-|-|E|-)
LS Type: ASBR-summary-LSA
Link State ID: 107.100.0.1 (AS Boundary Router address)
Advertising Router: 30.90.90.90
LS Seq Number: 0x80000002
Checksum: 0xB9A2
Length: 28
Network Mask: /0
      TOS: 0 Metric: 1

      ASBR-Summary Link States (Area 0.0.0.11)

LS age: 119
Options: 0x2 (*|-|-|-|-|E|-)
LS Type: ASBR-summary-LSA
Link State ID: 40.90.90.90 (AS Boundary Router address)
Advertising Router: 30.90.90.90
LS Seq Number: 0x80000002
Checksum: 0x3DB8
Length: 28
Network Mask: /0
      TOS: 0 Metric: 1

Total Entries: 2

ZEQUOxxxxRE#
```

8.5.28 show ip ospf database external

This command is used to display information about the external LSAs.

Syntax

- show ip ospf database external [*LINK-STATE-ID* | self-originate | adv-router *IP-ADDRESS*]

Parameters

Parameters	description
<i>LINK-STATE-ID</i>	(Optional) Specifies the link state ID (as an IP address).
self-originate	(Optional) Specifies the self-originated link states.

Parameters	description
adv-router	(Optional) Specifies to display all the LSAs of the specified router.
<i>IP-ADDRESS</i>	(Optional) Specifies the advertise router IP address.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information about the external LSAs.

Example

This example shows how to display information about the external LSAs.

```
ZEQUOxxxxRE#show ip ospf database external

      OSPF Router with ID (107.100.0.1)

      AS External Link States

LS age: 1056
Options: 0x2 (*|---|E|)
LS Type: AS-external-LSA
Link State ID: 1.0.0.0 (External Network Number)
Advertising Router: 10.47.65.160
LS Seq Number: 80000001
Checksum: 0x17e4
Length: 36
Network Mask: /24
    Metric Type: 2 (Larger than any link state path)
    TOS: 0
    Metric: 20
    Forward Address: 47.65.52.2
    External Route Tag: 0

Total Entries: 1

ZEQUOxxxxRE#
```

8.5.29 show ip ospf database network

This command is used to display information about the network LSAs.

Syntax

- show ip ospf database network [*LINK-STATE-ID* | self-originate | adv-router *IP-ADDRESS*]

Parameters

Parameters	description
<i>LINK-STATE-ID</i>	(Optional) Specifies the link state ID (as an IP address).
self-originate	(Optional) Specifies the self-originated link states.
adv-router	(Optional) Specifies to display all the LSAs of the specified router.
<i>IP-ADDRESS</i>	(Optional) Specifies the advertise router IP address

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information about the network LSAs.

Example

This example shows how to display information about the network LSAs.

```
ZEQUOxxxxRE#show ip ospf database network

      OSPF Router with ID (107.100.0.1)

      Net Link States (Area 0.0.0.0)

LS age: 276
Options: 0x2 (*|-|-|-|-|E|-)
LS Type: network-LSA
Link State ID: 1.0.0.1 (address of Designated Router)
Advertising Router: 40.90.90.90
LS Seq Number: 0x80000001
Checksum: 0x4775
Length: 32
Network Mask: /8
    Attached Router: 40.90.90.90
    Attached Router: 30.90.90.90

LS age: 276
Options: 0x2 (*|-|-|-|-|E|-)
LS Type: network-LSA
Link State ID: 2.0.0.1 (address of Designated Router)
Advertising Router: 40.90.90.90
LS Seq Number: 0x80000001
Checksum: 0x3A81
Length: 32
Network Mask: /8
    Attached Router: 40.90.90.90
    Attached Router: 30.90.90.90

      Net Link States (Area 0.0.0.11)

LS age: 273
Options: 0x2 (*|-|-|-|-|E|-)
LS Type: network-LSA
Link State ID: 11.0.0.3 (address of Designated Router)
Advertising Router: 107.100.0.1
LS Seq Number: 0x80000001
Checksum: 0x106D
Length: 32
Network Mask: /8
    Attached Router: 107.100.0.1
    Attached Router: 30.90.90.90

Total Entries: 3

ZEQUOxxxxRE#
```

8.5.30 show ip ospf database nssa-external

This command is used to display information about the NSSA-external LSAs.

Syntax

- show ip ospf database nssa-external [*LINK-STATE-ID* | self-originate | adv-router *IP-ADDRESS*]

Parameters

Parameters	description
<i>LINK-STATE-ID</i>	(Optional) Specifies the link state ID (as an IP address).
self-originate	(Optional) Specifies the self-originated link states.
adv-router	(Optional) Specifies to display all the LSAs of the specified router.
<i>IP-ADDRESS</i>	(Optional) Specifies the advertise router IP address

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information about the NSSA-external LSAs.

Example

This example shows how to display information about the NSSA-external LSAs.

```
ZEQUOxxxxRE# #show ip ospf database nssa-external

      OSPF Router with ID (90.0.0.2)

      NSSA-external Link States (Area 0.0.0.2)

LS age: 851
Options: 0x2 (*|-|-|-|-|E|-)
LS Type: AS_NSSA_LSA
Link State ID: 0.0.0.0 (External Network Number For NSSA)
Advertising Router: 90.0.0.2
LS Seq Number: 0x80000001
Checksum: 0x14DF
Length: 36
Network Mask: /0
    Metric Type: 1
    TOS: 0
    Metric: 1
    NSSA: Forward Address: 0.0.0.0
    External Route Tag: 0

Total Entries: 1

ZEQUOxxxxRE#
```

8.5.31 show ip ospf database self-originate

This command is used to display LSAs generated by the local router.

Syntax

- show ip ospf database self-originate

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display LSAs generated by the local router.

Example

This example shows how to display LSAs generated by the local router.

```
ZEQUOxxxxRE#show ip ospf database self-originate

      OSPF Router with ID (10.64.84.203)

      Router Link States (Area 0.0.0.0)

LS age: 796
Options: 0x2 (*|-|-|-|-|E|-)
Flags: 0x2 : ASBR
LS Type: router-LSA
Link State ID: 10.64.84.203
Advertising Router: 10.64.84.203
LS Seq Number: 800000f1
Checksum: 0x57c1
Length: 84
Number of Links: 5
  Link connected to: a Transit Network
    (Link ID) Designated Router address: 172.0.12.81
    (Link Data) Router Interface address: 172.0.12.82
    Number of TOS metrics: 0
    TOS 0 Metric: 1
  Link connected to: a Transit Network
    (Link ID) Designated Router address: 172.0.14.100
    (Link Data) Router Interface address: 172.0.14.101
    Number of TOS metrics: 0
    TOS 0 Metric: 1
  Link connected to: a Transit Network
    (Link ID) Designated Router address: 172.0.15.2
    (Link Data) Router Interface address: 172.0.15.1
    Number of TOS metrics: 0
    TOS 0 Metric: 1
  Link connected to: a Transit Network
    (Link ID) Designated Router address: 192.0.21.3
    (Link Data) Router Interface address: 192.0.21.2
    Number of TOS metrics: 0
    TOS 0 Metric: 1
  Link connected to: a Transit Network
    (Link ID) Designated Router address: 192.0.22.3
    (Link Data) Router Interface address: 192.0.22.2
    Number of TOS metrics: 0
    TOS 0 Metric: 1

Total Entries: 1

ZEQUOxxxxRE#
```

8.5.32 show ip ospf database router

This command is used to display information about the router LSAs.

Syntax

- show ip ospf database router [*LINK-STATE-ID* | self-originate | adv-router *IP-ADDRESS*]

Parameters

Parameters	description
<i>LINK-STATE-ID</i>	(Optional) Specifies the link state ID (as an IP address).
self-originate	(Optional) Specifies the self-originated link states.
adv-router	(Optional) Specifies to display all the LSAs of the specified router.
<i>IP-ADDRESS</i>	(Optional) Specifies the advertise router IP address

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information about the router LSAs.

Example

This example shows how to display information about the router LSAs.

```
ZEQUOxxxxRE#show ip ospf database router

      OSPF Router with ID (10.47.65.160)

      Router Link States (Area 0.0.0.0)

LS age: 1056
Options: 0x2 (*|---|---|E|)
Flags: 0x3 : ABR ASBR
LS Type: router-LSA
Link State ID: 10.47.65.160
Advertising Router: 10.47.65.160
LS Seq Number: 8000000e
Checksum: 0x107f
Length: 96
Number of Links: 6
  Link connected to: a Transit Network
    (Link ID) Designated Router address: 47.65.49.111
    (Link Data) Router Interface address: 47.65.49.1
    Number of TOS metrics: 0
    TOS 0 Metric: 1
  Link connected to: a Virtual Link
    (Link ID) Neighboring Router ID: 10.47.65.181
    (Link Data) Router Interface address: 47.65.51.1
    Number of TOS metrics: 0
    TOS 0 Metric: 1
  Link connected to: a Virtual Link
    (Link ID) Neighboring Router ID: 10.47.65.182
    (Link Data) Router Interface address: 47.65.52.1
    Number of TOS metrics: 0
    TOS 0 Metric: 1
  Link connected to: a Virtual Link
    (Link ID) Neighboring Router ID: 10.47.65.183
    (Link Data) Router Interface address: 47.65.53.1
    Number of TOS metrics: 0
    TOS 0 Metric: 1
  Link connected to: a Virtual Link
    (Link ID) Neighboring Router ID: 10.47.65.184
    (Link Data) Router Interface address: 47.65.54.1
    Number of TOS metrics: 0
    TOS 0 Metric: 1
  Link connected to: Stub Network
    (Link ID) Network/subnet number: 47.65.49.112
    (Link Data) Network Mask: 255.255.255.255
    Number of TOS metrics: 0
    TOS 0 Metric: 0
```

```

LS age: 1063
Options: 0x2 (*|-|-|-|-|E|-)
Flags: 0x3 : ABR ASBR
LS Type: router-LSA
Link State ID: 10.47.65.181
Advertising Router: 10.47.65.181
LS Seq Number: 80000006
Checksum: 0xb55d
Length: 48
Number of Links: 2
  Link connected to: a Virtual Link
    (Link ID) Neighboring Router ID: 10.47.65.160
    (Link Data) Router Interface address: 47.65.51.2
    Number of TOS metrics: 0
    TOS 0 Metric: 1
  Link connected to: a Virtual Link
    (Link ID) Neighboring Router ID: 10.47.65.184
    (Link Data) Router Interface address: 47.65.84.2
    Number of TOS metrics: 0
    TOS 0 Metric: 10

Total Entries: 2

ZEQUOxxxxRE#

```

8.5.33 show ip ospf database summary

This command is used to display information about the summary LSAs.

Syntax

- show ip ospf database summary [*LINK-STATE-ID* | self-originate | adv-router *IP-ADDRESS*]

Parameters

Parameters	description
<i>LINK-STATE-ID</i>	(Optional) Specifies the link state ID (as an IP address).
self-originate	(Optional) Specifies the self-originated link states.
adv-router	(Optional) Specifies to display all the LSAs of the specified router.
<i>IP-ADDRESS</i>	(Optional) Specifies the advertise router IP address

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information about the summary LSAs.

Example

This example shows how to display information about the summary LSAs.

```
ZEQUOxxxxRE#show ip ospf database summary

      OSPF Router with ID (10.47.65.160)

      Router Link States (Area 0.0.0.0)

LS age: 1225
Options: 0x2 (*|---|E|)
LS Type: summary-LSA
Link State ID: 2.1.1.0 (summary Network Number)
Advertising Router: 10.47.65.160
LS Seq Number: 80000001
Checksum: 0xe359
Length: 28
Network Mask: /24
      TOS: 0 Metric: 1

LS age: 1225
Options: 0x2 (*|---|E|)
LS Type: summary-LSA
Link State ID: 2.1.2.0 (summary Network Number)
Advertising Router: 10.47.65.160
LS Seq Number: 80000001
Checksum: 0xd863
Length: 28
Network Mask: /24
      TOS: 0 Metric: 1

Total Entries: 2

ZEQUOxxxxRE#
```

8.5.34 show ip ospf database stub

This command is used to display information about the LSAs in the stub and NSSA areas.

Syntax

- **show ip ospf database stub** [*LINK-STATE-ID* | **self-originate** | **adv-router** *IP-ADDRESS*]

Parameters

Parameters	description
<i>LINK-STATE-ID</i>	(Optional) Specifies the link state ID (as an IP address).
self-originate	(Optional) Specifies the self-originated link states.
adv-router	(Optional) Specifies to display all the LSAs of the specified router.
<i>IP-ADDRESS</i>	(Optional) Specifies the advertise router IP address

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information about the LSAs in the stub and NSSA areas.

Example

This example shows how to display information about the LSAs in the stub and NSSA areas.

```
ZEQUOxxxxRE#show ip ospf database stub

      OSPF Router with ID (10.47.65.181)

      Router Link States (Area 1.1.1.1)

LS age: 1063
Options: 0x2 (*|-|-|-|-|E|-)
Flags: 0x3 : ABR ASBR
LS Type: router-LSA
Link State ID: 10.47.65.181
Advertising Router: 10.47.65.181
LS Seq Number: 80000006
Checksum: 0xb55d
Length: 48
Number of Links: 2
  Link connected to: a Virtual Link
    (Link ID) Neighboring Router ID: 10.47.65.160
    (Link Data) Router Interface address: 47.65.51.2
    Number of TOS metrics: 0
    TOS 0 Metric: 1
  Link connected to: a Virtual Link
    (Link ID) Neighboring Router ID: 10.47.65.184
    (Link Data) Router Interface address: 47.65.84.2
    Number of TOS metrics: 0
    TOS 0 Metric: 10

      Net Link States (Area 1.1.1.1)

LS age: 1034
Options: 0x0 (*|-|-|-|-|-|-)
LS Type: network-LSA
Link State ID: 47.65.49.111 (address of Designated Router)
Advertising Router: 47.65.49.111
LS Seq Number: 80000001
Checksum: 0x33da
Length: 32
Network Mask: /24
  Attached Router: 47.65.49.111
  Attached Router: 10.47.65.160

      Summary Link States (Area 1.1.1.1)

LS age: 1225
Options: 0x2 (*|-|-|-|-|E|-)
LS Type: summary-LSA
Link State ID: 2.1.1.0 (summary Network Number)
Advertising Router: 10.47.65.160
LS Seq Number: 80000001
Checksum: 0xe359
Length: 28
Network Mask: /24
  TOS: 0 Metric: 1

Total Entries: 3

ZEQUOxxxxRE#
```

8.5.35 show ip ospf interface

This command is used to display interface information for OSPF.

Syntax

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

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface ID to display.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display interface information for OSPF. If the no interface type or number is specified, OSPF information of all interfaces will be displayed.

Example

This example shows how to display interface information for OSPF.

```
ZEQUOxxxxRE#show ip ospf interface

vlan11 is up, line protocol is up
  Internet Address: 11.0.0.1/24, Area 0.0.0.0
  Router ID 1.1.1.1, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 1.1.1.1, Interface Address 11.0.0.1
  Timer intervals configured, Hello 10, Dead 80, Retransmit 5
  Current Authentication Type: none

vlan20 is up, line protocol is up
  Internet Address: 20.0.0.1/24, Area 0.0.0.2
  Router ID 1.1.1.1, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 200
  Designated Router (ID) 1.1.1.1, Interface Address 20.0.0.1
  Backup Designated Router (ID) 2.2.2.2, Interface Address 20.0.0.2
  Timer intervals configured, Hello 10, Dead 60, Retransmit 5
  Current Authentication Type: md5
  Authentication Key Configuration
    Authentication type: md5
    Message-digest-key 255

Total Entries: 2

ZEQUOxxxxRE#
```

8.5.36 show ip ospf neighbor

This command is used to display information of OSPF neighbors.

Syntax

- **show ip ospf neighbor** [*NEIGHBOR-ID* | interface *INTERFACE-ID*] [*detail*]

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	(Optional) Specifies the interface ID to display.
<i>NEIGHBOR-ID</i>	(Optional) Specifies the Neighbor ID.
detail	(Optional) Specifies to display detailed information of neighbors.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display information of OSPF neighbors. If no interface type or number is specified, OSPF neighbor information of all interfaces will be displayed.

Example

This example shows how to display information of OSPF neighbors.

```
ZEQUOxxxxRE#show ip ospf neighbor
```

Neighbor ID	Pri	State	Address	Interface
30.90.90.90	1	2-Way/DROther	11.0.0.1	vlan11
100.104.0.2	1	2-Way/DROther	11.0.0.2	vlan11
200.1.201.1	1	2-Way/DROther	11.0.0.4	vlan11
207.102.2.1	1	Full/Backup	11.0.0.5	vlan11
212.254.254.1	1	Full/DR	11.0.0.254	vlan11

Total Entries : 5

```
ZEQUOxxxxRE#show ip ospf neighbor detail
```

```
Neighbor 30.90.90.90, interface address 11.0.0.1
  In the area 0.0.0.0 via interface vlan11
  Neighbor priority is 1, State is 2-Way, 2 state change
  DR is 11.0.0.254, BDR is 11.0.0.5
  Options: 0x2 (*| - | - | - | - | E | -)
```

```
Neighbor 100.104.0.2, interface address 11.0.0.2
  In the area 0.0.0.0 via interface vlan11
  Neighbor priority is 1, State is 2-Way, 2 state change
  DR is 11.0.0.254, BDR is 11.0.0.5
  Options: 0x2 (*| - | - | - | - | E | -)
```

```
Neighbor 200.1.201.1, interface address 11.0.0.4
  In the area 0.0.0.0 via interface vlan11
  Neighbor priority is 1, State is 2-Way, 2 state change
  DR is 11.0.0.254, BDR is 11.0.0.5
  Options: 0x2 (*| - | - | - | - | E | -)
```

```
Neighbor 207.102.2.1, interface address 11.0.0.5
  In the area 0.0.0.0 via interface vlan11
  Neighbor priority is 1, State is Full, 6 state change
  DR is 11.0.0.254, BDR is 11.0.0.5
  Options: 0x42 (*| O | - | - | - | - | E | -)
```

```
Neighbor 212.254.254.1, interface address 11.0.0.254
  In the area 0.0.0.0 via interface vlan11
  Neighbor priority is 1, State is Full, 6 state change
  DR is 11.0.0.254, BDR is 11.0.0.5
  Options: 0x42 (*| O | - | - | - | - | E | -)
```

Total Entries : 5

```
ZEQUOxxxxRE#show ip ospf interface vlan11

vlan11 is up, line protocol is up
 Internet Address: 11.0.0.11/8, Area 0.0.0.0
 Router ID 112.255.255.1, Network Type BROADCAST, Cost: 1
 Transmit Delay is 1 sec, State OTHER, Priority 1, BFD enabled
 Designated Router (ID) 212.254.254.1, Interface Address 11.0.0.254
 Backup Designated Router (ID) 207.102.2.1, Interface Address 11.0.0.5
 Timer intervals configured, Hello 10, Dead 40, Retransmit 5
 Current Authentication Type: none

Total Entries : 1

ZEQUOxxxxRE#
```

8.5.37 show ip ospf virtual-links

This command is used to display virtual link information.

Syntax

- show ip ospf virtual-links

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display virtual link information.

Example

This example shows how to display virtual link information.

```
ZEQUOxxxxRE#show ip ospf virtual-links

Virtual Link to router 10.90.90.90 is up
  Transit area 0.0.0.3 via interface vlan40
  Local address 4.0.0.1
  Remote address 4.0.0.2
  Transmit Delay is 1 sec, State Point-To-Point
  Timer intervals configured, Hello 10, Dead 40, Retransmit 5
  Adjacency state Full
  Current Authentication Type: md5
  Authentication Key Configuration
    Authentication type: md5
    message-digest-key 1

Total Entries : 1

ZEQUOxxxxRE#
```

8.5.38 debug ip ospf

This command is used to turn on the OSPF debug function. Use the **no** form of this command to turn off the OSPF debug function.

Syntax

- debug ip ospf
- no debug ip ospf

Parameters

None.

Default

By default, the OSPF debug function is turned off.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to turn on or turn off the OSPF debug function while the global debug function has been turned on before.

Example

This example shows how to turn on the OSPF debug function.

```
ZEQUOxxxxRE# debug ip ospf  
ZEQUOxxxxRE#
```

8.5.39 debug ip ospf neighbor

This command is used to turn on the OSPF neighbor state debug switch. Use the **no** form of this command to turn off the OSPF neighbor state debug switch.

Syntax

- debug ip ospf neighbor
- no debug ip ospf neighbor

Parameters

None.

Default

By default, the OSPF neighbor state debug switch is turned off.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to turn on or turn off the OSPF neighbor state debug switch. When the neighbor state changes or some events happen to change the neighbor state, debug information will be printed if the OSPF debug function is turned on.

Example

This example shows how to turn on the OSPF neighbor state debug switch.

```
ZEQUOxxxxRE# debug ip ospf neighbor  
ZEQUOxxxxRE#
```

```
NBR 2.2.2.2 state change from LOADING to FULL tic 100  
NBR 3.3.3.3 state change from FULL to DOWN tic 100
```

8.5.40 debug ip ospf interface

This command is used to turn on the OSPF interface state debug switch. Use the **no** form of this command to turn off the OSPF interface state debug switch.

Syntax

- debug ip ospf interface
- no debug ip ospf interface

Parameters

None.

Default

By default, the OSPF interface state debug switch is turned off.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to turn on or turn off the OSPF interface state debug switch. When the OSPF interface state changes or some events happen to change the interface state, debug information will print. When DR selection happens, debug information will also print if the OSPF debug function is turned on.

Example

This example shows how to turn on the OSPF interface state debug switch.

```
ZEQUOxxxxRE# debug ip ospf interface
ZEQUOxxxxRE#

intf 10.1.1.1 up tic 10
intf 100.1.1.1 down tic 20
OSPF: Select DR: 2.2.2.2
OSPF: Select BDR: 1.1.1.1
```

8.5.41 debug ip ospf log

This command is used to enable the router to send OSPF syslog messages. Use the **no** form of this command to disable the router to send OSPF syslog messages.

Syntax

- debug ip ospf log
- no debug ip ospf log

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to enable or disable the router to send OSPF syslog messages.

Example

This example shows how to enable the router to send OSPF syslog messages.

```
ZEQUOxxxxRE#debug ip ospf log
ZEQUOxxxxRE#
```

8.5.42 debug ip ospf lsa-originating

This command is used to turn on the OSPF LSA originating debug switch. Use the **no** form of this command to turn off the OSPF interface state debug switch.

Syntax

- debug ip ospf lsa-originating
- no debug ip ospf lsa-originating

Parameters

None.

Default

By default, the OSPF LSA originating debug switch is turned off.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to turn on or turn off the OSPF LSA originating debug switch. When the LSA is originated, debug information will print if the OSPF debug function is turned on.

Example

This example shows how to turn on the OSPF LSA originating debug switch.

```
ZEQUOxxxxRE# debug ip ospf lsa-originating  
ZEQUOxxxxRE#
```

```
Build Router LSA id 100.1.1.2 for area 0.0.0.0 seq 80000001 tic 10
```

8.5.43 debug ip ospf lsa-flooding

This command is used to turn on the OSPF LSA flooding debug switch. Use the **no** form of this command to turn off the OSPF LSA flooding debug switch.

Syntax

- debug ip ospf lsa-flooding
- no debug ip ospf lsa-flooding

Parameters

None.

Default

By default, the OSPF LSA flooding debug switch is turned off.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to turn on or turn off the OSPF LSA flooding debug switch. When the LSA is received, added into local database, or flooded to neighboring router, the debug information will print if the OSPF debug function is turned on.

Example

This example shows how to turn on the OSPF LSA flooding debug switch.

```
ZEQUOxxxxRE# debug ip ospf lsa-flooding  
ZEQUOxxxxRE#
```

```
Received LSA type 1 id 2.2.2.2 from nbr 2.2.2.2 in area 0.0.0.0 seq 80000001 csum  
fe3a tic 15  
Flood LSAs in area 0.0.0.0 tic 15
```

8.5.44 debug ip ospf packet-receiving

This command is used to turn on the OSPF packet receiving debug switch. Use the **no** form of this command to turn off the OSPF packet receiving debug switch.

Syntax

- debug ip ospf packet-receiving
- no debug ip ospf packet-receiving

Parameters

None.

Default

By default, the OSPF packet receiving debug switch is turned off.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to turn on or turn off the OSPF packet receiving debug switch. When one OSPF protocol packet is received, the debug information will print if the OSPF debug function is turned on.

Example

This example shows how to turn on the OSPF packet receiving debug switch.

```
ZEQUOxxxxRE# debug ip ospf packet-receiving  
ZEQUOxxxxRE#
```

```
Received a Hello packet from addr 10.1.1.2 at interface System tic 100  
Received a Hello packet from addr 100.1.1.2 at interface ip100 tic 102
```

8.5.45 debug ip ospf packet-transmitting

This command is used to turn on the OSPF packet transmitting debug switch. Use the **no** form of this command to turn off the OSPF packet receiving debug switch.

Syntax

- debug ip ospf packet-transmitting
- no debug ip ospf packet-transmitting

Parameters

None.

Default

By default, the OSPF packet transmitting debug switch is turned off.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to turn on or turn off the OSPF packet transmitting debug switch. When one OSPF protocol packet is sent out, the debug information will print if the OSPF debug function is turned on.

Example

This example shows how to turn on the OSPF packet transmitting debug switch.

```
ZEQUOxxxxRE# debug ip ospf packet-transmitting
ZEQUOxxxxRE#
```

```
Send out a Hello on interface 10.1.1.1 dst 255.0.0.5 tic 200
Send out a Hello on interface 100.1.1.1 dst 255.0.0.5 tic 220
```

8.5.46 debug ip ospf spf

This command is used to turn on the OSPF SPF calculation debug switch. Use the **no** form of this command to turn off the OSPF SPF calculation debug switch.

Syntax

- debug ip ospf spf
- no debug ip ospf spf

Parameters

None.

Default

By default the OSPF SPF calculation switch is turned off.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to turn on or turn off the OSPF SPF calculation debug switch. When one SFP calculation is processing, the debug information will print if the OSPF debug function is turned on.

Example

This example shows how to turn on the OSPF SPF calculation debug switch.

```
ZEQUOxxxxRE# debug ip ospf spf
ZEQUOxxxxRE#
```

```
Running SPF-intra for area 0.0.0.0 tic 300
SPF-intra calculation completed tic 310
```

8.5.47 debug ip ospf timer

This command is used to turn on the OSPF timer debug switch. Use the **no** form of this command to turn off the OSPF timer debug switch.

Syntax

- debug ip ospf timer
- no debug ip ospf timer

Parameters

None.

Default

By default, the OSPF timer switch is turned off.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to turn on or turn off the OSPF timer debug switch. When the event related to the OSPF timer happens, the debug information will print if the OSPF debug function is turned on.

Example

This example shows how to turn on the OSPF timer debug switch.

```
ZEQUOxxxxRE# debug ip ospf timer
ZEQUOxxxxRE#
```

```
Start Hello timer at interface System tic 20
Wait timer expired at interface System tic 100
```

8.5.48 debug ip ospf virtual-link

This command is used to turn on the OSPF virtual link debug switch. Use the **no** form of this command to turn off the OSPF virtual link debug switch.

Syntax

- debug ip ospf virtual-link
- no debug ip ospf virtual-link

Parameters

None.

Default

By default, the OSPF virtual link switch is turned off.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to turn on or turn off the OSPF virtual link debug switch. When the event related to the OSPF virtual link happens, the debug information will print.

Example

This example shows how to turn on the OSPF virtual link debug switch.

```
ZEQUOxxxxRE# debug ip ospf virtual-link  
ZEQUOxxxxRE#
```

```
Virtual link up transit area 1.1.1.1 vnbr 3.3.3.3 tic 260
```

8.5.49 debug ip ospf route

This command is used to turn on the OSPF route debug switch. Use the **no** form of this command to turn off the OSPF route debug switch.

Syntax

- debug ip ospf route
- no debug ip ospf route

Parameters

None.

Default

By default, the OSPF route switch is turned off.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to turn on or turn off the OSPF route debug switch. When one OSPF route is added, updated or deleted, the debug information will print if the OSPF debug function is turned on.

Example

This example shows how to turn on the OSPF route debug switch.

```
ZEQUOxxxxRE# debug ip ospf route  
ZEQUOxxxxRE#
```

```
Add an OSPF route level 1 dst 172.18.1.1 mask 255.255.255.0 nh cnt 1 cost 10 cost2:  
0 tic: 300
```

8.5.50 debug ip ospf redistribution

This command is used to turn on the OSPF redistribution debug switch. Use the **no** form of this command to turn off the OSPF redistribution debug switch.

Syntax

- debug ip ospf redistribution
- no debug ip ospf redistribution

Parameters

None.

Default

By default, the OSPF redistribution switch is turned off.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to turn on or turn off the OSPF redistribution debug switch. When one route of other protocol is redistributed into OSPF or not redistributed into OSPF any more, the debug information will print if the OSPF debug function is turned on.

Example

This example shows how to turn on the OSPF redistribution debug switch.

```
ZEQUOxxxxRE# debug ip ospf redistribution
```

```
Import AS external route from src 5 net 192.1.1.1 mask 255.255.255.0 type 2 cost 50  
fwd 10.1.1.100 tic 500
```

```
ZEQUOxxxxRE#
```

8.5.51 debug ip ospf show counter

This command is used to display OSPF statistic counters.

Syntax

- debug ip ospf show counter [packet | neighbor | spf]

Parameters

Parameters	description
packet	(Optional) Specifies to display the OSPF packet counter.
neighbor	(Optional) Specifies to display the OSPF neighbor counter.
spf	(Optional) Specifies to display the OSPF SPF event counter.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to check statistic information about OSPF packet, neighbor and SPF calculations.

Example

This example shows how to display all OSPF statistic counters.

```
ZEQUOxxxxRE# debug ip ospf show counter
```

```
OSPF Debug Statistic Counters
```

```
Packet Receiving:
```

```
Total   : 5  
Hello   : 5  
DD      : 0  
LSR     : 0  
LSU     : 0  
LSAck   : 0  
Drop    : 0  
Auth Fail : 0
```

```
Packet Sending:
```

```
Total   : 5  
Hello   : 5  
DD      : 0  
LSR     : 0  
LSU     : 0  
LSAck   : 0
```

```
Neighbor State:
```

```
Change   : 3  
SeqMismatch : 0
```

```
SPF Calculation:
```

```
Intra    : 1  
Inter    : 1  
Extern   : 1
```

```
ZEQUOxxxxRE#
```

8.5.52 debug ip ospf clear counter

This command is used to reset OSPF statistic counters.

Syntax

- debug ip ospf clear counter [packet | neighbor | spf]

Parameters

Parameters	description
packet	(Optional) Specifies to reset the OSPF packet counter.
neighbor	(Optional) Specifies to reset the OSPF neighbor counter.
spf	(Optional) Specifies to reset the OSPF SPF event counter.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to reset OSPF statistic counters. After the reset, the specified counters will change to 0.

Example

This example shows how to reset all OSPF statistic counters.

```
ZEQUOxxxxRE# debug ip ospf clear counter  
ZEQUOxxxxRE#
```

8.5.53 debug ip ospf show database

This command is used to view detailed information about the OSPF LSDB.

Syntax

- debug ip ospf show database {rt-link | net-link | summary-link | external-link | type7-link}

Parameters

Parameters	description
rt-link	Specifies to display detailed information of Router LSAs.
net-link	Specifies to display detailed information of Network LSAs.
summary-link	Specifies to display detailed information of Summary LSAs.
external-link	Specifies to display detailed information of AS external LSAs.
type7-link	Specifies to display detailed information of type-7 LSAs.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command is used to view detailed information about the OSPF LSDB.

Example

This example shows how to display detailed information about Router LSAs.

```

ZEQUOxxxxRE# debug ip ospf show database rt-link

OSPF Phase2 RT Link:

=====
AREA 0.0.0.0:
  Router LSA:
  Link-State ID: 100.1.1.2
  Advertising Router: 100.1.1.2
  LS Age: 10 Seconds
  Options: 0x2
  ....0 = 0 Bit Isn't Set
  ....1 = E: ExternalRoutingCapability
  ....0.. = MC: NOT Multicast Capable
  ....0... = N/P: NSSA Bit
  ....0... = EA: Not Support Rcv And Fwd EA_LSA
  ..0. .... = DC: Not Support Handling Of Demand Circuits
  .0... .... = O: O Bit Isn't Set
  0... .... = 7 Bit Isn't Set
  LS Sequence Number: 0x80000001
  Length: 36
  Flags: 0x0
  ....0 = B: NO Area Border Router
  ....0.. = E: NO AS Boundary Router
  ....0... = V: NO Virtual Link Endpoint
  Number Of Links: 1
  Type: Stub      ID: 10.1.1.0      Data: 255.255.255.0      Metric: 1
  Internal Field:
  Del_flag: 0x0  I_ref_count: 0  Seq: 0x80000001  Csum: 0x4d28
  Rxtime: 0  Tmtime: 0  Orgage: 0
  Current Time: 10

ZEQUOxxxxRE#

```


8.5.54 debug ip ospf show request-list

This command is used to display current LSA information of the internal OSPF request list.

Syntax

- debug ip ospf show request-list

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to check the information about LSAs that OSPF is requesting to neighbors

Example

This example shows how to display current requested LSAs.

```
ZEQUOxxxxRE# debug ip ospf show request-list
```

```
OSPF Request List:
```

```
*Area 0.0.0.0:
Circuit: 1.1.1.1
Neighbor: 90.2.0.1 IP: 1.1.1.2
LSID: 192.194.134.0 RTID: 90.2.0.1
LSID: 192.194.135.0 RTID: 90.2.0.1
LSID: 192.194.136.0 RTID: 90.2.0.1
LSID: 192.194.137.0 RTID: 90.2.0.1
LSID: 192.194.138.0 RTID: 90.2.0.1
```

```
ZEQUOxxxxRE#
```

8.5.55 debug ip ospf show redistribution

This command is used to display the current internal OSPF redistribution list.

Syntax

- debug ip ospf show redistribution

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to check the information about the external routes imported into OSPF.

Example

This example shows how to display the external routes imported into OSPF.

```
ZEQUOxxxxRE# debug ip ospf show redistribution
```

```
OSPF Redistribution List:
```

IP	Nexthop	State	Type	Tag
1.1.1.0/24	0.0.0.0	ON	2	0.0.0.0

```
OSPF ASE Table:
```

IP	Nexthop	State	Type	Tag
1.1.1.0/24	0.0.0.0	ON	2	0.0.0.0

```
Switch #
```

8.5.56 debug ip ospf show summary-list

This command is used to display the current internal OSPF summary list.

Syntax

- debug ip ospf show summary-list

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.
Any Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to check the information about the route to be aggregated.

Example

This example shows how to display route information to be aggregated.

```
ZEQUOxxxxRE# debug ip ospf show summary-list
```

```
OSPF Summary List:
```

```
Area 0.0.0.0:  
Circuit: 1.1.1.1  
Neighbor: 90.2.0.1 IP: 1.1.1.2  
LSID: 1.1.1.1 RTID: 1.1.1.1
```

```
Circuit: 2.2.2.1
```

```
Circuit: 10.1.1.6
```

```
Switch #
```

8.6 OSPFv3 (Open Shortest Path First Version 3) Commands [ZEQUO6700RE/6600RE]

8.6.1 area default-cost

This command is used to set the summary-default cost of a stub area. Use the **no** form of this command to disable this function.

Syntax

- **area** *AREA-ID* **default-cost** *COST*
- **no area** *AREA-ID* **default-cost**

Parameters

Parameters	description
<i>AREA-ID</i>	Specifies the identifier of the area. It can be specified as an IPv4 address.
<i>COST</i>	Specifies the metric or cost for this summary route, which is used during IPv6 OSPF calculation to determine the shortest paths to the destination. The value can be 0 to 65535.

Default

By default, this option is disabled.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used only on an ABR attached to a stub area. In all routers and access servers attached to the stub area, the area should be configured as a stub area using the **area stub** command. Use the **area default-cost** command only on an ABR attached to the stub area. The **area default-cost** command provides the metric for the summary default route generated by the ABR into the stub area.

Example

This example shows how to assign a default cost of 10 to stub area 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 router ospf
ZEQUOxxxxRE(config-rtr)# area 0.0.0.1 stub
ZEQUOxxxxRE(config-rtr)# area 0.0.0.1 default-cost 10
ZEQUOxxxxRE(config-rtr)#
```

8.6.2 area range

This command is used to consolidate and summarize routes at an area boundary. Use the **no** form of this command to disable this function.

Syntax

- **area** *AREA-ID* **range** *IPv6-PREFIX/PREFIX-LENGTH* [**advertise** | **not-advertise**]
- **no area** *AREA-ID* **range** *IPv6-PREFIX/PREFIX-LENGTH*

Parameters

Parameters	description
<i>AREA-ID</i>	Specifies the identifier of the area which routes are to be summarized. It can be specified as an IPv4 address.
<i>IPv6-PREFIX</i>	Specifies the IPv6 prefix.
<i>PREFIX-LENGTH</i>	Specifies the IPv6 prefix length.
advertise	(Optional) Specifies to advertise and generate a Type-3 summary LSA for the specified address range.
not-advertise	(Optional) Specifies to set the status to Do-Not-Advertise for the specified address range. The Type-3 summary LSA is suppressed, and the component networks remain hidden from other networks.

Default

By default, this option is disabled.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used only with ABRs. It is used to consolidate or summarize routes for an area. The result is that a single summary route is advertised to other areas by the ABR. Routing information is condensed at area boundaries. External to the area, a single route is advertised for each address range.

Example

This example shows how to configure one summary route to be advertised by the ABR to other areas for IPv6 prefix 2001:0DB8:0:1::/64 and for the Router ID 20.0.1.10.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 router ospf
ZEQUOxxxxRE(config-rtr)# router-id 20.0.1.10
ZEQUOxxxxRE(config-rtr)# area 0.0.0.1 range 2001:0DB8:0:1::/64
ZEQUOxxxxRE(config-rtr)#
```

8.6.3 area stub

This command is used to define an area as a stub area. Use the **no** form of this command to disable this function.

Syntax

- **area** *AREA-ID* **stub** [**no-summary**]
- **no area** *AREA-ID* **stub** [**no-summary**]

Parameters

Parameters	description
<i>AREA-ID</i>	Specifies the identifier of the area. It can be specified as an IPv4 address.
no-summary	(Optional) Specifies to prevent an ABR from sending summary LSAs into the stub area.

Default

By default, this option is disabled.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command on all routers in the stub area. There are two stub area router configuration commands: the **area stub** and **area default-cost** commands. In all routers attached to the stub area, configure the area by using the stub option of the area command. For an ABR attached to the stub area, use the **area default-cost** command.

Use the **no-summary** parameter with this command to define a totally stubby area. Define an area as a totally stubby area, when routers in the area do not require learning about summary LSAs from other areas. The area can be defined as a totally stubby area by configuring the ABR of that area using the **area stub no-summary** command.

Example

This example shows how to configure the router as a stub that advertises connected and summary routes.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 router ospf
ZEQUOxxxxRE(config-rtr)# router-id 20.0.1.10
ZEQUOxxxxRE(config-rtr)# area 1.1.1.1 stub
ZEQUOxxxxRE(config-rtr)#
```

8.6.4 area virtual-link

This command is used to define an IPv6 OSPF virtual link. Use the **no** form of this command to remove a virtual link.

Syntax

- **area** *AREA-ID* **virtual-link** *ROUTER-ID* [**hello-interval** *SECONDS*] [**dead-interval** *SECONDS*] [**transmit-delay** *SECONDS*] [**retransmit-interval** *SECONDS*] [**instance-id** *INSTANCE-ID*]

- **no area** *AREA-ID* **virtual-link** *ROUTER-ID* [**dead-interval** | **hello-interval** | **transmit-interval** | **retransmit-interval**]

Parameters

Parameters	description
<i>AREA-ID</i>	Specifies the identifier of the area. It can be specified as an IPv4 address.
<i>ROUTER-ID</i>	Specifies the router ID associated with the virtual link neighbor. It can be specified as an IPv4 address.
hello-interval <i>SECONDS</i>	(Optional) Specifies the interval in seconds, between the hello packets that the router sends on an interface. The valid setting is 1-65535.
dead-interval <i>SECONDS</i>	(Optional) Specifies the interval in seconds, during which no packets are received and after which a neighbor is regarded as off-line. The valid setting is 1-65535.
transmit-delay <i>SECONDS</i>	(Optional) Specifies the interval that the router waits before it transmits a packet. The valid setting is 1-65535.
retransmit-interval <i>SECONDS</i>	(Optional) Specifies the interval that the router waits before it retransmits a packet. The valid setting is 1-65535.
instance-id <i>INSTANCE-ID</i>	(Optional) Specifies the instance identifier.

Default

No IPv6 OSPF virtual link is defined.
hello-interval *SECONDS*: 10 seconds.
dead-interval *SECONDS*: 40 seconds.
transmit-delay *SECONDS*: 1 seconds.
retransmit-interval *SECONDS*: 5 seconds.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

All areas in an IPv6 OSPF autonomous system must be physically connected to the backbone area (area 0). In some cases where this physical connection is not possible, you can use a virtual link to connect to the backbone through a non-backbone area. As mentioned above, you can also use virtual links to connect two parts of a partitioned backbone through a non-backbone area. The area through which you configure the virtual link, known as a transit area, must have full routing information. The transit area cannot be a stub area.

In IPv6 OSPF, all non-backbone areas must be connected to a backbone area. If the connection to the backbone is lost, the virtual link repairs the connection. You can configure virtual links between any two backbone routers that have an interface to a common non-backbone area. The protocol treats these two routers joined by a virtual link as if they were connected by an un-numbered point-to-point network. To configure virtual link, include both the transit area ID and the corresponding virtual link neighbor's router ID in the virtual link neighbor.

Configure the hello-interval to be the same for all routers attached to a common network. A short hello interval results in the router detecting topological changes faster but also an increase in the routing traffic.

As with the hello interval, the value of dead-interval must be the same for all routers and access servers attached to a common network.

The retransmit-interval is the expected round-trip delay between any two routers in a network. Set the value to be greater than the expected round-trip delay to avoid needless retransmissions.

The transmit-delay is the time taken to transmit a link state update packet on the interface. Before transmission, the LSUs are incremented by this amount. Set the transmit-delay to be greater than zero. Also, take into account the transmission and propagation delays for the interface.

To configure a virtual link in IPv6 OSPF, you must use a router ID instead of an address. In IPv6 OSPF, the virtual link takes the router ID rather than the IPv6 prefix of the remote router.

Example

This example shows how to establish a virtual link with default values for all optional parameters.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 router ospf
ZEQUOxxxxRE(config-rtr)# area 0.0.0.1 virtual-link 192.168.255.1
ZEQUOxxxxRE(config-rtr)#
```

8.6.5 auto-cost reference-bandwidth

This command is used to control the reference value IPv6 OSPF uses when calculating metrics for interfaces. To return the reference value to its default, use the **no** form of this command.

Syntax

- **auto-cost reference-bandwidth** *MBPS*
- **no auto-cost reference-bandwidth**

Parameters

Parameters	description
<i>MBPS</i>	Specifies the bandwidth rate in Mbps. The range is from 1 to 4294967. The default is 100.

Default

By default, this value is 100Mbps.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to control the reference value IPv6 OSPF uses when calculating metrics for interfaces.

Example

This example shows how to set the auto-cost reference bandwidth to 1000 Mbps.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 router ospf
ZEQUOxxxxRE(config-rtr)# auto-cost reference-bandwidth 1000
```

```
Reference bandwidth is changed.
Please ensure reference bandwidth is consistent across all routers.
ZEQUOxxxxRE(config-rtr)#
```

8.6.6 clear ipv6 ospf

This command is used to restart the OSPF state, based on the OSPF routing process ID.

Syntax

- clear ipv6 ospf [*PROCESS-ID*] process

Parameters

Parameters	description
<i>PROCESS-ID</i>	(Optional) Specifies the internally used identification parameter for an IPv6 OSPF routing process. It is locally assigned and can be any positive integer. A unique value is assigned for each IPv6 OSPF routing process.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

The OSPF database is cleared, repopulated, and then the SPF algorithm is performed. Use the process ID option to clear only one OSPF process. If the process ID option is not specified, all OSPF processes are cleared.

Example

This example shows how to clear the OSPF database.

```
ZEQUOxxxxRE# clear ipv6 ospf process
ZEQUOxxxxRE#
```

8.6.7 distance ospf

This command is used to configure the distance for specific OSPF routes. Use the **no** form of this command to revert to the default setting.

Syntax

- **distance ospf** { **external** | **inter-area** | **intra-area** } *DISTANCE*
- **no distance ospf**

Parameters

Parameters	description
external	Specifies the distance for OSPF external routes.
inter-area	Specifies the distance for OSPF inter-area routes.
intra-area	Specifies the distance for OSPF intra-area routes.
<i>DISTANCE</i>	Specifies the distance value of specific OSPF routes in the range 1 to 254.

Default

By default, the distance value is 110 for all OSPF routes.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **distance ospf** command to set the administrative distance for specific OSPF routes. The **distance ospf** command acts as the distance command which determines which routes will be installed in routing table.

Numerically, an administrative distance is an integer from 0 to 255. In general, the higher the value is, the lower the rating of trustworthiness is. The administrative distance of 255, means that the routing information source cannot be trusted and should be ignored.

Example

This example shows how to configure the distance of external routes to 50.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 router ospf 1
ZEQUOxxxxRE(config-rtr)# distance ospf external 50
ZEQUOxxxxRE(config-rtr)#
```

8.6.8 ipv6 ospf area

This command is used to configure an area of an OSPF process on an interface. Use the **no** form of this command to disable OSPF routing for the interfaces defined.

Syntax

- **ipv6 ospf area** *AREA-ID* [*instance INSTANCE-ID*]
- **no ipv6 ospf area** *AREA-ID* [*instance INSTANCE-ID*]

Parameters

Parameters	description
<i>AREA-ID</i>	Specifies the identifier of the area. It can be specified as an IPv4 address.
<i>INSTANCE-ID</i>	(Optional) Specifies Instance identifier. The valid setting is from 0 to 255. If not specified, the default is 0.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command configures an area of an OSPF process on an interface. This setting takes effect only when the configured interface is an IPv6 interface. The created area is a normal area initially and can be changed to another type of area by using the **area stub** command.

On the same interface, only one area can be configured for the same OSPF process. The instance ID is a value representing a specific instance. The instance ID must be the same as the neighbor router in order to establish the neighbor session.

Example

This example shows how to create an OSPF area on an interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan 1
ZEQUOxxxxRE(config-if)# ipv6 ospf area 1.1.1.1
ZEQUOxxxxRE(config-if)#
```

8.6.9 ipv6 ospf cost

This command is used to explicitly specify the cost of sending a packet on an interface. Use the **no** form of this command to revert to the default setting.

Syntax

- **ipv6 ospf cost** *COST*
- **no ipv6 ospf cost**

Parameters

Parameters	description
<i>COST</i>	Specifies the unsigned integer value expressed as the link-state metric. It can be a value in the range from 1 to 65535.

Default

By default, this value is 10.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Set the metric manually using the **ipv6 ospf cost** command. Using the **auto-cost reference-bandwidth** command changes the link cost as long as the **ipv6 ospf cost** command is not used. The link-state metric is advertised as the link cost in the router link advertisement.

Example

This example shows how to set the interface cost value to 65.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 ospf cost 65
ZEQUOxxxxRE(config-if)#
```

8.6.10 ipv6 ospf dead-interval

This command is used to set the time period for which hello packets must not be seen before neighbors declare the router down. Use the **no** form of this command to revert to the default setting.

Syntax

- **ipv6 ospf dead-interval** *SECONDS*
- **no ipv6 ospf dead-interval**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval in seconds, during which no packets are received and after which a neighbor is regarded as off-line. The valid setting is 1-65535.

Default

The default interval is 40 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The interval is advertised in router hello packets. This value must be the same for all routers and access servers on a specific network.

Example

This example shows how to set the IPv6 OSPF dead interval to 60 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 ospf dead-interval 60
ZEQUOxxxxRE(config-if)#
```

8.6.11 ipv6 ospf hello-interval

This command is used to specify the interval between hello packets that the software sends on the interface. Use the **no** form of this command to revert to the default setting.

Syntax

- `ipv6 ospf hello-interval SECONDS`
- `no ipv6 ospf hello-interval`

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval in seconds, between the hello packets that the router sends on an interface. The valid setting is 1-65535.

Default

The default interval is 10 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This value is advertised in the hello packets. The shorter the hello interval, the earlier topological changes will be detected, but more routing traffic will ensue. This value must be the same for all routers and access servers on a specific network.

Example

This example shows how to set the interval between hello packets to 15 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 ospf hello-interval 15
ZEQUOxxxxRE(config-if)#
```

8.6.12 ipv6 ospf priority

This command is used to set the router priority, which helps determine the designated router for this network. Use the **no** form of this command to revert to the default setting.

Syntax

- `ipv6 ospf priority PRIORITY`
- `no ipv6 ospf priority`

Parameters

Parameters	description
<i>PRIORITY</i>	Specifies the number value of the priority of the router. The range is from 0 to 255.

Default

By default, the router priority is 1.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Set the priority to help determine the OSPF Designated Router (DR) for a network. If two routers attempt to become the DR, the router with the higher router priority becomes the DR. If the router priority is the same for two routers, the router with the higher router ID takes precedence.

Only routers with nonzero router priority values are eligible to become the designated or backup designated router. Configure router priority for multi-access networks (not point-to-point) only.

Example

This example shows how to set the router priority value to 4.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 ospf priority 4
ZEQUOxxxxRE(config-if)#
```

8.6.13 ipv6 ospf retransmit-interval

This command is used to specify the time between LSA retransmissions for adjacencies belonging to the interface. Use the **no** form of this command to revert to the default setting.

Syntax

- **ipv6 ospf retransmit-interval** *SECONDS*
- **no ipv6 ospf retransmit-interval**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval the router waits before it retransmits a packet. The valid setting is 1-65535.

Default

The default interval is 5 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

After sending an LSA to a neighbor, the router keeps the LSA until it receives an acknowledgement. In case the router does not receive an acknowledgement during the set time (the retransmit interval value), it retransmits the LSA. Set the retransmission interval value conservatively to avoid needless retransmission. The interval should be greater than the expected round-trip delay between two routers.

Example

This example shows how to set the retransmit interval value to 6 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 ospf retransmit-interval 6
ZEQUOxxxxRE(config-if)#
```

8.6.14 ipv6 ospf transmit-delay

This command is used to set the estimated time required to send a link-state update packet on the interface. Use the **no** form of this command to revert to the default setting.

Syntax

- **ipv6 ospf transmit-delay** *SECONDS*
- **no ipv6 ospf transmit-delay**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval the router waits for before it transmits a packet. The valid setting is 1-65535.

Default

The default interval is 1 second.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

LSUs must have their ages incremented by the amount specified in the seconds argument before transmission. The value assigned should take into account the transmission and propagation delays for the interface.

If the delay is not added before transmission over a link, the time in which the LSA propagates over the link is not considered. This setting has more significance on very low speed links.

Example

This example shows how to set the transmit delay value to 3 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 ospf transmit-delay 3
ZEQUOxxxxRE(config-if)#
```

8.6.15 ipv6 router ospf

This command is used to configure an IPv6 OSPF routing process and enter the Router Configuration mode. Use the **no** form of this command to remove an OSPF routing process.

Syntax

- **ipv6 router ospf**
- **no ipv6 router ospf**

Parameters

None.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enter the OSPF for IPv6 Router Configuration mode. From this mode, you can configure other settings of IPv6 OSPF.

Example

This example shows how to enter the OSPF for IPv6 Router Configuration mode.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 router ospf
ZEQUOxxxxRE(config-rtr)#
```

8.6.16 no area

This command is used to remove the specific area that has been created.

Syntax

- no area *AREA-ID*

Parameters

Parameters	description
<i>AREA-ID</i>	Specifies the ID of the area.

Default

None.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command removes the specified OSPF area and its configuration, such as area default-cost, area range, area stub, and area virtual-link.

Example

This example shows how to remove area 0.0.0.3.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 router ospf
ZEQUOxxxxRE(config-rtr)# no area 0.0.0.3
ZEQUOxxxxRE(config-rtr)#
```

8.6.17 passive-interface

This command is used to configure the specified network interface or all interfaces as the passive interface. Use the **no** form of this command to revert to the default setting.

Syntax

- passive-interface { default | *INTERFACE-ID* }
- no passive-interface { default | *INTERFACE-ID* }

Parameters

Parameters	description
default	Specifies that all interfaces will operate in the passive mode.
<i>INTERFACE-ID</i>	Specifies the ID of the interface that will operate in the passive mode.

Default

By default, no interface is configured to operate in the passive mode.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If an interface is passive, the OSPF routing update packets are not sent nor received through the specified interface.

Example

This example shows how to configure all interfaces as passive and activates VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 router ospf
ZEQUOxxxxRE(config-rtr)# passive-interface default
ZEQUOxxxxRE(config-rtr)# no passive-interface vlan1
ZEQUOxxxxRE(config-rtr)#
```

8.6.18 router-id

This command is used to specify a router ID for the OSPF process. Use the **no** form of this command to revert to the default setting.

Syntax

- router-id *ROUTER-ID*
- no router-id

Parameters

Parameters	description
<i>ROUTER-ID</i>	Specifies the router ID in the IPv4 address format.

Default

By default, the router ID is automatically selected.

Command Mode

Router Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The router ID is a 32-bit number assigned to each router running OSPF. This number uniquely identifies the router within an autonomous system. Each router has a unique router ID among IPv6 OSPF processes.

Example

This example shows how to specify a fixed router ID.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 router ospf
ZEQUOxxxxRE(config-rtr)# router-id 10.1.1.1
ZEQUOxxxxRE(config-rtr)#
```

8.6.19 show ipv6 ospf

This command is used to display general information about OSPF routing processes.

Syntax

- show ipv6 ospf

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

The information displayed by the **show ipv6 ospf** command is useful in debugging OSPF routing operations.

Example

This example shows how to display general information about OSPF routing processes.

```
ZEQUOxxxxRE#show ipv6 ospf

Routing Process "OSPFv3" with ID 192.168.70.124
  Process uptime is 0DT5H11M59S
  Conforms to RFC 2740
  SPF schedule delay 5 secs, Hold time between SPFs 10 secs
  Number of LSA originated 0
  Number of LSA received 0
  Number of areas in this router is 2
    Area 0.0.0.0 (BACKBONE)
      Number of interfaces in this area is 1 active interface number is 0
      Number of fully adjacent virtual neighbors through this area is 0
      SPF algorithm executed 0 times
      Number of LSA 0. Checksum Sum 0x0
      Number of Unknown LSA 0
      Area ranges are
    Area 1.1.1.1
      Number of interfaces in this area is 0 active interface number is 0
      Number of fully adjacent virtual neighbors through this area is 0
      SPF algorithm executed 0 times
      Number of LSA 0. Checksum Sum 0x0
      Number of Unknown LSA 0
      Area ranges are
        2001:DB8:0:1::/64 Passive Advertie

ZEQUOxxxxRE#
```

8.6.20 show ipv6 ospf border-routers

This command is used to display the ABRs and ASBRs for the IPv6 OSPF instance.

Syntax

- **show ipv6 ospf border-routers**

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the ABRs and ASBRs information.

Example

This example shows how to display the ABRs and ASBRs for the IPv6 OSPF instance.

```
ZEQUOxxxxRE# show ipv6 ospf border-routers

OSPFv3 Process internal Routing Table
Codes: i - Intra-area route, I - Inter-area route
i 12.127.0.1 [10] via FE80::200:FF:FE17:34FA, vlan3, ABR, ASBR, Area 0.0.0.0

Total Entries: 1

ZEQUOxxxxRE#
```

8.6.21 show ipv6 ospf database

This command is used to display the database summary about OSPF routing processes.

Syntax

- show ipv6 ospf [*PROCESS-ID*] database [external | inter-area prefix | inter-area router | link | network | prefix | router] [adv-router *ROUTER-ID* | self-originate] [area *AREA-ID*]

Parameters

Parameters	description
<i>PROCESS-ID</i>	(Optional) Specifies the process ID. The ID of a process is used internally and should be uniquely locally assigned.
adv-router <i>ROUTER-ID</i>	(Optional) Specifies to display all the LSAs of the advertising router. The router ID can be specified as an IPv4 address.
external	(Optional) Specifies to display information only about the external LSAs.

Parameters	description
inter-area prefix	(Optional) Specifies to display information only about LSAs based on inter-area prefix LSAs.
inter-area router	(Optional) Specifies to display information only about LSAs based on inter-area router LSAs.
link	(Optional) Specifies to display information about the link LSAs.
network	(Optional) Specifies to display information only about the network LSAs.
prefix	(Optional) Specifies to display information on the intra-area-prefix LSAs.
router	(Optional) Specifies to display information only about the router LSAs.
self-originate	(Optional) Specifies to display only self-originated LSAs (from the local router).
<i>AREA-ID</i>	(Optional) Specifies to display all the LSAs of the specified area. It can be specified as an IPv4 address.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

A router's collection of LSA data is stored in a link-state database. The contents of the database, when subjected to the Dijkstra algorithm, result in the creation of the OSPF routing table. Both of these keywords can be appended to all other keywords used with the **show ipv6 ospf database** command to provide more detailed information.

Example

This example shows how to display the database summary about OSPF routing processes.

```
ZEQUOxxxxRE# show ipv6 ospf database
```

```
OSPFv3 Router with ID (10.76.37.30) (Process 1)
```

```
Link-LSA (Interface vlan2)
```

ADV Router	Age	Seq#	CkSum	LinkCnt
10.76.37.3	512	0x80000001	0xdf6f	1
10.76.37.30	400	0x80000001	0x48fa	1

```
Link-LSA (Interface vlan3)
```

ADV Router	Age	Seq#	CkSum	LinkCnt
10.76.37.30	400	0x80000001	0x3210	1

```
Router-LSA (Area 0.0.0.0) (BACKBONE)
```

ADV Router	Age	Seq#	CkSum	LinkCnt
10.76.37.3	354	0x8000000a	0x717d	1
10.76.37.30	357	0x80000003	0x34c8	1
10.76.37.79	439	0x8000000c	0x7be0	0

```
Inter-Area-Prefix-LSA (Area 0.0.0.0) (BACKBONE)
```

ADV Router	Age	Seq#	CkSum	Prefix
10.76.37.3	503	0x80000002	0x8a9f	3ffe:2::/64
10.76.37.3	503	0x80000002	0xb723	3ffe:2::10/128
10.76.37.3	346	0x80000004	0x8e95	3ffe:4::/64
10.76.37.3	346	0x80000003	0x3d6e	3ffe:4::30/128
10.76.37.30	374	0x80000002	0xd345	3ffe:3::/64
10.76.37.30	374	0x80000002	0xd73f	3ffe:4::/64
10.76.37.30	374	0x80000002	0x7e20	3ffe:4::30/128
10.76.37.30	352	0x80000003	0xa570	3ffe:2::/64
10.76.37.30	352	0x80000003	0x0fad	3ffe:2::10/128

```
Inter-Area-Router-LSA (Area 0.0.0.0) (BACKBONE)
```

ADV Router	Age	Seq#	CkSum	Dest-RtrID
10.76.37.3	366	0x80000001	0x26dd	10.76.37.30

```
Intra-Area-Prefix-LSA (Area 0.0.0.0) (BACKBONE)
```

ADV Router	Age	Seq#	CkSum	Ref-LsType	Ref-LSID	Prefix
10.76.37.3	348	0x80000000a	0x6a0c	Router-LSA	0.0.0.0	3ffe:1::/64
10.76.37.79	468	0x800000001	0xacdb	Network-LSA	0.0.4.1	1234::/16
10.76.37.79	458	0x800000001	0xf028	Router-LSA	0.0.0.0	1234::/16
10.76.37.79	448	0x800000001	0xe631	Router-LSA	0.0.0.0	1234::/16
10.76.37.79	438	0x800000001	0xd243	Router-LSA	0.0.0.0	1234::/16
Router-LSA (Area 0.0.0.1)						
ADV Router	Age	Seq#	CkSum	LinkCnt		
10.76.37.3	354	0x800000003	0x3cd1	1		
10.76.37.30	357	0x800000005	0x757e	1		
Network-LSA (Area 0.0.0.1)						
ADV Router	Age	Seq#	CkSum			
10.76.37.3	380	0x800000001	0xe8a7			
Inter-Area-Prefix-LSA (Area 0.0.0.1)						
ADV Router	Age	Seq#	CkSum	Prefix		
10.76.37.3	346	0x800000003	0x84a6	3ffe:1::/64		
10.76.37.30	395	0x800000002	0xd345	3ffe:3::/64		
Intra-Area-Prefix-LSA (Area 0.0.0.1)						
ADV Router	Age	Seq#	CkSum	Ref-LsType	Ref-LSID	Prefix
10.76.37.3	370	0x800000002	0xe744	Router-LSA	0.0.0.0	3ffe:2::10/128
10.76.37.3	374	0x800000001	0xd71c	Network-LSA	0.0.0.2	3ffe:2::/64
10.76.37.30	378	0x800000004	0x379b	Router-LSA	0.0.0.0	3ffe:4::30/128
Router-LSA (Area 0.0.0.3)						
ADV Router	Age	Seq#	CkSum	LinkCnt		
10.76.37.30	360	0x800000003	0xbdd5	0		
Inter-Area-Prefix-LSA (Area 0.0.0.3)						
ADV Router	Age	Seq#	CkSum	Prefix		
10.76.37.30	395	0x800000002	0x920e	3ffe:4::30/128		
10.76.37.30	395	0x800000002	0xd73f	3ffe:4::/64		
10.76.37.30	352	0x800000003	0xaf67	3ffe:2::/64		
10.76.37.30	352	0x800000003	0x19a4	3ffe:2::10/128		
10.76.37.30	347	0x800000002	0xcb41	3ffe:1::/64		
Intra-Area-Prefix-LSA (Area 0.0.0.3)						
ADV Router	Age	Seq#	CkSum	Ref-LsType	Ref-LSID	Prefix
10.76.37.30	359	0x800000003	0xda73	Router-LSA	0.0.0.0	3ffe:3::/64

ZEQUOxxxxRE#

This example shows how to display the router LSAs information.

```
ZEQUOxxxxRE# show ipv6 ospf database router
```

```
OSPFv3 Router with ID (10.47.65.180) (Process 1)
```

```
Router-LSA (Area 0.0.0.0) (BACKBONE)
```

```
LS age: 1766
LS Type: Router-LSA
Link State ID: 0.0.0.0
Advertising Router: 10.47.65.180
LS Seq Number: 0x8000000F
Checksum: 0x9586
Length: 56
Flags: 0x03 (-|-|E|B)
Options: 0x000013 (-|R|-|-|E|V6)
Number of Links: 2
  Link connected to: a Virtual Link
    Metric: 1
    Interface ID: 2147483809
    Neighbor Interface ID: 2147483649
    Neighbor Router ID: 10.47.65.182
  Link connected to: a Virtual Link
    Metric: 1
    Interface ID: 2147483810
    Neighbor Interface ID: 2147483649
    Neighbor Router ID: 10.47.65.183
```

```
LS age: 1766
LS Type: Router-LSA
Link State ID: 0.0.0.0
Advertising Router: 10.47.65.182
LS Seq Number: 0x800001C3
Checksum: 0xAD4F
Length: 56
Flags: 0x03 (-|-|E|B)
Options: 0x000013 (-|R|-|-|E|V6)
Number of Links: 2
  Link connected to: a Virtual Link
    Metric: 1
    Interface ID: 2147483649
    Neighbor Interface ID: 2147483809
    Neighbor Router ID: 10.47.65.180
  Link connected to: a Virtual Link
    Metric: 10
    Interface ID: 2147483650
    Neighbor Interface ID: 2147483650
    Neighbor Router ID: 10.47.65.183
```

```
Total Entries: 2
```

```
ZEQUOxxxxRE#
```

This example shows how to display the network LSAs information.

```
ZEQUOxxxxRE# show ipv6 ospf database network

      OSPFv3 Router with ID (47.65.49.1) (Process 1)

      Network-LSA (Area 0.0.0.0) (BACKBONE)

LS age: 68
LS Type: Network-LSA
Link State ID: 0.0.4.49
Advertising Router: 47.65.49.1
LS Seq Number: 0x80000003
Checksum: 0xC9D1
Length: 32
Options: 0x000013 (-|R|-|-|E|V6)
  Attached Router: 47.65.49.1
  Attached Router: 47.65.49.111

Total Entries: 1
```

```
ZEQUOxxxxRE#
```

This example shows how to display information about inter-area prefix LSAs.

```
ZEQUOxxxxRE# show ipv6 ospf database inter-area prefix

      OSPFv3 Router with ID (10.47.65.180) (Process 1)

      Inter-Area-Prefix-LSA (Area 0.0.0.0) (BACKBONE)

LS age: 1056
LS Type: Inter-Area-Prefix-LSA
Link State ID: 128.64.0.0
Advertising Router: 47.65.49.111
LS Seq Number: 0x800000B5
Checksum: 0x7F28
Length: 36
Metric: 0
Prefix: c800::/64, Prefix Options: 0

Total Entries: 1

ZEQUOxxxxRE#
```

This example shows how to display information about inter-area router LSAs.

```
ZEQUOxxxxRE# show ipv6 ospf database inter-area router
```

```
    OSPFv3 Router with ID (10.47.65.180) (Process 1)
```

```
        Inter-Area-Router-LSA (Area 0.0.0.0) (BACKBONE)
```

```
LS age: 162
LS Type: Inter-Area-Router-LSA
Link State ID: 0.0.0.1
Advertising Router: 10.47.65.180
LS Seq Number: 0x80000003
Checksum: 0x3889
Length: 32
Options: 0x000013 (-|R|-|-|E|V6)
Metric: 1
Destination Router ID: 10.47.65.183
```

```
LS age: 162
LS Type: Inter-Area-Router-LSA
Link State ID: 0.0.0.2
Advertising Router: 10.47.65.180
LS Seq Number: 0x80000003
Checksum: 0x1862
Length: 32
Options: 0x000013 (-|R|-|-|E|V6)
Metric: 2
Destination Router ID: 47.65.151.111
```

```
Total Entries: 2
```

```
ZEQUOxxxxRE#
```

This example shows how to display information about external LSAs.

```
ZEQUOxxxxRE# show ipv6 ospf database external

      OSPFv3 Router with ID (10.47.65.180) (Process 1)

      AS-external-LSA

LS age: 279
LS Type: AS-External-LSA
Link State ID: 0.0.0.1
Advertising Router: 10.47.65.180
LS Seq Number: 0x80000003
Checksum: 0xBF8B
Length: 32
Metric Type: 1 (Comparable directly to link state metric)
Metric: 16000000
Prefix: 1151::/32, Prefix Options: 0 (-|-|-|-)

LS age: 279
LS Type: AS-External-LSA
Link State ID: 0.0.0.2
Advertising Router: 10.47.65.180
LS Seq Number: 0x80000003
Checksum: 0xD96D
Length: 32
Metric Type: 1 (Comparable directly to link state metric)
Metric: 16000000
Prefix: 1154::/32, Prefix Options: 0 (-|-|-|-)

LS age: 279
LS Type: AS-External-LSA
Link State ID: 0.0.0.3
Advertising Router: 10.47.65.180
LS Seq Number: 0x80000003
Checksum: 0xDB69
Length: 32
Metric Type: 1 (Comparable directly to link state metric)
Metric: 16000000
Prefix: 1155::/32, Prefix Options: 0 (-|-|-|-)

Total Entries: 3

ZEQUOxxxxRE#
```

This example shows how to display information about link LSAs.

```
ZEQUOxxxxRE# show ipv6 ospf database link

      OSPFv3 Router with ID (10.47.65.180) (Process 4765)

      Link-LSA (Interface vlan49)

LS age: 347
LS Type: Link-LSA
Link State ID: 0.0.4.49
Advertising Router: 10.47.65.180
LS Seq Number: 0x80000003
Checksum: 0x62B6
Length: 64
Priority: 1
Options: 0x000013 (-|R|-|-|E|V6)
Link-Local Address: fe80::4b0:ff:fe17:31
Number of Prefixes: 2
    Prefix: 1149::/32, Prefix Options: 0 (-|-|-|-)
    Prefix: 2049:1::/64, Prefix Options: 0 (-|-|-|-)

Total Entries: 1

ZEQUOxxxxRE#
```

This example shows how to display information about intra-area-prefix LSAs.

```
ZEQUOxxxxRE# show ipv6 ospf database prefix

      OSPFv3 Router with ID (10.47.65.180) (Process 1)

      Intra-Area-Prefix-LSA (Area 0.0.0.1)

LS age: 326
LS Type: Intra-Area-Prefix-LSA
Link State ID: 0.0.0.2
Advertising Router: 10.47.65.180
LS Seq Number: 0x8000000B
Checksum: 0x9814
Length: 52
Referenced LS Type: 0x2001
Referenced Link State ID: 0.0.0.0
Referenced Advertising Router: 10.47.65.180
Number of Prefixes: 1
  Prefix: 1152:0:1::1/128, Prefix Options: 2 (-|-|LA|-)
  Metric: 0

LS age: 1124
LS Type: Intra-Area-Prefix-LSA
Link State ID: 0.0.0.2
Advertising Router: 10.47.65.182
LS Seq Number: 0x80000024
Checksum: 0x1F76
Length: 44
Referenced LS Type: 0x2002
Referenced Link State ID: 0.0.8.107
Referenced Advertising Router: 10.47.65.182
Number of Prefixes: 1    Prefix: 2113:1::/64, Prefix Options: 0 (-|-|-|-)
  Metric: 0

Total Entries: 2

ZEQUOxxxxRE#
```

This example shows how to display all the LSAs of the advertising router 10.47.65.182.

```
ZEQUOxxxxRE# show ipv6 ospf database router adv-router 10.47.65.182
```

```
      OSPFv3 Router with ID (10.47.65.180) (Process 4765)
```

```
          Router-LSA (Area 0.0.0.0) (BACKBONE)
```

```
LS age: 1734
LS Type: Router-LSA
Link State ID: 0.0.0.0
Advertising Router: 10.47.65.182
LS Seq Number: 0x800001D1
Checksum: 0x915D
Length: 56
Flags: 0x03 (-|-|E|B)
Options: 0x000013 (-|R|-|-|E|V6)
Number of Links: 2
  Link connected to: a Virtual Link
    Metric: 1
    Interface ID: 2147483649
    Neighbor Interface ID: 2147483809
    Neighbor Router ID: 10.47.65.180
  Link connected to: a Virtual Link
    Metric: 10
    Interface ID: 2147483650
    Neighbor Interface ID: 2147483650
    Neighbor Router ID: 10.47.65.183
```

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

This example shows how to display information about self-originated LSAs.

```
ZEQUOxxxxRE# show ipv6 ospf database router self-originate

      OSPFv3 Router with ID (10.47.65.180) (Process 4765)
        Router-LSA (Area 0.0.0.0) (BACKBONE)

LS age: 1753
LS Type: Router-LSA
Link State ID: 0.0.0.0
Advertising Router: 10.47.65.180
LS Seq Number: 0x8000001D
Checksum: 0x7994
Length: 56
Flags: 0x03 (-|-|E|B)
Options: 0x000013 (-|R|-|-|E|V6)
Number of Links: 2
  Link connected to: a Virtual Link
    Metric: 1
    Interface ID: 2147483809
    Neighbor Interface ID: 2147483649
    Neighbor Router ID: 10.47.65.182
  Link connected to: a Virtual Link
    Metric: 1
    Interface ID: 2147483810
    Neighbor Interface ID: 2147483649
    Neighbor Router ID: 10.47.65.183

Total Entries: 1

ZEQUOxxxxRE#
```

8.6.22 show ipv6 ospf interface

This command is used to display OSPF-related interface information.

Syntax

- show ipv6 ospf [*PROCESS-ID*] interface [*INTERFACE-ID*]

Parameters

Parameters	description
<i>PROCESS-ID</i>	(Optional) Specifies the process ID. The ID of a process is used internally and should be uniquely locally assigned.
<i>INTERFACE-ID</i>	(Optional) Specifies the interface ID to display the OSPF information. If no interface ID is specified, the OSPF information on all interfaces will be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Both of these keywords can be appended to all other keywords used with the **show ipv6 ospf interface** command to provide all interfaces' information.

Example

This example shows how to display OSPF-related interface information.

```
ZEQUOxxxxRE#show ipv6 ospf interface

vlan1 is up, line protocol is up
  Link Local Address: FE80::20F:36FF:FE31:AE01/128
  Interface ID: 1
  OSPFv3 Process (1), Area 0.0.0.107 (active), Instance ID 0, MTU 1500
  Router ID 107.100.0.1, Network Type BROADCAST, Cost: 10
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 107.100.0.1,
    Local Address FE80::20F:36FF:FE31:AE01
  Backup Designated Router (ID) 0.0.0.0,
    Local Address ::
  Timer intervals configured, Hello 10, Dead 40, Retransmit 5
  Neighbor Count is 0, Adjacent neighbor count is 0
  Hello received 0 sent 535, DD received 0 sent 0
  LS-Req received 0 sent 0, LS-Upd received 0 sent 0
  LS-Ack received 0 sent 0, Discarded 0

vlan11 is up, line protocol is up
  Link Local Address: FE80::20F:36FF:FE31:AE03/128
  Interface ID: 2
  OSPFv3 Process (1), Area 0.0.0.11 (active), Instance ID 11, MTU 1500
  Router ID 107.100.0.1, Network Type BROADCAST, Cost: 10
  Transmit Delay is 1 sec, State Backup, Priority 1
  Designated Router (ID) 30.90.90.90,
    Local Address FE80::206:28FF:FED8:FE94
  Backup Designated Router (ID) 107.100.0.1,
    Local Address FE80::20F:36FF:FE31:AE03
  Timer intervals configured, Hello 10, Dead 40, Retransmit 5
  Neighbor Count is 1, Adjacent neighbor count is 1
  Hello received 587 sent 491, DD received 8 sent 6
  LS-Req received 1 sent 4, LS-Upd received 26 sent 24
  LS-Ack received 23 sent 27, Discarded 0

Total Entries: 2
ZEQUOxxxxRE#
```

8.6.23 show ipv6 ospf neighbor

This command is used to display OSPF neighbor information on a per-interface basis.

Syntax

- `show ipv6 ospf neighbor [INTERFACE-ID] [NEIGHBOR-ID] [detail]`

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface ID to display the neighbor information.
<i>NEIGHBOR-ID</i>	(Optional) Specifies the Neighbor ID. It can be specified as an IPv4 address.
detail	(Optional) Specifies to display all neighbors in detail.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Both of these keywords can be appended to all other keywords used with the `show ipv6 ospf neighbor` command to provide all neighbors' information.

Example

This example shows how to display OSPF neighbor information on a per-interface basis.

```
ZEQUOxxxxRE#show ipv6 ospf neighbor
```

Neighbor ID	Pri	State	Interface	Instance ID
20.1.1.2	1	FULL/BACKUP	vlan2	0
12.127.0.1	0	FULL/DROTHER	vlan3	0

```
Total Entries: 2
```

```
Switch# show ipv6 ospf neighbor detail
```

```
Neighbor 20.1.1.2, Link Local address FE80::2022:22FF:FE22:2223
  In the area 0.0.0.0 via interface vlan2
  Neighbor priority is 1, State is FULL, 6 state changes
  DR is 30.1.1.1 BDR is 20.1.1.2
  Options is 0x000013 (-|R|-|-|E|V6)
```

```
Neighbor 12.127.0.1, Link Local address FE80::200:FF:FE17:34FA
  In the area 0.0.0.0 via interface vlan3
  Neighbor priority is 0, State is FULL, 6 state changes
  DR is 30.1.1.1 BDR is 0.0.0.0
  Options is 0x000013 (-|R|-|-|E|V6)
```

```
Total Entries: 2
```

```
ZEQUOxxxxRE#
```

8.6.24 show ipv6 ospf virtual-links

This command is used to display parameters and the current state of OSPF virtual links.

Syntax

- `show ipv6 ospf virtual-links`

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

The information displayed by the **show ipv6 ospf virtual-links** command is useful in debugging OSPF routing operations.

Example

This example shows how to display parameters and the current state of OSPF virtual links.

```
ZEQUOxxxxRE# show ipv6 ospf virtual-links

Virtual Link to router 10.90.90.90 is up
  Transit area 0.0.0.3 via interface vlan40, instance ID 0
  Local Peer Address FD80::2A10:7BFF:FE7D:D963/128
  Remote Peer Address 4000::A/128
  Transmit Delay is 1 sec, State Point-To-Point,
  Timer intervals configured, Hello 10, Dead 40, Retransmit 5
  Adjacency state Full

Total Entries: 1

ZEQUOxxxxRE#
```

9 Multicast Control

9.1 IGMP (Internet Group Management Protocol) Commands [ZEQUO6700RE/6600RE]

In multicast where data is simultaneously sent to multiple destinations, destinations are managed in a unit called "group." Each group has its own unique multicast IP address and multicast MAC address assigned. A client that wants to join multicast can be a member of the group after sending a notification that it joins a specific multicast group to neighbor routers.

IGMP is a protocol to maintain and manage multicast groups. It is used for clients to join or leave a group or used to exchange group information between routers.

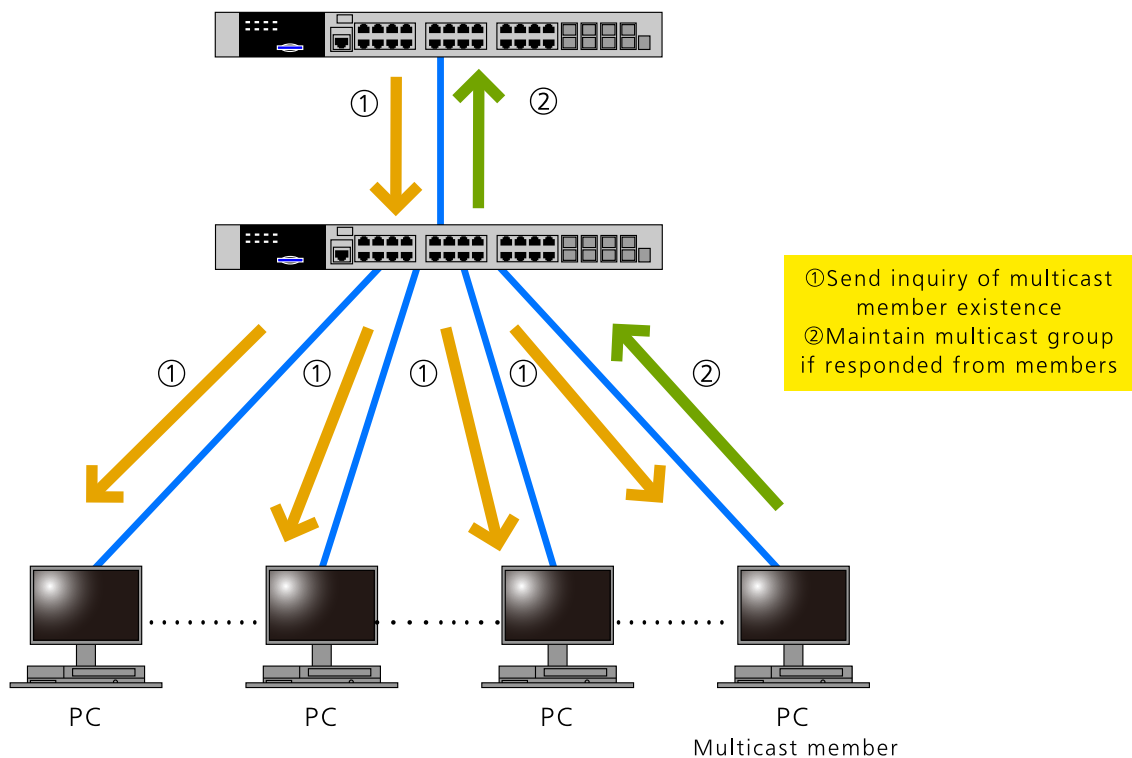


Figure 57-1 IGMP overview

9.1.1 ip igmp ignore-subscriber-ip-check

This command is used to disable checking the subscriber's source IP when an IGMP report or leave message is received. Use the **no** form of this command to revert to the default setting.

Syntax

- **ip igmp ignore-subscriber-ip-check**
- **no ip igmp ignore-subscriber-ip-check**

Parameters

None.

Default

By default, the Switch will check the subscriber's source IP.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

By default, the IGMP report or leave messages received by the interface will be checked to determine whether its source IP is in the same network as the interface. If they are not in the same network, the message information won't be learned by the IGMP protocol.

Use the **ip igmp ignore-subscriber-ip-check** command to disable the source IP check. If the check is disabled, the IGMP report or leave message with any source IP will be processed by the IGMP protocol.

Example

This example shows how to disable the subscriber's source IP check on VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip igmp ignore-subscriber-ip-check
ZEQUOxxxxRE(config-if)#
```

9.1.2 ip igmp enable

This command is used to enable the IGMP protocol state. Use the **no** form of this command to disable the IGMP protocol state.

Syntax

- ip igmp enable
- no ip igmp enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. This command only takes effect when the interface has IP address configured.

Example

This example shows how to enable IGMP on VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip igmp enable
ZEQUOxxxxRE(config-if)#
```

9.1.3 ip igmp last-member-query-interval

This command is used to configure the interval at which the router sends IGMP group-specific or group-source-specific (channel) query messages. Use the **no** form of the command to revert to the default setting.

Syntax

- ip igmp last-member-query-interval *SECONDS*
- no ip igmp last-member-query-interval

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval at which IGMP group-specific host query messages are sent. The range is from 1 to 25.

Default

By default, this value is 1 second.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the router receives a leave message from a receiver to claim leave from a group or a channel, the router will send the group specific query or group-source specific query message to the receiver interface. The IGMP last-member query interval will be advertised in the query message and conveyed to the receiver. This command configures the period that the router will send the next group-specific query or group-source specific query message if there is no report from receiver for the specific group or specific channel. The router will retry for the last member query count. If there is no report messages received after the retry count, the interface will be removed the membership from the specific group or specific channel.

Example

This example shows how to enable IGMP and configure the IGMP last member query interval value to 2 seconds on VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1000
ZEQUOxxxxRE(config-if)# ip igmp enable
ZEQUOxxxxRE(config-if)# ip igmp last-member-query-interval 2
ZEQUOxxxxRE(config-if)#
```

9.1.4 ip igmp query-interval

This command is used to configure the interval at which the router sends IGMP general query messages periodically. Use the **no** form of this command to revert to the default setting.

Syntax

- ip igmp query-interval *SECONDS*
- no ip igmp query-interval

Parameters

Parameters	description
<i>SECONDS</i>	Specifies to configure the interval at which the designated router sends IGMP general query messages. The range is from 1 to 31744.

Default

By default, this value is 125 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the IGMP group member query interval. The IGMP querier sends IGMP query messages at the interval specified by **ip igmp query-interval** command to discover the receivers attached to the interface interested in joining to multicast groups. Hosts respond to the query with IGMP report messages to indicate the multicast group they are interested to join the membership.

Example

This example shows how to enable IGMP and configure the IGMP query interval to 300 seconds on VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1000
ZEQUOxxxxRE(config-if)# ip igmp enable
ZEQUOxxxxRE(config-if)# ip igmp query-interval 300
ZEQUOxxxxRE(config-if)#
```

9.1.5 ip igmp query-max-response-time

This command is used to configure the maximum response time advertised in IGMP queries. Use the **no** form of this command to revert to the default setting.

Syntax

- **ip igmp query-max-response-time** *SECONDS*
- **no ip igmp query-max-response-time**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies to configure the maximum response time, in seconds, advertised in IGMP queries. The range is form 1 to 25.

Default

By default, this value is 10 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command configures the period of which the group member can respond to an IGMP query message before the router deletes the membership. The group membership lifetime is equal to the query interval times the robustness plus the maximum response time.

Example

This example shows how to configure the IGMP maximum query response time to 10 seconds on VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1000
ZEQUOxxxxRE(config-if)# ip igmp query-max-response-time 10
ZEQUOxxxxRE(config-if)#
```

9.1.6 ip igmp robustness-variable

This command is used to configure the robustness variable used in IGMP. Use the **no** form of this command to revert to the default setting.

Syntax

- **ip igmp robustness-variable** *VALUE*
- **no ip igmp robustness-variable**

Parameters

Parameters	description
<i>VALUE</i>	Specifies the robustness variable.

Default

By default, this value is 2.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

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 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.

Example

This example shows how to configure the robustness variable to be 3 on interface VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1000
ZEQUOxxxxRE(config-if)# ip igmp robustness-variable 3
ZEQUOxxxxRE(config-if)#
```

9.1.7 ip igmp static-group

This command is used to create a static membership on an interface for a group or a channel. Use the **no** form of this command to remove the membership.

Syntax

- **ip igmp static-group** *GROUP-ADDRESS*
- **no ip igmp static-group** *GROUP-ADDRESS*

Parameters

Parameters	description
<i>GROUP-ADDRESS</i>	Specifies the IP multicast group address.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command allows the user to create an IGMP static group in case that when the attached host does not support the IGMP protocol. Once configured, the group member entry is added to the IGMP cache.

Example

This example shows how to configure a static IGMP group entry on VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1000
ZEQUOxxxxRE(config-if)# ip igmp static-group 238.1.1.2
ZEQUOxxxxRE(config-if)#
```

9.1.8 ip igmp version

This command is used to change the IGMP version on the specified interface. Use the **no** form of this command to revert to the default setting.

Syntax

- ip igmp version { 1 | 2 | 3 }
- no ip igmp version

Parameters

Parameters	description
1	Specifies to configure the Switch to run IGMP version 1.
2	Specifies to configure the Switch to run IGMP version 2.
3	Specifies to configure the Switch to run IGMP version 3.

Default

The default IGMP version is 3.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Different IGMP versions support different functions for multicast data routing to hosts. Some commands are only effective for IGMPv2 and IGMPv3. For example, if you change to version 1, then the setting configured by the **ip igmp query-max-response-time** command will not be effective.

Example

This example shows how to enable IGMP and configure the IGMP version to 3.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1000
ZEQUOxxxxRE(config-if)# ip igmp enable
ZEQUOxxxxRE(config-if)# ip igmp version 3
ZEQUOxxxxRE(config-if)#
```

9.1.9 show ip igmp groups

This command is used to display IGMP group information on an interface.

Syntax

- show ip igmp groups [*IP-ADDRESS* | interface *INTERFACE-ID*] [{detail | static}]

Parameters

Parameters	description
<i>IP-ADDRESS</i>	(Optional) Specifies Group IP address to be displayed. If no IP address is specified, all IGMP group information will be displayed.
interface <i>INTERFACE-ID</i>	(Optional) Specifies the interface to be displayed. If no interface is specified, IGMP group information for all interfaces that are IGMP enabled will be displayed.

Parameters	description
detail	(Optional) Specifies to display detailed information.
static	(Optional) Specifies to display the static group.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Select to display multicast group information for a specific group or for a specific interface.

Example

This example shows how to display IGMP group information in interface VLAN 1000.

```
ZEQUOxxxxRE# show ip igmp groups interface vlan1000
```

Interface	Group Address	Uptime	Expire	Last Reporter
vlan1000	224.0.1.149	0DT00H00M09S	0DT00H04M15S	10.10.0.91

Total Entries: 1

```
ZEQUOxxxxRE#
```

This example shows how to display IGMP group detailed information of group 224.1.1.1.

```
ZEQUOxxxxRE# show ip igmp groups 224.1.1.1 detail
```

```
Interface      : vlan1000
Group          : 224.1.1.1
Uptime        : 0DT00H00M42S
Expires       : Stopped
Group mode    : Include
Last reporter  : 192.168.50.111
```

```
Group source list:
  Source Address      v3 Exp
  -----
    192.168.55.55      0DT00H03M38S
    192.168.10.55      0DT00H03M38S
```

```
Total Source Entries: 2
```

```
Interface      : vlan2000
Group          : 224.1.1.1
Uptime        : 0DT00H00M42S
Expires       : 0DT00H03M38S
Group mode    : Exclude
Last reporter  : 192.168.51.111
Source list is empty
```

```
Total Entries: 2
```

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Uptime	The time elapsed since the entry has been created in the format of [n]DT[n]H[n]M[n]S.
Expires	The time that the entry will be removed if there is no refresh on the entry in the format of [n]DT[n]H[n]M[n]S. Stopped indicates that timing out of this entry is not determined by this expire timer. If the router is in Include mode for a group, then the whole group entry times out after the last source entry has timed out (unless the mode is changed to Exclude mode before it times out).
Group mode	Include or Exclude : The group mode is based on the type of membership reports that are received on the interface for the group.
Last reporter	The last host to report being a member of the multicast group.

9.1.10 show ip igmp interface

This command is used to display IGMP configuration information on an interface.

Syntax

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

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies an interface. If no interface is specified, the Switch displays IGMP information on all interfaces on which IGMP is enabled. Note that only VLAN interfaces can be specified.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display IGMP configuration settings on interfaces.

Example

This example shows how to display IGMP configuration information about interface VLAN1.

```
ZEQUOxxxxRE#show ip igmp interface vlan1

VLAN 1
  Version                : 3
  IP Address/Netmask      : 172.18.67.139/21
  IGMP State              : Enabled
  Querier                 : 172.18.67.139
  Query Interval          : 125 seconds
  Query Maximum Response Time : 10 seconds
  Robustness Variable     : 2
  Last Member Query Interval : 1 seconds
  Subscriber Source IP Check : Enabled

Total Entries: 1

ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Version	The IGMP protocol version running on the interface.
Querier	The querier IP on the interface LAN.
Subscriber Source IP Check	This field specifies whether to ignore the source IP check on incoming IGMP packets from subscriber. Enabled indicates not to ignore the source IP check. Disabled indicates to ignore the source IP check.

9.2 IGMP (Internet Group Management Protocol) Proxy Commands

IGMP (Internet Group Management Protocol) is a protocol to manage multicast groups.

IGMP proxy is a function to transfer IGMP packets from multicast members to the upstream router. If a multicast transmission route is fixed, this function can transfer multicast packets between routers on the fixed route without using a multicast routing protocol. If a multicast server does not exist on the topology uplink, use the multicast routing function.

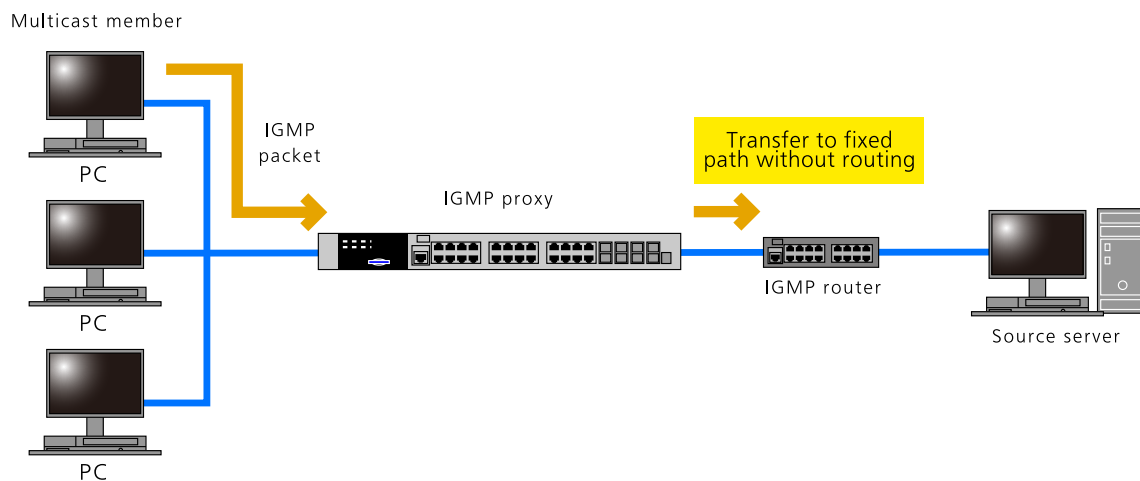


Figure 58-1 IGMP proxy overview

9.2.1 ip igmp proxy

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

Syntax

- ip igmp proxy
- no ip igmp proxy

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The IGMP proxy only works in a simple tree topology. Make sure that there are no other multicast routers except for the proxy devices in the simple tree topology. When receiving IGMP report packets from a downstream interface, IGMP proxy will update its membership database which is generated by the merger of all subscriptions on any downstream interface. If the database is changed, the proxy device will send unsolicited reports or leaves from upstream interface. It can also send membership reports from the upstream interface when queried.

Example

This example shows how to enable IGMP proxy on the device.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip igmp proxy
ZEQUOxxxxRE(config)#
```

9.2.2 ip igmp proxy upstream

This command is used to configure an interface as the upstream in IGMP proxy. Use the **no** form of this command to disable the IGMP proxy upstream function on the interface.

Syntax

- ip igmp proxy upstream
- no ip igmp proxy upstream

Parameters

None.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only one upstream can exist in an IGMP proxy device.

Example

This example shows how to configure interface VLAN 3 to act as the proxy upstream interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan 3
ZEQUOxxxxRE(config-if)# ip igmp proxy upstream
ZEQUOxxxxRE(config-if)#
```

9.2.3 ip igmp proxy downstream

This command is used to configure an interface as a downstream in IGMP proxy. Use the **no** form of this command to disable the IGMP proxy downstream function on the interface.

Syntax

- ip igmp proxy downstream
- no ip igmp proxy downstream

Parameters

None.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Multiple downstream interfaces can be configured on an IGMP proxy device.

Example

This example shows how to configure interface VLAN 4 to act as the proxy downstream interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan4
ZEQUOxxxxRE(config-if)# ip igmp proxy downstream
ZEQUOxxxxRE(config-if)#
```

9.2.4 ip igmp proxy designated-forwarding

This command is used to enable designated forwarding on a non-querier IGMP proxy downstream interface. Use the **no** form of this command to disable this option.

Syntax

- ip igmp proxy designated-forwarding
- no ip igmp proxy designated-forwarding

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

To avoid local loops and redundant traffic for links that are considered downstream links by multiple IGMP-based forwarders, IGMP proxy uses the IGMP querier election to elect a single forwarder on a LAN. Use this command to make a non-querier device a forwarder. Use the configuration in the appropriate topology. Improper usage may cause local loops or redundant traffic. The command does not take effect if the interface is not set as the downstream interface or set as the upstream interface.

Example

This example shows how to enable designated forwarding on downstream interface VLAN 4.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan4
ZEQUOxxxxRE(config-if)# ip igmp proxy designated-forwarding
ZEQUOxxxxRE(config-if)#
```

9.2.5 show ip igmp proxy

This command is used to display IGMP proxy configurations.

Syntax

- show ip igmp proxy

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display upstream interface configurations and downstream interfaces.

Example

This example shows how to display the IGMP proxy configurations on the device.

```
ZEQUOxxxxRE# show ip igmp proxy

IGMP Proxy Global State:    Enabled
Upstream Interface:         vlan14
Downstream Interface:
vlan11, vlan12 (DF), vlan13 (DF)

ZEQUOxxxxRE#
```

9.2.6 show ip igmp proxy group

This command is used to display multicast groups learned by the IGMP proxy function.

Syntax

- **show ip igmp proxy group** [*GROUP-ADDRESS*]

Parameters

Parameters	description
<i>GROUP-ADDRESS</i>	Specifies the IPv4 multicast address.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display all group information by not specifying the group address.

Example

This example shows how to display the groups learned by IGMP proxy function.

```
ZEQUOxxxxRE# show ip igmp proxy group
```

```
224.2.2.2, Exclude  
Source list: 1.2.2.3, 1.3.3.8
```

```
227.3.1.5, Include  
Source list: 3.2.3.9
```

```
Total entries: 2
```

```
ZEQUOxxxxRE#
```

9.2.7 show ip igmp proxy forwarding

This command is used to display multicast forwarding entries created by the IGMP proxy function.

Syntax

- **show ip igmp proxy forwarding** [*GROUP-ADDRESS*]

Parameters

Parameters	description
<i>GROUP-ADDRESS</i>	Specifies the IPv4 multicast address.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display all proxy forwarding information by not specifying the group address.

Example

This example shows how to display the forwarding information created by the IGMP proxy function.

```
ZEQUOxxxxRE# show ip igmp proxy forwarding
```

```
237.1.1.0, 100.52.1.10, vlan52  
outgoing interface:  
vlan20, vlan30
```

```
237.1.1.1, 100.52.1.10, vlan52  
outgoing interface:  
vlan20
```

```
Total Entries: 2
```

```
ZEQUOxxxxRE#
```

9.3 IGMP (Internet Group Management Protocol) Snooping Commands

IGMP (Internet Group Management Protocol) is a protocol to manage multicast groups.

IGMP snooping is a filtering function to monitor IGMP packets flowing on ports of the switch and prevent data from flowing to unnecessary ports. This filtering function allows to efficiently process a large amount of data, such as video distribution.

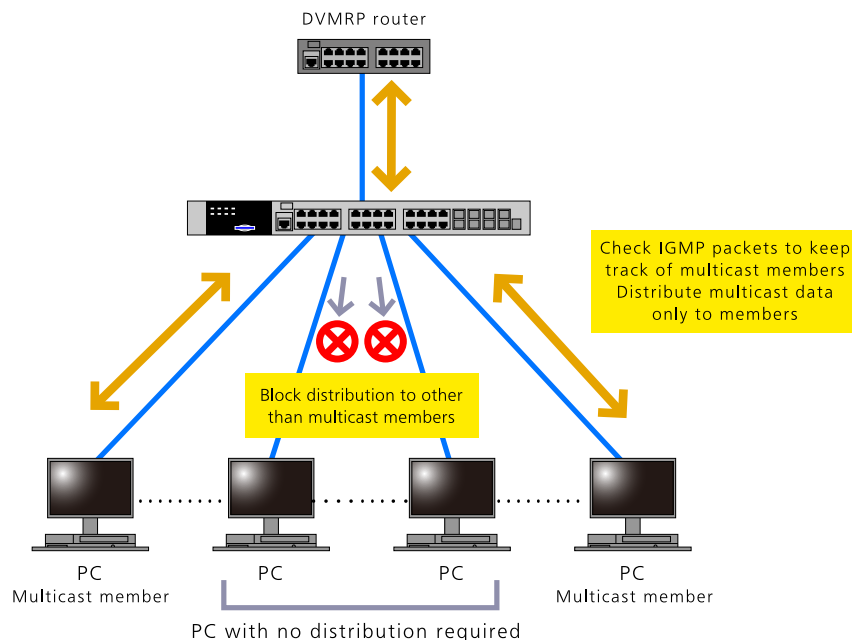


Figure 59-1 IGMP Snooping overview

9.3.1 clear ip igmp snooping statistics

This command is used to clear the IGMP snooping related statistics.

Syntax

- `clear ip igmp snooping statistics { all | vlan VLAN-ID | interface INTERFACE-ID }`

Parameters

Parameters	description
all	Specifies to clear IP IGMP snooping statistics for all VLANs and all ports.
vlan <i>VLAN-ID</i>	Specifies a VLAN to clear the IP IGMP snooping statistics.
interface <i>INTERFACE-ID</i>	Specifies a port to clear the IP IGMP snooping statistics.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to clear the IGMP snooping related statistics.

Example

This example shows how to clear all IGMP Snooping statistics.

```
ZEQUOxxxxRE# clear ip igmp snooping statistics all
ZEQUOxxxxRE#
```

9.3.2 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.

Syntax

- **ip igmp snooping**
- **no ip igmp snooping**

Parameters

None.

Default

IGMP snooping is disabled on all VLAN interfaces.
The IGMP snooping global state is disabled.

Command Mode

Interface Configuration Mode.
Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

In the interface configuration mode, the command is only available for VLAN interface configuration. For a VLAN to operate with IGMP snooping, both the global state and per interface state must be enabled. On a VLAN, the setting of IGMP snooping and MLD snooping are independent. IGMP snooping and MLD snooping can be simultaneously enabled on the same VLAN.

Example

This example shows how to disable the IGMP snooping operation on all VLANs.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# no ip igmp snooping
ZEQUOxxxxRE(config)#
```

This example shows how to enable the IGMP snooping operation on all VLANs.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip igmp snooping
ZEQUOxxxxRE(config)#
```

This example shows how to disable IGMP snooping on VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1
ZEQUOxxxxRE(config-vlan)# no ip igmp snooping
ZEQUOxxxxRE(config-vlan)#
```

9.3.3 ip igmp snooping access-group

This command is used to restrict the receivers on a subnet to only join the multicast groups that are permitted by a standard IP access list. Use the **no** form of this command to disable this function.

Syntax

- **ip igmp snooping access-group** *ACCESS-LIST-NAME* [**vlan** *VLAN-ID*]
- **no ip igmp snooping access-group** [**vlan** *VLAN-ID*]

Parameters

Parameters	description
<i>ACCESS-LIST-NAME</i>	Specifies a standard IP access list. To permit users to join a group (*, G), specify "any" in source address field and G in destination address field of the access list entry.
vlan <i>VLAN-ID</i>	(Optional) Specifies a Layer 2 VLAN on a trunk port and applies the filter to packets arrive on that VLAN.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **ip igmp snooping access-group** command on the Switch to restrict the multicast traffic receiver to join to specific group. The destination address part of the access list represents the multicast group address that the receiver is permitted or denied to join.

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

Example

This example shows how to restrict the serviced IGMP snooping group for GigabitEthernet1/0/1 to group 226.1.1.1. In the following example, first, create an IP access list named "igmp_filter" which only permits the packets destined for group address 226.1.1.1. Then, associate this access group in GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip access-list igmp_filter
ZEQUOxxxxRE(config-ip-acl)# permit any host 226.1.1.1
ZEQUOxxxxRE(config-ip-acl)# end
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# ip igmp snooping access-group igmp_filter
ZEQUOxxxxRE(config-if)#
```

9.3.4 ip igmp snooping fast-leave

This command is used to configure IGMP Snooping fast-leave on the interface. Use the **no** form of this command to disable the fast-leave option on the specified interface.

Syntax

- ip igmp snooping fast-leave
- no ip igmp snooping fast-leave

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. The **ip igmp snooping fast-leave** command allows IGMP membership to be removed from a port right on 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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1
ZEQUOxxxxRE(config-vlan)# ip igmp snooping fast-leave
ZEQUOxxxxRE(config-vlan)#
```

9.3.5 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.

Syntax

- **ip igmp snooping last-member-query-interval** *SECONDS*
- **no ip igmp snooping last-member-query-interval**

Parameters

Parameters	description
<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

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. On receiving an IGMP leave message, the IGMP snooping querier will assume that there are no local members on the interface if there are no reports received after the response time. Users can lower this interval to reduce the amount of time it takes a switch to detect the loss of the last member of a group.

Example

This example shows how to configure the last member query interval time to be 3 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# ip igmp snooping last-member-query-interval 3
ZEQUOxxxxRE(config-vlan)#
```

9.3.6 ip igmp snooping limit

This command is used to set the limitation on the number of IGMP cache entries that can be created. Use the **no** form of this command to remove the limitation.

Syntax

- **ip igmp snooping limit** *NUMBER* [**exceed-action** { **drop** | **replace** }] [**except** *ACCESS-LIST-NAME*] [**vlan** *VLAN-ID*]
- **no ip igmp snooping limit** [**vlan** *VLAN-ID*]

Parameters

Parameters	description
<i>NUMBER</i>	Specifies to set the maximum number of IGMP cache entries that can be created. This value must be between 1 and 8192.
exceed-action	(Optional) Specifies the action for handling newly learned groups when the limitation is exceeded.
drop	(Optional) Specifies that the new group will be dropped.
replace	(Optional) Specifies that the new group will replace the oldest group.

Parameters	description
except <i>ACCESS-LIST-NAME</i>	(Optional) Specifies a standard IP access list. The group (*,G), or channel (S,G) permitted by the access list will be excluded from the limit. To permit a channel (S,G), specifies S in the source address field and G in the destination address field of the access list entry. To permit a group (*,G), specifies "any" in the source address field and G in the destination address field of the access list entry.
vlan <i>VLAN-ID</i>	(Optional) Specifies a Layer 2 VLAN and applies the filter to packets that arrive on that VLAN.

Default

By default, there is no limit.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for physical port or port-channel interface configuration. The except-option allows users to specify a standard access list to exclude a list of groups or channels from the limit.

Example

This example shows how to set the limit number of IGMP snooping groups with a configuration limit from an ACL that GigabitEthernet1/0/4 with the VLAN ID of 1000 can join to.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/4
ZEQUOxxxxRE(config-if)# ip igmp snooping limit 80 except igmp_filter vlan 1000
ZEQUOxxxxRE(config-if)#
```

This example shows how to reset the limit number to the default of IGMP snooping groups that port-channel 4 with the VLAN ID of 1000 can join to.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface port-channel 4
ZEQUOxxxxRE(config-if)# no ip igmp snooping limit vlan 1000
ZEQUOxxxxRE(config-if)#
```


9.3.7 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.

Syntax

- **ip igmp snooping mrouter** {interface *INTERFACE-ID* [, | -] | forbidden interface *INTERFACE-ID* [, | -]}
- **no ip igmp snooping mrouter** {interface *INTERFACE-ID* [, | -] | forbidden interface *INTERFACE-ID* [, | -]}

Parameters

Parameters	description
interface	Specifies a static multicast router port.
forbidden interface	Specifies a port that cannot be multicast router port.
<i>INTERFACE-ID</i>	Specifies an interface or an interface list. The interface can be a physical interface or a port-channel.
,	(Optional) Specifies a series of interfaces or 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.
Auto-learning is enabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. To specify a multicast router port, the valid interface can be a physical port or a port-channel. The specified multicast router port must be member port of the configured VLAN. A multicast router port can be either dynamic learned or statically configured. With the dynamic learning, the IGMP snooping entity will learn IGMP, PIM, or DVMRP packet to identify a multicast router port. If auto-learn is disabled, the multicast router port can only be statically configured.

Example

This example shows how to add an IGMP snooping static multicast router port for VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1
ZEQUOxxxxRE(config-vlan)# ip igmp snooping mrouter interface gil/0/4
ZEQUOxxxxRE(config-vlan)#
```

9.3.8 ip igmp snooping proxy-reporting

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

Syntax

- ip igmp snooping proxy-reporting [source *IP-ADDRESS*]
- no ip igmp snooping proxy-reporting

Parameters

Parameters	description
source <i>IP-ADDRESS</i>	(Optional) Specifies the source IP of proxy reporting. The default value is zero IP.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. When the function proxy reporting is enabled, the received multiple IGMP report or leave packets for a specific (S, G) will be integrated into one report before being sent to the router port. Proxy reporting source IP will be used as source IP of the report, Zero IP address will be used when the proxy reporting source IP is not set. Interface MAC will be used as source MAC of the report. If the VLAN has no IP address configured, then system MAC will be used.

Example

This example shows how to enable IGMP snooping proxy-reporting on VLAN 1 and configure the proxy-reporting message source IP to be 1.2.2.2.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1
ZEQUOxxxxRE(config-if)# ip igmp snooping proxy-reporting source 1.2.2.2
ZEQUOxxxxRE(config-if)#
```

9.3.9 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.

Syntax

- ip igmp snooping querier
- no ip igmp snooping querier

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. The interface must have IP address assigned to start the querier. The system will return warning message if the VLAN has no IP address. If querier is enabled, but IP address is removed, the querier will be stopped. 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. If IGMP protocol is also enabled on the interface, IGMP snooping querier state will be disabled automatically.

Example

This example shows how to enable the IGMP snooping querier on VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1
ZEQUOxxxxRE(config-vlan)# ip igmp snooping querier
ZEQUOxxxxRE(config-vlan)#
```

9.3.10 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.

Syntax

- ip igmp snooping query-interval *SECONDS*
- no ip igmp snooping query-interval

Parameters

Parameters	description
<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

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. The query interval is the interval between General Queries sent by the Querier. By varying the query interval, an administrator may tune the number of IGMP messages on the network; larger values cause IGMP Queries to be sent less often.

Example

This example shows how to configure the IGMP snooping query interval to 300 seconds on VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# ip igmp snooping query-interval 300
ZEQUOxxxxRE(config-vlan)#
```

9.3.11 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.

Syntax

- ip igmp snooping query-max-response-time *SECONDS*
- no ip igmp snooping query-max-response-time

Parameters

Parameters	description
<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

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. This command configures the period of which the group member can respond to an IGMP query message before the IGMP Snooping deletes the membership.

Example

This example shows how to configure the maximum response time to 20 seconds on an interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# ip igmp snooping query-max-response-time 20
ZEQUOxxxxRE(config-vlan)#
```

9.3.12 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.

Syntax

- ip igmp snooping query-version *NUMBER*
- no ip igmp snooping query-version

Parameters

Parameters	description
<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

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. The query version number setting will affect the querier electing. When configured to version 1, IGMP snooping will always act as the querier, and will not initiate new querier electing no matter what IGMP query packet is received. When configured to version 2 or version 3, IGMP snooping will initiate a new querier electing if any IGMPv2 or IGMPv3 query packet is received. When receiving an IGMPv1 query packet, IGMP snooping won't initiate a new querier electing.

Example

This example shows how to configure the query version to be 2 on VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# ip igmp snooping query-version 2
ZEQUOxxxxRE(config-vlan)#
```

9.3.13 ip igmp snooping rate-limit

This command is used to configure the upper limit per second for ingress IGMP control packets. Use the **no** form of this command to disable the rate limit.

Syntax

- **ip igmp snooping rate-limit** *NUMBER*
- **no ip igmp snooping rate-limit**

Parameters

Parameters	description
<i>NUMBER</i>	Specifies to configure the rate of the IGMP control packet that the Switch can process on a specific interface. The rate is specified in packets per second.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for VLAN interface configuration, physical port or port-channel interface. The command configures the rate of IGMP control packet that can be processed by IGMP snooping.

Example

This example shows how to limit 30 packets per second on interface VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# ip igmp snooping rate-limit 30
ZEQUOxxxxRE(config-vlan)#
```

9.3.14 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.

Syntax

- ip igmp snooping robustness-variable *VALUE*
- no ip igmp snooping robustness-variable

Parameters

Parameters	description
<i>VALUE</i>	Specifies the robustness variable. The value is from 1 to 7.

Default

By default, this value is 2.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. The robustness variable provides fine-tuning to allow for expected packet loss on an interface. The value of the robustness variable is used in calculating the following IGMP message intervals:

- **Group member interval** – The amount of time that must pass before a multicast router decides there are no more members of a group on a network.
This interval is calculated as follows: (robustness variable x query interval) + (1 x query response interval).
- **Other querier present interval** – The amount of time that must pass before a multicast router decides that there is no longer another multicast router that is the querier.
This interval is calculated as follows: (robustness variable x query interval) + (0.5 x query response interval).
- **Last member query count** – The number of group-specific queries sent before the router assumes there are no local members of a group. The default number is the value of the robustness variable.

Users can increase this value if a subnet is expected to be loose.

Example

This example shows how to configure the robustness variable to be 3 on interface VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# ip igmp snooping robustness-variable 3
ZEQUOxxxxRE(config-vlan)#
```

9.3.15 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.

Syntax

- **ip igmp snooping static-group** *GROUP-ADDRESS* **interface** *INTERFACE-ID* [, | -]
- **no ip igmp snooping static-group** *GROUP-ADDRESS* [**interface** *INTERFACE-ID* [, | -]]

Parameters

Parameters	description
<i>GROUP-ADDRESS</i>	Specifies an IP multicast group address.
interface <i>INTERFACE-ID</i>	Specifies an interface or an interface list. The interface can be a physical interface or a port-channel.
,	(Optional) Specifies a series of interfaces or 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

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. This command applies to IGMP snooping on a VLAN interface to statically add group membership entries and/or source records.

The **ip igmp snooping static-group** command allows the user to create an IGMP snooping static group in case that the attached host does not support the IGMP protocol.

Example

This example shows how to statically add a group and source records for IGMP snooping.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1
ZEQUOxxxxRE(config-vlan)# ip igmp snooping static-group 226.1.2.3 interface gil/0/5
ZEQUOxxxxRE(config-vlan)#
```

9.3.16 show ip igmp snooping

This command is used to display IGMP snooping information on the Switch.

Syntax

- show ip igmp snooping [vlan *VLAN-ID*]

Parameters

Parameters	description
vlan <i>VLAN-ID</i>	(Optional) Specifies the VLAN to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display IGMP snooping information for all VLANs where IGMP snooping is enabled.

Example

This example shows how to display IGMP snooping configurations.

```
ZEQUOxxxxRE#show ip igmp snooping

IGMP snooping global state: Enabled

VLAN #1 configuration
  IGMP snooping state           : Enabled
  Fast leave                    : Disabled (host-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
  Proxy reporting               : Disabled (Source 0.0.0.0)
  Rate limit                    : 0

Total Entries: 1

ZEQUOxxxxRE#
```

9.3.17 show ip igmp snooping groups

This command is used to display IGMP snooping group information learned on the Switch.

Syntax

- show ip igmp snooping groups [vlan *VLAN-ID* [, | -] | [*IP-ADDRESS*] [detail]

Parameters

Parameters	description
vlan <i>VLAN-ID</i>	(Optional) Specifies the VLAN interface to be displayed. If no VLAN is specified, IGMP snooping group information of all VLANs will be displayed, at which IGMP Snooping is enabled.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.
<i>IP-ADDRESS</i>	(Optional) Specifies the group IP address to be displayed. If no IP address is specified, all IGMP group information will be displayed.
detail	(Optional) Specifies to display the IGMP group detail information.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display IGMP snooping group information.

Example

This example shows how to display IGMP snooping group information.

```
ZEQUOxxxxRE# show ip igmp snooping groups
```

```
Total Group Entries : 1
```

```
Total Source Entries: 2
```

```
vlan1, 230.1.1.1
```

```
Learned on port: 1/0/3,1/0/5
```

```
ZEQUOxxxxRE#
```

9.3.18 show ip igmp snooping filter

This command is used to display IGMP snooping filter configuration information for all interfaces on the Switch or for a specified interface.

Syntax

- show ip igmp snooping filter [interface *INTERFACE-ID* [, | -]]

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	(Optional) Specifies that the interface can be a physical interface or a port-channel. If no interface is specified, IGMP snooping filter information on all interface will be displayed.

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

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the IGMP snooping limit and access group information.

Example

This example shows how to display IGMP snooping filter information when no interface is specified.

```
ZEQUOxxxxRE#show ip igmp snooping filter
```

```
Gi1/0/1
  Rate limit: Not Configured
  Access group: Not Configured
  Groups/Channel Limit: Not Configured
  vlan1:
    Access group: Not Configured
    Groups/Channel Limit: 100 (Exception List: AccessList, exceed-action: drop)
```

```
Gi1/0/2
  Rate limit: 10pps
  Access group: Not Configured
  Groups/Channel Limit: Not Configured
  vlan1:
    Access group: Not Configured
    Groups/Channel Limit: 100 (Exception List: ExtendACL, exceed-action: drop)
```

```
ZEQUOxxxxRE#
```

This example shows how to display filter information of GigabitEthernet1/0/2.

```
ZEQUOxxxxRE#show ip igmp snooping filter interface gil/0/2
```

```
Gil/0/2
Rate limit: 10pps
Access group: Not Configured
Groups/Channel Limit: Not Configured
vlan1:
  Access group: Not Configured
  Groups/Channel Limit: 100 (Exception List: ExtendACL, exceed-action: drop)
```

```
ZEQUOxxxxRE#
```

9.3.19 show ip igmp snooping mrouter

This command is used to display IGMP snooping multicast router information that has been automatically learned and manually configured on the Switch.

Syntax

- show ip igmp snooping mrouter [vlan *VLAN-ID* [, | -]]

Parameters

Parameters	description
vlan <i>VLAN-ID</i>	(Optional) Specifies the VLAN. If no VLAN is specified, IGMP snooping information on all VLANs will be displayed of which IGMP snooping is enabled.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display dynamically learned or manually configured multicast router interfaces.

Example

This example shows how to display IGMP snooping m-router information.

```
ZEQUOxxxxRE#show ip igmp snooping mrouter
```

```
VLAN    Ports
-----  -----
1        1/0/1-1/0/4 (static)
```

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

9.3.20 show ip igmp snooping statistics

This command is used to display IGMP snooping statistics information on the Switch.

Syntax

- show ip igmp snooping statistics** { interface [*INTERFACE-ID* [, | -]] | vlan [*VLAN-ID* [, | -]] }

Parameters

Parameters	description
interface	Specifies to display statistics counters by interface.
<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.
vlan	Specifies to display statistics counters by VLAN.
<i>VLAN-ID</i>	(Optional) Specifies the VLAN ID to be displayed.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the IGMP snooping related statistics information.

Example

This example shows how to display IGMP snooping statistics information.

```
ZEQUOxxxxRE#show ip igmp snooping statistics vlan 1
```

```
VLAN 1 Statistics:
  IGMPv1 Rx: Report 0, Query 0
  IGMPv2 Rx: Report 0, Query 0, Leave 0
  IGMPv3 Rx: Report 3, Query 0
  IGMPv1 Tx: Report 0, Query 0
  IGMPv2 Tx: Report 0, Query 0, Leave 0
  IGMPv3 Tx: Report 1, Query 2
```

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

9.3.21 show ip igmp snooping static-group

This command is used to display statically configured IGMP snooping groups on the Switch.

Syntax

- `show ip igmp snooping static-group [ GROUP-ADDRESS | vlan VLAN-ID ]`

Parameters

Parameters	description
<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.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display statically configured IGMP snooping groups on the Switch. If no optional parameter is specified, all information will be displayed.

Example

This example shows how to display statically configured IGMP snooping groups.

```
ZEQUOxxxxRE#show ip igmp snooping static-group
```

VLAN ID	Group address	Interface
-----	-----	-----
1	230.1.1.1	1/0/1-1/0/2

Total Entries: 1

```
ZEQUOxxxxRE#
```

9.4 DVMRP (Distance Vector Multicast Routing Protocol) Commands [ZEQUO6700RE/6600RE]

9.4.1 ip dvmrp

This command is used to enable DVMRP on the current interface. Use the **no** form of this command to disable DVMRP on the interface.

Syntax

- ip dvmrp
- no ip dvmrp

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The interface would start to run (or stop) the DVMRP protocol on the interface. Before enabling the DVMRP function on an interface, IP multicast routing should be enabled by using the **ip multicast-routing** command in the Global Configuration mode. Only one multicast routing protocol can be enabled on one interface. If more than one multicast routing protocol is enabled, an error message will be shown.

Example

This example shows how to enable the DVMRP protocol on the interface VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip dvmrp
```

9.4.2 ip dvmrp metric

This command is used to configure the metric associated with the route for DVMRP reports. Use the **no** form of this command to revert to the default setting.

Syntax

- ip dvmrp metric *METRIC*
- no ip dvmrp metric

Parameters

Parameters	description
<i>METRIC</i>	Specifies the metric value. This value must be between 1 and 32. A value of 32 means infinity (unreachable).

Default

The default metric value is 1.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

For each source network reported, a route metric is associated with the route being reported. The metric is the sum of the interface metrics between the router originating the report and the source network. For DVMRP, the metric with 32 means infinity (unreachable). This limits the breadth across the whole DVMRP network and is necessary to place an upper bound on the convergence time of the protocol.

Example

This example shows how to change the metric value to 2 of an interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip dvmrp metric 2
```

9.4.3 ip dvmrp neighbor-timeout

This command is used to configure the DVMRP neighbor lifetime value. Use the **no** form of this command to revert to the default setting.

Syntax

- **ip dvmrp neighbor-timeout** *SECONDS*
- **no ip dvmrp neighbor-timeout**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the neighbor lifetime value. It can be a value from 1 to 65535 seconds.

Default

By default, this value is 35 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If the router has not received a probe message from a neighbor after the neighbor timeout interval, the neighbor is supposed to be down.

Example

This example shows how to configure the neighbor expiry time to 60 seconds for an interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip dvmrp neighbor-timeout 60
```

9.4.4 ip dvmrp probe-time

This command is used to configure the DVMRP probe interval. Use the **no** form of this command to revert to the default setting.

Syntax

- ip dvmrp probe-time *SECONDS*
- no ip dvmrp probe-time

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the DVMRP probe interval value. It can be a value from 1 to 65535 seconds.

Default

By default, this value is 10 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the interval time that the DVMRP router uses to send DVMRP Probe messages.

Example

This example shows how to change the probe time to 20 seconds of an interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip dvmrp probe-time 20
```

9.4.5 show ip dvmrp interface

This command is used to display DVMRP configuration information on an interface.

Syntax

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

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies a VLAN interface.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays Distance Vector Multicast Routing Protocol (DVMRP) information on interfaces on which DVMRP is active. You can use the **show running-config** to further check the DVMRP configuration, if the interface is not displayed. If no interface is specified, all DVMRP active interfaces will be displayed.

Example

This example shows how to display DVMRP configure information for interface 'vlan1000'.

```
ZEQUOxxxxRE# show ip dvmrp interface vlan1000
```

```
NT = Neighbor Timeout
Interface  Address          NT    Probe    Metric  Generation ID  State
-----  -
vlan1000  10.0.0.254       35    10       1       1234567890     Enabled
```

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

9.4.6 show ip dvmrp neighbor

This command is used to display DVMRP neighbor information.

Syntax

- show ip dvmrp neighbor [*INTERFACE-ID* | *IP-ADDRESS*]

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface ID.
<i>IP-ADDRESS</i>	(Optional) Specifies the IP address of the neighbor.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display DVMRP neighbor information. If neither the interface ID nor the IP address is specified, information of all neighbors will be displayed

Example

This example shows how to display neighbor information.

```
ZEQUOxxxxRE# show ip dvmrp neighbor
```

Interface	Neighbor Address	Generation ID	ExpTime
-----	-----	-----	-----
vlan1	10.10.10.11	35ef6d	0DT00H00M29S

Total Entries: 1

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Interface	The interface referred to the routing interface and it is mapped to a VLAN interface.
Neighbor Address	Once a system has received a probe from a neighbor, that contains the system's address in the neighbor list, the system has established a two-way neighbor adjacency with this router.
Generation ID	If a DVMRP router was restarted, it will not be aware of any previous prunes that it had sent or received. In order for the neighbor to detect that the router has restarted, a non-decreasing number is placed in the periodic probe message called the generation ID. When a change in the generation ID is detected, any prune information received from the router is no longer valid and should be flushed.
ExpTime	The neighbor timeout interval should be set at 35 seconds. This allows fairly early detection of a lost neighbor yet provides tolerance for busy multicast routers. These values must be coordinated between all DVMRP routers on a physical network segment. The expire-time value, shown here, is how much time remained before reaching the timeout interval.

9.4.7 show ip dvmrp route

This command is used to display DVMRP route information.

Syntax

- show ip dvmrp route [*NETWORK-ADDRESS*]

Parameters

Parameters	description
<i>NETWORK-ADDRESS</i>	(Optional) Specifies the source network address and mask length. If the network address not specified, all DVMRP routes will be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.
Any Configuration Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display DVMRP route information.

Example

This example shows how to display route information.

```
ZEQUOxxxxRE# show ip dvmrp route
```

```
State: H = Hold-down
Source Network    Upstream Neighbor  Metric  Learned  Interface  State  ExpTime
-----
10.10.11.0/24     10.10.11.11        1       Local    vlan1      -      -
```

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Source Network	The source network.
Upstream neighbor	The next hop router to the source network. If the interface is a local entry, then the up-stream neighbor displays the interface IP address.
Learned	Indicates this route entry is a local interface. The other condition is dynamically learned.
Interface	The interface to the source network.
State	The route state displays "H" if the DVMRP route is in the "Hold-down" state. The route state displays "-" if it is a local interface.
ExpTime	The amount of time remaining until the entry is removed from the DVMRP routing table. A dash note indicates that this entry is not going to be removed (because it is a local interface).

9.5 MLD (Multicast Listener Discovery) Commands[ZEQUO6700RE/6600RE]

MLD (Multicast Listener Discovery) is a protocol to manage multicast groups in an IPv6 environment. It is a protocol equivalent to IGMP in IPv4.

MLD snooping is a filtering function to monitor MLD packets flowing on ports of the switch and prevent data from flowing to unnecessary ports. This prevention function allows to efficiently process a large amount of data, such as video distribution.

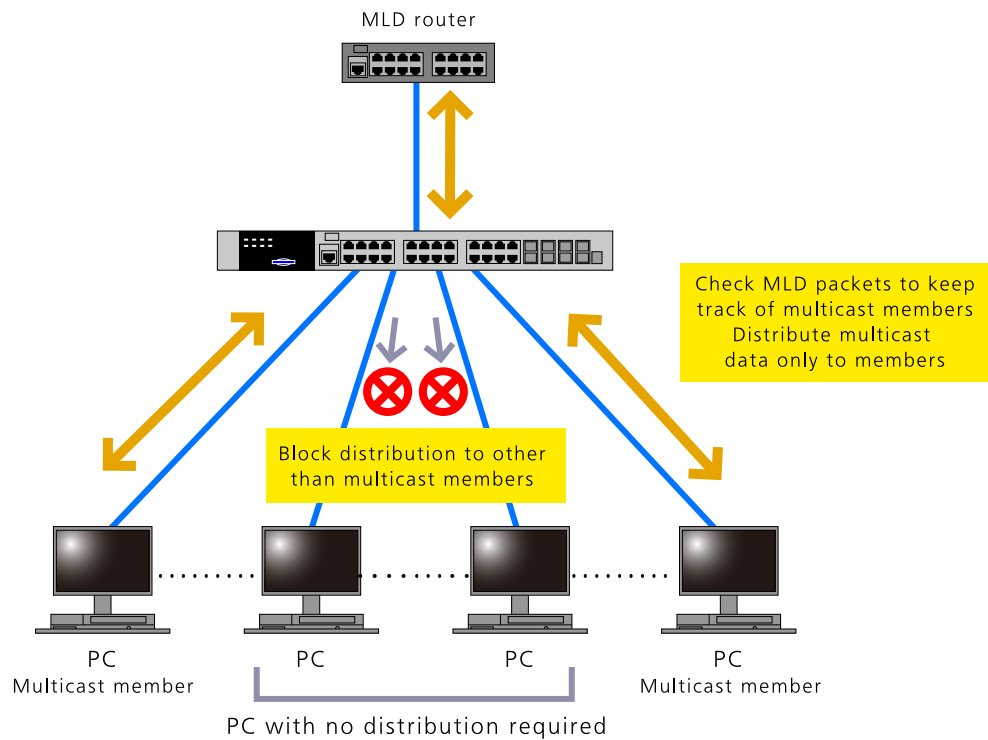


Figure 61-1 MLD Snooping overview

9.5.1 ipv6 mld enable

This command is used to enable the MLD protocol state. Use the **no** form of this command to disable the MLD protocol state.

Syntax

- `ipv6 mld enable`
- `no ipv6 mld enable`

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. This command only takes effect when the interface has an IPv6 address configured.

Example

This example shows how to enable MLD on VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 mld enable
ZEQUOxxxxRE(config-if)#
```

9.5.2 ipv6 mld last-listener-query-interval

This command is used to configure the MLD last listener query interval on an interface. Use the **no** form of this command to revert to the default setting.

Syntax

- `ipv6 mld last-listener-query-interval SECONDS`
- `no ipv6 mld last-listener-query-interval`

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the Interval between group-specific or group-and-source-specific queries, in seconds. The valid range is 1 to 25.

Default

By default, this value is 1 second.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only valid for the VLAN interface. When an MLD querier receives a packet to leave the specific group or channel, it will send a group-specific or group-and-source-specific query. The leave timer starts once the MLD querier receives the packet from an interface. If the interface does not receive the report packet before the leave timer expires, then the interface's membership will be removed from the group or channel that is to be left. The value of the leave timer is calculated as follows: (last listener query interval) x (last listener query count).

Example

This example shows how to configure the interval of the last listener query to 2 seconds on VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1000
ZEQUOxxxxRE(config-if)# ipv6 mld last-listener-query-interval 2
ZEQUOxxxxRE(config-if)#
```

9.5.3 ipv6 mld query-interval

This command is used to configure the interval at which the router sends MLD Multicast Listener Query messages. Use the **no** form of this command to revert to the default setting.

Syntax

- `ipv6 mld query-interval SECONDS`
- `no ipv6 mld query-interval`

Parameters

Parameters	description
<code>query-interval <i>SECONDS</i></code>	Specifies to configure the frequency at which the designated router sends MLD general-query messages. The range is from 1 to 31744.

Default

By default, this value is 125 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only valid for the VLAN interface. The user can use this command to modify the MLD query interval on an interface.

The MLD querier will send the general query at the interval specified by the query interval command. On receiving the general query, the MLD listener needs to respond the report packet to claim that it is interested in the specified multicast group.

Example

This example shows how to configure the MLD query interval for VLAN 1000. It configures the MLD query Interval to 150 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1000
ZEQUOxxxxRE(config-if)# ipv6 mld query-interval 150
ZEQUOxxxxRE(config-if)#
```

9.5.4 ipv6 mld query-max-response-time

This command is used to configure the maximum response time advertised in MLD queries. Use the **no** form of this command to revert to the default setting.

Syntax

- **ipv6 mld query-max-response-time** *SECONDS*
- **no ipv6 mld query-max-response-time**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies to set the maximum response time, in seconds, advertised in MLD queries. The range is from 1 to 25.

Default

By default, this value is 10 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only valid for the VLAN interface. This command controls the period during which the group member can respond to an MLD query message before the router deletes the membership.

Example

This example shows how to configure the MLD query maximum response time for VLAN 1000. It configures the MLD query maximum response time to 10 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1000
ZEQUOxxxxRE(config-if)# ipv6 mld query-max-response-time 10
ZEQUOxxxxRE(config-if)#
```

9.5.5 ipv6 mld robustness-variable

This command is used to set the robustness variable used in MLD. Use the **no** form of this command to revert to the default setting.

Syntax

- **ipv6 mld robustness-variable** *VALUE*
- **no ipv6 mld robustness-variable**

Parameters

Parameters	description
<i>VALUE</i>	Specifies the robustness variable. The valid value range is 1 to 7.

Default

By default, this value is 2.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for the VLAN interface configuration.

The robustness variable provides fine-tuning to allow for expected packet loss on an interface. The value of the robustness variable is used in calculating the following MLD message intervals:

- **Group member interval** - 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).

Users can increase this value if a subnet is expected to be loose.

Example

This example shows how to configure the MLD robustness variable to 3 for VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1000
ZEQUOxxxxRE(config-if)# ipv6 mld robustness-variable 3
ZEQUOxxxxRE(config-if)#
```

9.5.6 ipv6 mld version

This command is used to change the MLD version on the specified interface. Use the **no** form of this command to revert to the default setting.

Syntax

- `ipv6 mld version { 1 | 2 }`
- `no ipv6 mld version`

Parameters

Parameters	description
1	Specifies to configure the Switch to run MLD version 1.
2	Specifies to configure the Switch to run MLD version 2.

Default

The default MLD version is 2.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for the VLAN interface configuration. The user can use this command to modify the MLD query version on an interface.

Example

This example shows how to configure the MLD version 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1000
ZEQUOxxxxRE(config-if)# ipv6 mld version 1
ZEQUOxxxxRE(config-if)#
```

9.5.7 show ipv6 mld groups

This command is used to display MLD group information on an interface.

Syntax

- show ipv6 mld groups [*GROUP-ADDRESS* | interface *INTERFACE-ID*] [detail]

Parameters

Parameters	description
<i>GROUP-ADDRESS</i>	(optional) Specifies to display the group IPv6 address. If no IPv6 address specified, all MLD group information will be displayed.
interface <i>INTERFACE-ID</i>	(optional) Specifies the interface to display. If no interface is specified, MLD group information about all interfaces will be displayed.
detail	(Optional) Specifies to display the detailed group information.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display multicast group information for a specific group or for a specific interface.

Example

This example shows how to display MLD group information in interface VLAN 1.

```
ZEQUOxxxxRE#show ipv6 mld groups interface vlan1
```

Group Address	Interface	Uptime	Expire
FF02::1:FF00:65	vlan1	0DT00H05M26S	0DT00H01M12S
FF02::1:FF23:86CC	vlan1	0DT00H03M26S	0DT00H01M55S
FF02::4:FF00:1	vlan1	0DT00H04M12S	Stopped

Total Entries: 3

```
ZEQUOxxxxRE#
```

This example shows how to display MLD group detailed information of group ff02::1:ff23:86cc.

```
ZEQUOxxxxRE# show ipv6 mld groups ff02::1:ff23:86cc detail
```

```
Interface      : vlan1
Group          : FF02::1:FF23:86CC
Uptime         : 0DT00H00M42S
Expires        : Stopped
Group mode     : Include
Last reporter  : FE80::202:B3FF:FEF0:79D8
```

Group source list:

Source Address	Uptime	Expire
2004:4::6	0DT00H00M42S	0DT00H03M38S

Total Source Entries: 1

Total Entries: 1

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Uptime	The time elapsed since the entry has been created, in the format: [n]DT[n]H[n]M[n]S.
Expires	The time that the entry will be removed if the entry is not refreshed, in the format: [n]DT[n]H[n]M[n]S. Stopped: Indicates that the timeout of this entry is not determined by the expire timer. If the router is in Include mode for a group, the whole group entry will time out after the last source entry times out (unless the mode is changed to Exclude mode before it times out).
Group mode	Include or Exclude: The group mode is based on the type of membership reports that are received on the interface for the group.
Last reporter	Last host to report being a member of the multicast group.

9.5.8 show ipv6 mld interface

This command is used to display MLD information on the Switch.

Syntax

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

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface ID. If no interface is specified, MLD information about all interfaces will be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display MLD information on all interfaces.

Example

This example shows how to display MLD interface information on VLAN 1000.

```
ZEQUOxxxxRE# show ipv6 mld interface vlan1000
```

```
VLAN 1000
  Version                : 2
  IPv6 Address/Netmask    : FE80::250:40FF:FE3C:7781/128
  MLD State               : Enabled
  Querier                : ::
  Query Interval          : 150 seconds
  Query Maximum Response Time : 10 seconds
  Robustness Variable     : 3
  Last Listener Query Interval : 2 seconds
```

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Version	The MLD protocol version running on the interface.
Querier	The querier IP on the interface LAN.

9.6 MLD (Multicast Listener Discovery) Proxy Commands

MLD (Multicast Listener Discovery) is a protocol to manage multicast groups in an IPv6 environment. It is a protocol equivalent to IGMP in IPv4.

MLD proxy is a function to transfer MLD packets from multicast members to the upstream router. If a multicast transmission route is fixed, this function can transfer multicast packets between routers on the fixed route without using a multicast routing protocol.

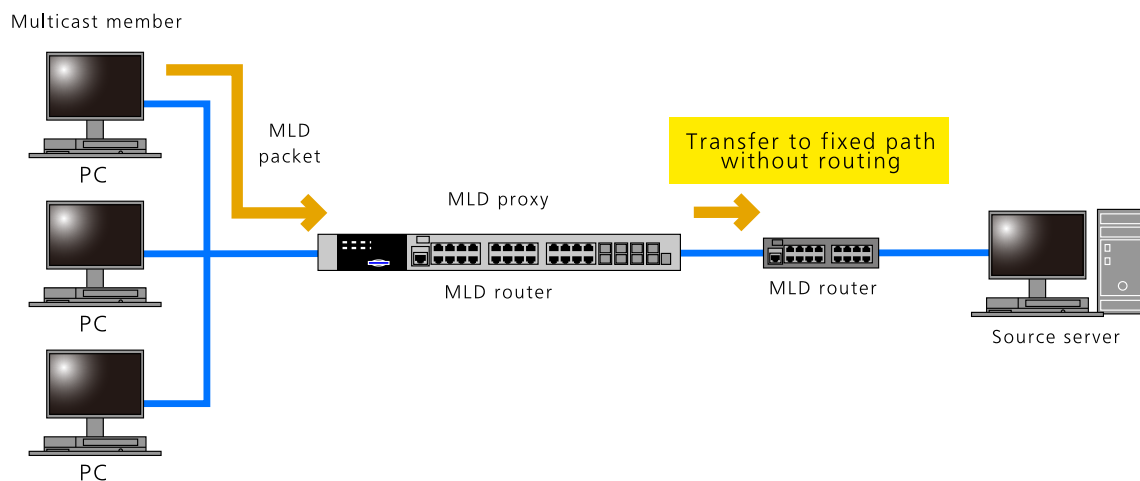


Figure 62-1 MLD proxy overview

9.6.1 ipv6 mld proxy

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

Syntax

- `ipv6 mld proxy`
- `no ipv6 mld proxy`

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The MLD proxy works in a simple tree topology. Make sure there are no other multicast routers except for the proxy in the simple tree topology.

When receiving MLD report packet from a downstream interface, MLD proxy will update its membership database which is generated by the merger of all subscriptions on any downstream interface. If the database is changed, the proxy device will send unsolicited reports or leaves from upstream interface. It can also send membership reports from the upstream interface when queried.

Example

This example shows how to enable the MLD proxy on the device.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 mld proxy
ZEQUOxxxxRE(config)#
```

9.6.2 ipv6 mld proxy upstream

This command is used to allow users to configure an interface as the upstream in MLD proxy. Use the **no** form of this command to disable the proxy function on the interface.

Syntax

- `ipv6 mld proxy upstream`
- `no ipv6 mld proxy upstream`

Parameters

None.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the interface has an IPv6 address configured. Only one upstream can exist in an MLD proxy device. Upstream performs the host portion of the MLD (RFC2710, RFC3810).

Example

This example shows how to configure the interface VLAN 3 to act as the proxy upstream interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan3
ZEQUOxxxxRE(config-if)# ipv6 mld proxy upstream
ZEQUOxxxxRE(config-if)#
```

9.6.3 ipv6 mld proxy downstream

This command is used to configure an interface as a downstream in MLD proxy. Use the **no** form of this command to disable the proxy function on the interface.

Syntax

- `ipv6 mld proxy downstream`
- `no ipv6 mld proxy downstream`

Parameters

None.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the interface has an IPv6 address configured. Multiple downstream interfaces can be configured on an MLD proxy device. It performs the router portion of the MLD protocol on each downstream interface.

Example

This example shows how to configure the interface VLAN 4 to act as the proxy downstream interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan4
ZEQUOxxxxRE(config-if)# ipv6 mld proxy downstream
ZEQUOxxxxRE(config-if)#
```

9.6.4 ipv6 mld proxy designated-forwarding

This command is used to enable designated forwarding on a non-querier MLD proxy downstream interface. Use the **no** form of this command to disable this option.

Syntax

- **ipv6 mld proxy designated-forwarding**
- **no ipv6 mld proxy designated-forwarding**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the interface has an IPv6 address configured and is set as the downstream interface.

To avoid local loops and redundant traffic for links that are considered downstream links by multiple MLD-based forwarders, MLD proxy uses the MLD querier election to elect a single forwarder on a LAN. Administrators can use this command to make a non-querier device to be a forwarder. Use the configuration in the appropriate topology. Improper usage may cause local loops or redundant traffic.

Example

This example shows how to enable designated forwarding on downstream interface VLAN 4.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan4
ZEQUOxxxxRE(config-if)# ipv6 mld proxy designated-forwarding
ZEQUOxxxxRE(config-if)#
```

9.6.5 show ipv6 mld proxy

This command is used to display the MLD proxy configuration.

Syntax

- show ipv6 mld proxy

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the upstream interface configuration and downstream interfaces.

Example

This example shows how to display the MLD proxy configuration on the Switch.

```
ZEQUOxxxxRE# show ipv6 mld proxy

MLD Proxy Global State:      Enabled
Upstream Interface:          vlan3
Downstream Interface:
vlan4 (DF), vlan5

ZEQUOxxxxRE#
```

9.6.6 show ipv6 mld proxy group

This command is used to display multicast groups learned by the MLD proxy function.

Syntax

- **show ipv6 mld proxy group** [*GROUP-ADDRESS*]

Parameters

Parameters	description
<i>GROUP-ADDRESS</i>	Specifies the IPv6 multicast address.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display multicast groups learned by the MLD proxy function. If no optional parameter is specified, all group information will be displayed.

Example

This example shows how to display the groups learned by the MLD proxy function.

```
ZEQUOxxxxRE# show ipv6 mld proxy group
```

```
FF1E::330E:32, Exclude  
Source list: 2000::2, 2000::3
```

```
FF1E::EC20:1, Include  
Source list: 100::1
```

```
Total entries: 2
```

```
ZEQUOxxxxRE#
```

This example shows how to display detailed information for group FF1E::330E:32.

```
ZEQUOxxxxRE# show ipv6 mld proxy group FF1E::330E:32
```

```
FF1E::330E:32, Include  
Source list: 100::1
```

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

9.6.7 show ipv6 mld proxy forwarding

This command is used to display multicast forwarding entries created by the MLD proxy function.

Syntax

- `show ipv6 mld proxy forwarding` [*GROUP-ADDRESS*]

Parameters

Parameters	description
<i>GROUP-ADDRESS</i>	Specifies the IPv6 multicast address.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display all MLD proxy forwarding information by not specifying the group address.

Example

This example shows how to display the forwarding information created by the MLD proxy function.

```
ZEQUOxxxxRE# show ipv6 mld proxy forwarding
```

```
FF1E::330E:32, 2000::2, vlan52  
outgoing interface:  
vlan20, vlan30
```

```
FF1E::EC20:1, 100::1, vlan52  
outgoing interface:  
vlan20
```

```
Total Entries: 2
```

```
ZEQUOxxxxRE#
```

This example shows how to display detailed information of the group FF1E::330E:32.

```
ZEQUOxxxxRE# show ipv6 mld proxy forwarding FF1E::330E:32
```

```
FF1E::330E:32, 2000::2, vlan52  
outgoing interface:  
vlan20, vlan30
```

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

9.7 MLD (Multicast Listener Discovery) Snooping Commands

9.7.1 clear ipv6 mld snooping statistics

This command is used to clear MLD snooping statistic counters on the Switch.

Syntax

- clear ipv6 mld snooping statistics { all | vlan *VLAN-ID* | interface *INTERFACE-ID* }

Parameters

Parameters	description
all	Specifies to clear IPv6 MLD snooping statistics for all VLANs and all ports.
vlan <i>VLAN-ID</i>	Specifies the VLAN used. If no VLAN is specified, statistics for all VLANs are cleared.
interface <i>INTERFACE-ID</i>	Specifies the interface used.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear MLD snooping statistic counters on the Switch.

Example

This example shows how to clear all MLD snooping statistics.

```
ZEQUOxxxxRE# clear ipv6 mld snooping statistics all
ZEQUOxxxxRE#
```

9.7.2 ipv6 mld snooping

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

Syntax

- `ipv6 mld snooping`
- `no ipv6 mld snooping`

Parameters

None.

Default

MLD snooping is disabled on all VLAN interfaces.
The MLD snooping global state is disabled by default.

Command Mode

Interface Configuration Mode.
Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

For a VLAN to operate with MLD snooping, both the global state and its interface state must be enabled. the setting of IGMP snooping and MLD snooping settings are independent on a VLAN, so they can be enabled simultaneously on the same VLAN.

Example

This example shows how to enable MLD snooping operation on VLANs that are MLD snooping enabled.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 mld snooping
ZEQUOxxxxRE(config)#
```

This example shows how to enable MLD snooping on VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1
ZEQUOxxxxRE(config-vlan)# ipv6 mld snooping
ZEQUOxxxxRE(config-vlan)#
```

9.7.3 ipv6 mld snooping access-group

This command is used to restrict the receivers on a subnet to only join the multicast groups that are permitted in a standard IPv6 access list. Use the **no** form of this command to disable this function.

Syntax

- **ipv6 mld snooping access-group** *IPV6-ACCESS-LIST-NAME* [**vlan** *VLAN-ID*]
- **no ipv6 mld snooping access-group** [**vlan** *VLAN-ID*]

Parameters

Parameters	description
<i>IPV6-ACCESS-LIST-NAME</i>	Specifies a standard IPv6 access list. To permit users to join a group (*, G), specify "any" in source address field and G in destination address field of the access list entry.
vlan <i>VLAN-ID</i>	(Optional) Specifies a Layer 2 VLAN and applies the filter to packets that arrive on the VLAN.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to restrict the multicast traffic receiver to join to a specific group. The destination address in the access list represents the multicast group address that is used to permit the receiver to join the multicast group or to deny the receiver from joining the multicast group.

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

Example

This example shows how to restrict the serviced MLD snooping group for GigabitEthernet1/0/1 to group FF1E::14. In the following example, an IPv6 access list named "mld_filter" is created and only permits the packets destined for group address FF1E::14. Then, "mld_filter" access group is associate with GigabitEthernet1/0/1.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#ipv6 access-list mld_filter
ZEQUOxxxxRE(config-ipv6-acl)#permit any host FF1E::14
ZEQUOxxxxRE(config-ipv6-acl)#end
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/1
ZEQUOxxxxRE(config-if)#ipv6 mld snooping access-group mld_filter
ZEQUOxxxxRE(config-if)#
```

9.7.4 ipv6 mld snooping fast-leave

This command is used to configure MLD snooping fast-leave on the interface. Use the **no** form of this command to disable the fast-leave or option on the specified interface.

Syntax

- `ipv6 mld snooping fast-leave`
- `no ipv6 mld snooping fast-leave`

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. The **ipv6 mld snooping fast-leave** command allows MLD membership to be removed from a port immediately after receiving the leave message without using the group-specific or group-and-source-specific query mechanism.

Example

This example shows how to enable MLD snooping fast-leave on VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1
ZEQUOxxxxRE(config-vlan)# ipv6 mld snooping fast-leave
ZEQUOxxxxRE(config-vlan)#
```

9.7.5 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.

Syntax

- **ipv6 mld snooping last-listener-query-interval** *SECONDS*
- **no ipv6 mld snooping last-listener-query-interval**

Parameters

Parameters	description
<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

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. On receiving a 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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# ipv6 mld snooping last-listener-query-interval 3
ZEQUOxxxxRE(config-vlan)#
```

9.7.6 ipv6 mld snooping limit

This command is used to set the limit of MLD snooping multicast groups or channels which layer 2 interface can join. Use the **no** form of this command to remove the limitation.

Syntax

- **ipv6 mld snooping limit** *NUMBER* [**exceed-action** { **drop** | **replace** }] [**except** *IPv6-ACCESS-LIST-NAME*] [**vlan** *VLAN-ID*]
- **no ipv6 mld snooping limit** [**vlan** *VLAN-ID*]

Parameters

Parameters	description
<i>NUMBER</i>	Specifies the maximum number of MLD snooping groups that the interface can join. This value must be between 1 and 4096.

Parameters	description
exceed-action	(Optional) Specifies the action for handling newly learned groups when the limitation is exceeded.
drop	(Optional) Specifies that the new group will be dropped.
replace	(Optional) Specifies that the new group will replace the oldest group.
except <i>IPv6-ACCESS-LIST-NAME</i>	(Optional) Specifies a standard IPv6 access list. The group (*,G) or channel (S,G) permitted in the access list will be excluded from the limit. To permit a channel (S,G), S is specified in the source address field and G is specified in the destination address field of the access list entry. To permit a group (*,G), "any" is specified in the source address field and G is specified in the destination address field of the access list entry.
vlan <i>VLAN-ID</i>	(Optional) Specifies a Layer 2 VLAN and applies the filter to packets that arrive on that VLAN.

Default

By default, there is no limit.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for physical port or port-channel interface configuration.

Example

This example shows how to set the limit of MLD snooping groups that GigabitEthernet1/0/4 with VLAN ID 1000 can join and specify the "mld_filter" access list to be excluded from the limit.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/4
ZEQUOxxxxRE(config-if)# ipv6 mld snooping limit 80 except mld_filter vlan 1000
ZEQUOxxxxRE(config-if)#

```

This example shows how to remove the limit of MLD snooping groups that port-channel 4 with VLAN ID 1000 can join.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface port-channel 4
ZEQUOxxxxRE(config-if)# no ipv6 mld snooping limit vlan 1000
ZEQUOxxxxRE(config-if)#
```

9.7.7 ipv6 mld snooping mrouter

This command is used to configure the specified interface(s) as router ports or ports forbidden from becoming IPv6 multicast router ports on the VLAN interface on the Switch. Use the **no** form of this command to remove the interface(s) from router ports or forbidden IPv6 multicast router ports.

Syntax

- **ipv6 mld snooping mrouter** {interface *INTERFACE-ID* [, | -] | forbidden interface *INTERFACE-ID* [, | -]}
- **no ipv6 mld snooping mrouter** {interface *INTERFACE-ID* [, | -] | forbidden interface *INTERFACE-ID* [, | -]}

Parameters

Parameters	description
interface	Specifies a range of interfaces as being connected to multicast-enabled routers.
forbidden interface	Specifies a range of interfaces as not being connected to multicast-enabled routers.
<i>INTERFACE-ID</i>	Specifies an interface or an interface list. No space is allowed before and after the comma. The interface can be a physical interface or a port-channel.
,	(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 IPv6 MLD snooping multicast router port is configured.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. To specify a multicast router port, the valid interface can be a physical port or a port-channel. The specified multicast router port must be the member port of the configured VLAN. The member port of a port channel cannot be specified.

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 packets to identify whether the partner device is a router.

Example

This example shows how to configure GigabitEthernet1/0/1 as an MLD snooping multicast router port and GigabitEthernet1/0/2 as an MLD snooping forbidden multicast router port on VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1
ZEQUOxxxxRE(config-vlan)# ipv6 mld snooping mrouter interface gil/0/1
ZEQUOxxxxRE(config-vlan)# ipv6 mld snooping mrouter forbidden interface gil/0/2
ZEQUOxxxxRE(config-vlan)#
```

9.7.8 ipv6 mld snooping proxy-reporting

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

Syntax

- `ipv6 mld snooping proxy-reporting [source IPV6-ADDRESS]`
- `no ipv6 mld snooping proxy-reporting`

Parameters

Parameters	description
<code>source <i>IPV6-ADDRESS</i></code>	(Optional) Specifies the source IP address of proxy reporting.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. The proxy reporting function only works for MLDv1 traffic.

When the proxy reporting function is enabled, the received multiple MLD report or leave packets are integrated into one report before being sent to the router port. The proxy reporting source IP will be used as source IP of the report, and the zero IP address will be used when the proxy reporting source IP is not set. Interface MAC will be used as source MAC of the report. If the VLAN has no IP address configured, then system MAC will be used.

Example

This example shows how to enable MLD snooping proxy-reporting on VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1
ZEQUOxxxxRE(config-vlan)# ipv6 mld snooping proxy-reporting
ZEQUOxxxxRE(config-vlan)#
```

9.7.9 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.

Syntax

- **ipv6 mld snooping querier**
- **no ipv6 mld snooping querier**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. The interface must have an IPv6 address assigned to start the querier. The system will return a warning message if the VLAN has no IPv6 address. If the querier is enabled, but the IPv6 address is removed, the querier will be stopped.

If the system can play the querier role, the entity will listen for MLD query packets sent by other devices. If an MLD query message is received, the device with lower IPv6 address becomes the querier. If the MLD protocol is also enabled on the interface, the MLD snooping querier state will be disabled automatically.

Example

This example shows how to enable the MLD snooping querier state on VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1
ZEQUOxxxxRE(config-vlan)# ipv6 mld snooping querier
ZEQUOxxxxRE(config-vlan)#
```

9.7.10 ipv6 mld snooping query-interval

This command is used to configure the interval at which the MLD snooping querier sends MLD general query messages. Use the **no** form of this command to revert to the default setting.

Syntax

- `ipv6 mld snooping query-interval SECONDS`
- `no ipv6 mld snooping query-interval`

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval at which the designated router sends MLD general query messages. The range is 1 to 31744.

Default

By default, this value is 125 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. The query interval is the interval between general queries sent by the querier. By varying the query interval, an administrator may tune the number of MLD messages on the network. Larger values cause MLD Queries to be sent less often.

Example

This example shows how to configure the MLD snooping query interval to 300 seconds on VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# ipv6 mld snooping query-interval 300
ZEQUOxxxxRE(config-vlan)#
```

9.7.11 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.

Syntax

- `ipv6 mld snooping query-max-response-time SECONDS`
- `no ipv6 mld snooping query-max-response-time`

Parameters

Parameters	description
<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

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. This command configures the period of which the group member can respond to an MLD query message before MLD snooping deletes the membership.

Example

This example shows how to configure the maximum response time to 20 seconds on an interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# ipv6 mld snooping query-max-response-time 20
ZEQUOxxxxRE(config-vlan)#
```

9.7.12 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.

Syntax

- `ipv6 mld snooping query-version { 1 | 2 }`
- `no ipv6 mld snooping query-version`

Parameters

Parameters	description
1	Specifies that the version of the MLD general query sent by MLD snooping querier is 1.
2	Specifies that the version of the MLD general query sent by MLD snooping querier is 2.

Default

By default, the version number is 2.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration.

Example

This example shows how to configure the query version to be 1 on VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# ipv6 mld snooping query-version 1
ZEQUOxxxxRE(config-vlan)#
```

9.7.13 ipv6 mld snooping rate-limit

This command is used to configure the upper limit of ingress MLD control packets per second. Use the **no** form of this command to disable the rate limit.

Syntax

- `ipv6 mld snooping rate-limit NUMBER`
- `no ipv6 mld snooping rate-limit`

Parameters

Parameters	description
<i>NUMBER</i>	Specifies to configure the rate of the MLD control packet that the Switch can process on a specific interface. The rate is specified in packets per second.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for VLAN interface configuration, physical port or port-channel interface. The command configures the rate of MLD control packets that are allowed per interface.

Example

This example shows how to limit 30 packets per second on interface VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# ipv6 mld snooping rate-limit 30
ZEQUOxxxxRE(config-vlan)#
```

9.7.14 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 setting.

Syntax

- **ipv6 mld snooping robustness-variable** *VALUE*
- **no ipv6 mld snooping robustness-variable**

Parameters

Parameters	description
<i>VALUE</i>	Specifies the robustness variable. The value is from 1 to 7.

Default

By default, this value is 2.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration.

The robustness variable provides fine-tuning to allow for expected packet loss on an interface. The value of the robustness variable is used in calculating the following MLD message intervals:

- **Group member interval** – 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.

This value can be increased if a subnet is expected to lose packets.

Example

This example shows how to configure the robustness variable to be 3 on interface VLAN 1000.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1000
ZEQUOxxxxRE(config-vlan)# ipv6 mld snooping robustness-variable 3
ZEQUOxxxxRE(config-vlan)#
```

9.7.15 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.

Syntax

- **ipv6 mld snooping static-group** *IPV6-ADDRESS* **interface** *INTERFACE-ID* [, | -]
- **no ipv6 mld snooping static-group** *IPV6-ADDRESS* [**interface** *INTERFACE-ID* [, | -]]

Parameters

Parameters	description
<i>IPV6-ADDRESS</i>	Specifies an IPv6 multicast group address.
interface <i>INTERFACE-ID</i>	Specifies the interfaces to be used.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

No static-group is configured.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is only available for VLAN interface configuration. This command applies to MLD snooping on a VLAN interface to statically add group membership entries and/or source records.

The **ipv6 mld snooping static-group** command allows the user to create an MLD snooping static group in case that the attached host does not support the MLD protocol.

Example

This example shows how to statically add group and/or source records for MLD snooping.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vlan 1
ZEQUOxxxxRE(config-vlan)# ipv6 mld snooping static-group FF02::12:03 interface gi1/0/5
ZEQUOxxxxRE(config-vlan)#
```

9.7.16 show ipv6 mld snooping

This command is used to display MLD snooping information on the Switch.

Syntax

- **show ipv6 mld snooping** [**vlan** *VLAN-ID*]

Parameters

Parameters	description
vlan <i>VLAN-ID</i>	(Optional) Specifies the VLAN to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If no optional parameter is specified, MLD snooping information for all VLANs with MLD snooping enabled will be displayed.

Example

This example shows how to display MLD snooping configuration.

```
ZEQUOxxxxRE# show ipv6 mld snooping

MLD snooping global state: Enabled

VLAN #1 configuration
  MLD snooping state           : Enabled
  Fast leave                   : Disabled (host-based)
  Proxy reporting              : Disabled (Source ::)
  Querier state                : Disabled
  Query version                : v2
  Query interval               : 125 seconds
  Max response time            : 10 seconds
  Robustness value             : 2
  Last listener query interval : 1 seconds
  Rate limit                   : 50

Total Entries: 1

ZEQUOxxxxRE#
```

9.7.17 show ipv6 mld snooping filter

This command is used to display MLD snooping filter information for specified interface(s).

Syntax

- show ipv6 mld snooping filter [interface *INTERFACE-ID* [, | -]]

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	(Optional) Specifies the interfaces to be displayed. The interface can be a physical interface or a port-channel.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display MLD snooping limit and access group information. If no optional parameter is specified, MLD snooping filter information for all interfaces will be displayed.

Example

This example shows how to display filter information when no interface is specified.

```
ZEQUOxxxxRE#show ipv6 mld snooping filter
```

```
Gi1/0/1
  Rate limit: Not Configured
  Access group: mld_filter
  Groups/Channel Limit: Not Configured
  vlan1000:
    Access group: Not Configured
    Groups/Channel Limit: 80 (Exception List: mld_filter, exceed-action: drop)
```

```
ZEQUOxxxxRE#
```

9.7.18 show ipv6 mld snooping groups

This command is used to display MLD snooping group information learned on the Switch.

Syntax

- show ipv6 mld snooping groups [*IPv6-ADDRESS* | vlan *VLAN-ID*] [detail]

Parameters

Parameters	description
<i>IPv6-ADDRESS</i>	(Optional) Specifies the group IP address. If no IPv6 address is specified, all MLD group information will be displayed.

Parameters	description
vlan <i>VLAN-ID</i>	(Optional) Specifies the VLAN ID to be displayed. If no VLAN is specified, MLD group information about all VLANs will be displayed.
,	(Optional) Specifies a series of VLANs, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.
detail	(Optional) Specifies to display the MLD group detail information.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display MLD group information by command.

Example

This example shows how to display MLD snooping group information.

```
ZEQUOxxxxRE# show ipv6 mld snooping groups
```

```
Total Group Entries : 1  
Total Source Entries: 1
```

```
vlan1, FF1E::1  
Learned on port: 1/0/3
```

```
ZEQUOxxxxRE#
```

9.7.19 show ipv6 mld snooping mrouter

This command is used to display MLD snooping multicast router information that has been automatically learned and manually configured on the Switch.

Syntax

- show ipv6 mld snooping mrouter [vlan *VLAN-ID* [, | -]]

Parameters

Parameters	description
vlan <i>VLAN-ID</i>	(Optional) Specifies the VLAN ID to be displayed. If no VLAN is specified, MLD snooping Multicast Router Information on all VLANs will be displayed.
,	(Optional) Specifies a series of VLANs, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display dynamically learned or manually configured multicast router interfaces.

Example

This example shows how to display MLD snooping multicast router information.

```
ZEQUOxxxxRE#show ipv6 mld snooping mrouter
```

```
VLAN    Ports
-----  -----
1        Gi1/0/1 (static)
          Gi1/0/2 (forbidden)
```

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

9.7.20 show ipv6 mld snooping static-group

This command is used to display statically configured MLD snooping groups on the Switch.

Syntax

- **show ipv6 mld snooping static-group** [*GROUP-ADDRESS* | **vlan** *VLAN-ID*]

Parameters

Parameters	description
<i>GROUP-ADDRESS</i>	(Optional) Specifies the group IPv6 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.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display statically configured MLD snooping groups on the Switch. If no optional parameter is specified, all information will be displayed.

Example

This example shows how to display statically configured MLD snooping groups.

```

ZEQUOxxxxRE#show ipv6 mld snooping static-group

VLAN ID Group address                               Interface
-----
1      FF02::12:3                                     Gi1/0/5

Total Entries: 1

ZEQUOxxxxRE#

```

9.7.21 show ipv6 mld snooping statistics

This command is used to display MLD snooping statistics information on the Switch.

Syntax

- show ipv6 mld snooping statistics { interface [*INTERFACE-ID* [, | -]] | vlan [*VLAN-ID* [, | -]] }

Parameters

Parameters	description
interface	Specifies to display statistics counters by interface.
<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.
vlan	Specifies to display statistics counters by VLAN.
<i>VLAN-ID</i>	(Optional) Specifies the VLAN ID to be displayed.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays the MLD snooping related statistics information.

Example

This example shows how to display MLD snooping statistics information.

```
ZEQUOxxxxRE#show ipv6 mld snooping statistics interface
```

```
Interface Gil/0/1
  Rx: v1Report 0, v2Report 14, Query 0, v1Done 0
  Tx: v1Report 0, v2Report 0, Query 0, v1Done 0
```

```
Interface Gil/0/2
  Rx: v1Report 0, v2Report 0, Query 0, v1Done 0
  Tx: v1Report 0, v2Report 0, Query 0, v1Done 0
```

```
Interface Gil/0/3
  Rx: v1Report 0, v2Report 0, Query 0, v1Done 0
  Tx: v1Report 0, v2Report 0, Query 0, v1Done 0
```

```
Interface Gil/0/4
  Rx: v1Report 0, v2Report 0, Query 0, v1Done 0
  Tx: v1Report 0, v2Report 0, Query 0, v1Done 0
```

```
Interface Gil/0/5
  Rx: v1Report 0, v2Report 0, Query 0, v1Done 0
  Tx: v1Report 0, v2Report 0, Query 0, v1Done 0
```

```
Interface Gil/0/6
  Rx: v1Report 0, v2Report 0, Query 0, v1Done 0
  Tx: v1Report 0, v2Report 0, Query 0, v1Done 0
--More--
```

9.8 PIM (Protocol Independent Multicast) Commands [ZEQUO6700RE/6600RE]

9.8.1 ip pim

This command is used to enable PIM on the interface for either Sparse Mode (SM) or Dense Mode (DM) operation. Use the **no** form of this command to disable the PIM function on the interface.

Syntax

- ip pim {sparse-mode | dense-mode | sparse-dense-mode}
- no ip pim

Parameters

Parameters	description
sparse-mode	Specifies to operate in the SM mode.
dense-mode	Specifies to operate in the DM mode.
sparse-dense-mode	Specifies to operate in the SM-DM mode.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the interface has an IP address configured.

Specify one of the three modes for an interface, sparse mode, dense mode or sparse-dense mode. To switch the PIM operating mode, use the **no ip pim** command to disable PIM first then set the new mode.

Dense Mode - PIM-DM assumes that when a source starts sending, all downstream routers want to receive the multicast data stream. Initially multicast data stream are flooded to all downstream routers and the interfaces that have group members. If there are no downstream routers or group members, the router will send prune message to indicate that the multicast data stream is not desired.

Sparse Mode - When multicast traffic is received on a sparse mode interface, the first hop router will encapsulate and send the register message to RP. If the router is not the first hop router, the traffic will be forwarded based on the mroute entry.

A sparse mode interface will only be populated as mroute member interface if receive join message from the downstream router or if group member on a sparse mode interface, PIM join process will be triggered to create the shared tree or the source tree.

Sparse-Dense Mode - When interface is configured as PIM Sparse-Dense mode, a multicast group received by the interface can operate in either sparse mode or dense mode of operation. When the interface receives a multicast traffic, if there is a known RP for the group, then this group will be operate in sparse mode, otherwise this multicast group will be operated in dense mode.

Example

This example shows how to enable the PIM-SM protocol on the specified interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ip pim sparse-mode
ZEQUOxxxxRE(config-if)#
```

9.8.2 ip pim bsr-candidate

This command is used to configure the router to announce itself as the Candidate Bootstrap Router (CBSR). Use the **no** form of this command to disable this router to act as a CBSR.

Syntax

- **ip pim bsr-candidate** *INTERFACE-ID* [*HASH-MASK-LENGTH* [*PRIORITY*]] [*interval SECONDS*]
- **no ip pim bsr-candidate**

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interface whose IP address will be announced as the bootstrap router address.
<i>HASH-MASK-LENGTH</i>	(Optional) Specifies to configure the hash mask length for RP selection. The range is 0 to 32. If not specified, the default length is 30.
<i>PRIORITY</i>	(Optional) Specifies to configure the priority for a CBSR. The candidate with the highest priority is preferred. If the priority values are the same, the router with the highest IP address is preferred. The range is from 0 to 255. If not specified, the default priority is 64.
interval <i>SECONDS</i>	(Optional) Specifies the interval between originating bootstrap messages. If not specified, the default interval is 60 seconds. The valid range is from 1 to 255.

Default

The router is not a CBSR by default.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the interface is specified by the command that has an IP address configured and is PIM-SM enabled.

This command causes the router to send bootstrap messages to announce the IP address of the designated interface as the CBSR address. The hash mask is used by all routers within a domain, to map a group to one of the RP from the matching set of group-range-to-RP maps (this set all have the same longest mask length and same highest priority). The algorithm takes as an input the group address and the addresses of the candidate RPs from the maps, and gives as an output one RP address to be used.

Example

This example shows how to configure the IP address of the router on VLAN 1 to be a CBSR with a hash-mask length of 20, priority of 192, and interval of 120 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip pim bsr-candidate vlan1 20 192 interval 120
ZEQUOxxxxRE(config)#
```

9.8.3 ip pim dr-priority

This command is used to configure the Designated Router (DR) priority value. Use the **no** form of this command to revert to the default setting.

Syntax

- **ip pim dr-priority** *PRIORITY*
- **no ip pim dr-priority**

Parameters

Parameters	description
<i>PRIORITY</i>	Specifies the DR priority value in the range of 0 to 4294967295. A larger value represents the higher priority.

Default

By default, this value is 1.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the interface is PIM-SM enabled. In the DM mode, the DR priority option will not be carried in the Hello message. The router with the highest priority value will be the DR. If multiple routers are with the same priority status, the router with the highest IP address will be the DR. If there is a router that does not support the DR priority in its Hello message on the LAN, all routers on the LAN will ignore DR priority and only use IP address to elect DR.

Example

This example shows how to configure the DR priority of the VLAN 1 interface to 200.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan 1
ZEQUOxxxxRE(config-if)# ip pim dr-priority 200
ZEQUOxxxxRE(config-if)#
```

9.8.4 ip pim jp-timer

This command is used to configure the Join/Prune interval value. Use the **no** form of this command to revert to the default setting.

Syntax

- ip pim jp-timer *SECONDS*
- no ip pim jp-timer

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval between Join/Prune messages. The range is from 1 to 18000.

Default

By default, this value is 60 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the interface is PIM-SM enabled. When configuring the Join/Prune interval, consider the factors, such as the configured bandwidth and expected average number of multicast route entries for the attached network or link. For the SM-mode, routers will periodically send join messages based on this interval. The hold-time in a Join/Prune message is 3.5 times the join-prune-interval. The receiving router will start a timer based on this hold-time, and prune the interface if no join message was received on this interface.

Example

This example shows how to configure the PIM Join/Prune timer to 120 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan 1
ZEQUOxxxxRE(config-if)# ip pim jp-timer 120
ZEQUOxxxxRE(config-if)#
```

9.8.5 ip pim query-interval

This command is used to configure the frequency of the PIM hello message. Use the **no** form of this command to revert to the default setting.

Syntax

- **ip pim query-interval** *SECONDS*
- **no ip pim query-interval**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval at which the hello message is sent.

Default

By default, this value is 30 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the interface is PIM enabled. A PIMv2 router learns PIM neighbors via the PIM hello message. This command configures the frequency of the hello message. Routers configured for IP multicasting send PIM hello messages to detect PIM routers. For SM, hello messages also determine the router to act as the designated router for each LAN segment. The configured query interval is also used as the value for hold time. By configuring a smaller period for the interval, the unresponsive neighbor can be discovered faster and thus the failover and recovery will become more efficient.

Example

This example shows how to configure the PIM hello interval to 45 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan 1
ZEQUOxxxxRE(config-if)# ip pim query-interval 45
ZEQUOxxxxRE(config-if)#
```

9.8.6 ip pim register-checksum-wholepkt

This command is used to enable the calculating of the register checksum value over the whole packet. Use the **no** form of this command to disable calculating the register checksum over the whole packet.

Syntax

- ip pim register-checksum-wholepkt rp-address-list *ACCESS-LIST-NAME*
- no ip pim register-checksum-wholepkt

Parameters

Parameters	description
<i>ACCESS-LIST-NAME</i>	Specifies the name of the IP access list which specifies a list of RP addresses. This is the address in the source address field of the access list entry.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If this setting is disabled, the checksum for the registered packets is calculated only over the header. This command can be only specified once. The later applied command will override the previous setting.

Example

This example shows how to enable the register checksum over the whole packet when sending to RP of 10.1.1.1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip access-list rp_filter
ZEQUOxxxxRE(config-ip-acl)# permit host 10.1.1.1
ZEQUOxxxxRE(config-ip-acl)# exit
ZEQUOxxxxRE(config)# ip pim register-checksum-wholepkt rp-address-list rp_filter
ZEQUOxxxxRE(config)#
```

9.8.7 ip pim register-probe

This command is used to configure the register probe time. Use the **no** form of this command to revert to the default setting.

Syntax

- ip pim register-probe *SECONDS*
- no ip pim register-probe

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the register probe time value in seconds. The range is from 1 to 127.

Default

By default, this value is 5 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The register probe time is the time before the Register Stop Timer (RST) expires when a DR may send a Null-Register to the RP to cause it to resend a Register-Stop message.

Example

This example shows how to configure the register probe time to 7 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip pim register-probe 7
ZEQUOxxxxRE(config)#
```

9.8.8 ip pim register-suppression

This command is used to configure the register suppression time. Use the **no** form of this command to revert to the default setting.

Syntax

- ip pim register-suppression *SECONDS*
- no ip pim register-suppression

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the register suppression timeout value in seconds. The range is from 3 to 65535.

Default

By default, this value is 60 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a DR receives the register stop message, it will start the suppression timer. During the suppression period, a DR stops sending the register message to the RP.

Use this command on the first hop router. The value of the register probe time must be less than half the value of the register suppression time to prevent a possible negative value in the setting of the register stop timer. The minimal value for the register suppression time is 3.

Example

This example shows how to configure the register suppression time to 30 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip pim register-suppression 30
ZEQUOxxxxRE(config)#
```

9.8.9 ip pim rp-address

This command is used to statically configure the RP address for multicast groups. Use the **no** form of this command to remove an RP address.

Syntax

- ip pim rp-address** *IP-ADDRESS* [**group-list** *ACCESS-LIST-NAME*]
- no ip pim rp-address** *IP-ADDRESS*

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IP address of the RP.
group-list <i>ACCESS-LIST-NAME</i>	(Optional) Specifies a standard access list that contains multiple groups. If no group list is specified, the RP will be mapped to all multicast groups.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to specify the static multicast groups to RP mapping. In a multicast domain, the static multicast group to RP mapping can be used together with BSR. All routers in a domain should have a consistent multicast group to RP mapping. The first hop router that initiates a register message will use the mapping entries to determine the RP for sending the PIM register message destined for a specific group. The last hop router that initiates a join message uses the mapping entries to determine the RP for sending the join and prune message for a specific group. When a router receives a join message, it will check the mapping entries for forwarding of the message. When a RP receives a register message, if the router is not the right RP for the multicast group, a register-stop message will be sent.

Multiple RPs can be defined, each with a single access list.

Example

This example shows how to configure the PIM RP address to 10.90.90.90 for multicast group 225.2.2.2 only.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip access-list PIM-Control
ZEQUOxxxxRE(config-ip-acl)# permit any host 225.2.2.2
ZEQUOxxxxRE(config-ip-acl)# exit
ZEQUOxxxxRE(config)# ip pim rp-address 10.90.90.90 group-list PIM-Control
ZEQUOxxxxRE(config)#
```

9.8.10 ip pim rp-candidate

This command is used to configure the router as an RP candidate. Use the **no** form of this command to remove the router as candidate RP.

Syntax

- **ip pim rp-candidate** { *INTERFACE-ID* [**group-list** *ACCESS-LIST-NAME*] | **interval** *SECONDS* | **priority** *PRIORITY* | **wildcard_prefix_cnt** { 0 | 1 } }
- **no ip pim rp-candidate** [*INTERFACE-ID*]

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interface ID. The IP address associated with this interface is advertised as a candidate RP address.
group-list <i>ACCESS-LIST-NAME</i>	(Optional) Specifies the name of the standard IP access list that defines the group prefixes that are advertised in association with the RP address. If no group list is specified, the Switch is a candidate RP for all groups.
interval <i>SECONDS</i>	Specifies the RP candidate advertisement interval. The range is from 1 to 16383 seconds. If not specified, default is 60 seconds.
priority <i>PRIORITY</i>	Specifies the RP priority value. The range is from 0 to 255. If not specified, default is 192.
wildcard_prefix_cnt	Specifies to set the wildcard (224.0.0.0/4) prefix count 1 or 0 in C-RP message. The default value is 0.

Default

By default, the router is not an RP candidate.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only one group access list can be specified for each interface. This command only takes effect when the interface specified by the command is PIM-SM enabled. This command causes the router to send a PIMv2 message advertising itself as the candidate RP to the BSR.

Example

This example shows how to configure the router to advertise itself as the candidate RP to the BSR in its PIM domain. A basic IP access list, named PIM-Control, which specifies the group prefix (239.0.0.0/8), is associated with the RP that has the address identified by interface VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip access-list PIM-Control
ZEQUOxxxxRE(config-ip-acl)# permit any 239.0.0.0 0.255.255.255
ZEQUOxxxxRE(config-ip-acl)# exit
ZEQUOxxxxRE(config)# ip pim rp-candidate vlan1 group-list PIM-Control
ZEQUOxxxxRE(config)#
```

9.8.11 ip pim spt-threshold

This command is used to configure the condition to switch over to the source tree. Use the **no** form of this command to revert to the default setting.

Syntax

- ip pim spt-threshold {0 | infinity}
- no ip pim spt-threshold

Parameters

Parameters	description
0	Specifies to establish the source tree right at the arrival of the first packet.
infinity	Specifies to always rely on the shared tree.

Default

0 (Zero).

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command on the last hop of the router. In the PIM-SM mode, initially the multicast traffic from the source will be flowing along the RPT share tree to the receiver. After the first packet arrives at the last hop router, for each group of traffic, it can operate in one of the following two modes. With the mode **infinity**, the traffic keeps following the share tree. With the mode **0**, the source tree will be established and the traffic switchover to the source tree.

Example

This example shows how to set the SPT threshold to infinity.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip pim spt-threshold infinity
ZEQUOxxxxRE(config)#
```

9.8.12 ip pim ssm

This command is used to configure the SSM multicast group address range. Use the **no** form of this command to disable PIM-SSM.

Syntax

- `ip pim ssm {default | range ACCESS-LIST}`
- `no ip pim ssm`

Parameters

Parameters	description
default	Specifies to use the default SSM group addresses. The default SSM group address range is 232.0.0.0/8.
<i>ACCESS-LIST</i>	Specifies the standard IP access list that defines the user-specified SSM group addresses. The group address should be defined in the destination IP address field of the rule entry.

Default

By default, PIM-SSM is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only affects PIM-SM operation. Use this command on the last hop of the router only.

When SSM is enabled, the last hop router will initiate to establish a source-based tree for the channel (S,G) on receiving a IGMPv3 include (S, G) request that falls in the SSM range from the attached hosts.

Example

This example shows how to configure an IP standard access list and specifies the defined group address as the SSM range.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip access-list SSM-GROUP
ZEQUOxxxxRE(config-ip-acl)# permit any 224.2.0.0 0.0.255.255
ZEQUOxxxxRE(config-ip-acl)# exit
ZEQUOxxxxRE(config)# ip pim ssm range SSM-GROUP
ZEQUOxxxxRE(config)#
```

9.8.13 show ip pim

This command is used to display the PIM global information.

Syntax

- show ip pim

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the global information of PIM.

Example

This example shows how to display PIM global information.

```
ZEQUOxxxxRE# show ip pim

PIM Configurations:

Register Checksum Wholepkt: (Not configured)
Register Probe Time          : 5 seconds
Register Suppression Time    : 60 seconds
SPT Threshold                 : Infinity

RP Address
  90.1.1.1, group-list: static-rp

RP Candidate
  priority: 192, interval: 60 seconds, wildcard-prefix-cnt: 0
  vlan100, group-list: rp-cand

BSR Candidate
  vlan100, hash-mask-length: 30, priority: 1, interval: 60 seconds

SSM group : Movies

ZEQUOxxxxRE#
```

9.8.14 show ip pim bsr-router

This command is used to display BSR information.

Syntax

- show ip pim bsr-router

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the elected BSR information and information about the locally configured candidate RP advertisement.

Example

This example shows how to display BSR information on the BSR router with the Candidate RP information on the router's interface, VLAN 100.

```
ZEQUOxxxxRE# show ip pim bsr-router

PIMv2 Bootstrap information

This system is the Bootstrap Router (BSR)
  BSR address: 90.1.1.3
  BSR Priority: 3, Hash mask length: 30
  Next bootstrap message in 0DT00H00M21S
  Candidate RP: 90.1.1.3(vlan100), Group ACL: crp-list
  Next Cand_RP_advertisement in 0DT00H00M13S
```

```
ZEQUOxxxxRE#
```

This example shows how to display BSR information on the non-BSR router with Candidate RP information on the router's interface

```
ZEQUOxxxxRE# show ip pim bsr-router

PIMv2 Bootstrap information

  BSR address: 192.168.53.113
  BSR Priority: 255, Hash mask length: 30
  Next bootstrap message in 0DT00H02M04S
  Candidate RP: 192.168.38.111(loopback2), Group ACL: d235.1.3-4/24
  Next Cand_RP_advertisement in 0DT00H00M41S
```

```
ZEQUOxxxxRE#
```

9.8.15 show ip pim interface

This command is used to display the interface information.

Syntax

- show ip pim interface [dense-mode | sparse-mode | sparse-dense-mode] [*INTERFACE-ID*] [detail]

Parameters

Parameters	description
dense-mode	(Optional) Specifies to display information only for PIM dense-mode.
sparse-mode	(Optional) Specifies to display information only for PIM sparse-mode.
sparse-dense-mode	(Optional) Specifies to display information only for PIM sparse-dense-mode.
<i>INTERFACE-ID</i>	(Optional) Specifies the interface which to display the interface information. Only VLAN interface IDs are applicable.
detail	(Optional) Specifies to display the interface information in detail.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display interface related information. If no interface is specified, the PIM information for all applicable interfaces will be shown.

Example

This example shows how to display interface information.

```
ZEQUOxxxxRE# show ip pim interface
```

p: passive, Nbr Cnt: Neighbor Count

Address	Interface	Mode	Nbr Cnt	DR Priority	DR	Generation ID
90.1.1.1	vlan100	SM	0	1	90.1.1.1	1645d8a00
30.1.1.1	vlan200	DM	1	0	0.0.0.0	3a5f93
12.1.1.1	vlan300	SM-DM	1	0	12.1.1.2	37c693

Total Entries: 3

```
ZEQUOxxxxRE#
```

This example shows how to display interface information in detail.

```
ZEQUOxxxxRE#show ip pim interface detail
```

```
vlan1
  Address      : 172.18.67.139
  PIM          : Enabled
  Mode         : Sparse
  Neighbor Count : 0
  DR           : 172.18.67.139
  DR Priority   : 1
  Generation ID : 2aaf
  Hello Interval : 30 seconds
  Join Prune timer : 60 sec
vlan3
  Address      : 3.1.1.2
  PIM          : Disabled
  Mode         : Dense
  Neighbor Count : 0
  Generation ID : 0
  Hello Interval : 30 seconds
  PIM Passive Mode : Disabled
```

Total Entries: 2

```
ZEQUOxxxxRE#
```

9.8.16 show ip pim neighbor

This command is used to display the PIM-SM neighbor information.

Syntax

- `show ip pim neighbor [INTERFACE-ID]`

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface to display PIM-SM neighbor information. If the interface ID is not configured, information on all interfaces will be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to determine which routers on the LAN are configured for PIM.

Example

This example shows how to display the PIM neighbor information on all interfaces.

```
ZEQUOxxxxRE# show ip pim neighbor
```

```
Mode: DR - Designated Router, N - Default DR Priority,  
      G - Generation ID
```

Neighbor	Interface	Uptime/Expires	Ver	DR Pri/Mode
10.10.0.9	vlan1	0DT00H55M33S/0DT00H01M44S	v2	1 /G
10.10.0.136	vlan1	0DT00H55M20S/0DT00H01M25S	v2	1 /G
10.10.0.172	vlan1	0DT00H55M33S/0DT00H01M32S	v2	1 /DR,G
192.168.0.100	vlan2	0DT00H55M30S/0DT00H01M20S	v2	N /G

```
Total Entries: 4
```

```
ZEQUOxxxxRE#
```

9.8.17 show ip pim rp mapping

This command is used to display group-to-RP (rendezvous point) mappings and the RP set.

Syntax

- show ip pim rp mapping

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display active rendezvous points (RPs) that are cached with associated multicast routing entries. This command is used to display the RP mapping information viewed by the router

Example

This example shows how to display group-to-RP (rendezvous point) mappings and the RP set.

```
ZEQUOxxxxRE# show ip pim rp mapping

Group(s): 224.0.0.0/4
RP: 90.1.1.3
Info source: 90.1.1.3, via bootstrap, priority 0
Uptime: 0DT16H52M39S, expires: 0DT00H02M50S
Group(s): 225.0.0.0/8
RP: 1.1.1.10
Info source: static

ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
RP	The address of the RP for the group specified.
Info source	Indicates from which system the router learned this RP information.
Via bootstrap	The RP mapping information is learned from the BSR.
Priority	The RP priority.
Uptime	The length of time (in day, hours, minutes, and seconds) that the router has known about this RP.
Expires	The time (in day, hours, minutes, and seconds) after which the information about this RP expires. If the router does not receive any refresh messages in this time, it will discard information about this RP.

9.9 PIM (Protocol Independent Multicast) IPv6 Commands [ZEQUO6700RE/6600RE]

9.9.1 ipv6 pim

This command is used to enable IPv6 PIM Sparse-Mode on an interface. Use the **no** form of this command to disable this function.

Syntax

- **ipv6 pim sparse-mode**
- **no ipv6 pim sparse-mode**

Parameters

None.

Default

PIM-SM for IPv6 is disabled on all interfaces.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Before the PIM function is enabled on an interface, enable IPv6 multicast routing by issuing the command **ipv6 multicast-routing** in the global configuration mode.

Example

This example shows how to enable the IPv6 PIM-SM on a specified interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 pim sparse-mode
ZEQUOxxxxRE(config-if)#
```

9.9.2 ipv6 pim bsr border

This command is used to specify that the interface is a PIM domain border. Use the **no** form of this command to remove the border setting.

Syntax

- **ipv6 pim bsr border**
- **no ipv6 pim bsr border**

Parameters

None.

Default

By default, no border is configured.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When an interface is configured as a border, it will prevent bootstrap router (BSR) messages from being sent or received through it.

Example

This example shows how to enable the PIM border on the VLAN 1 interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 pim bsr border
ZEQUOxxxxRE(config-if)#
```

9.9.3 ipv6 pim bsr candidate bsr

This command is used to configure the router to advertise itself as a candidate bootstrap router (BSR). Use the **no** form of this command to remove this router as a candidate for being a BSR.

Syntax

- **ipv6 pim bsr candidate bsr** *INTERFACE-ID* [*HASH-MASK-LENGTH*] [*priority PRIORITY-VALUE*]
- **no ipv6 pim bsr candidate bsr**

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interface whose IPv6 address will be announced as the bootstrap router address.
<i>HASH-MASK-LENGTH</i>	Specifies to configure the hash mask length for rendezvous point (RP) selection. The range is from 0 to 128. The mask (128 bits maximum) that is to be logically <i>AND</i> with the group address before the hash function is executed. All groups with the same seed hash (correspond) to the same RP. Therefore one RP can be derived for multiple groups.
priority <i>PRIORITY-VALUE</i>	Specifies to configure the priority for a BSR candidate. The range is from 0 to 255. The BSR with the larger priority is preferred. If the priority values are the same, the router with the larger IPv6 address is the BSR.

Default

By default, the router is not a BSR candidate.

HASH-MASK-LENGTH: 126.

PRIORITY-VALUE: 64.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only affects PIM-SM operation. This command causes the router to send bootstrap messages to all its PIM neighbors, with the address of the designated interface as the BSR address. A PIM-SM domain must contain a unique BSR which is responsible for collect and advertise the RP information.

Example

This example shows how to configure the IPv6 address of VLAN 1 on the router to be a candidate BSR with hash-mask length of 120 and priority of 192.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 pim bsr candidate bsr vlan1 120 priority 192
ZEQUOxxxxRE(config)#
```

9.9.4 ipv6 pim bsr candidate rp

This command is used to configure the candidate RP to send PIM RP advertisements to the BSR. Use the **no** form of this command to disable PIM RP advertisements to the BSR.

Syntax

- **ipv6 pim bsr candidate rp** *INTERFACE-ID* [**group-list** *ACCESS-LIST*] [**priority** *PRIORITY-VALUE*] [**interval** *SECONDS*]
- **no ipv6 pim bsr candidate rp** *INTERFACE-ID*

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interface whose IPv6 address will be advertised as the candidate RP (C-RP).
group-list <i>ACCESS-LIST</i>	(Optional) Specifies the name of the IPv6 access list that defines the group prefixes that are advertised in association with the RP address. If no group-list is specified, the Switch is a candidate RP for all groups.

Parameters	description
priority <i>PRIORITY-VALUE</i>	(Optional) Specifies the RP priority value. The range is from 0 to 255. The default value is 192.
interval <i>SECONDS</i>	(Optional) Specifies the RP candidate advertisement interval. The range is from 1 to 16383 seconds. The default value is 60 seconds.

Default

By default, the router is not an RP candidate.

Priority: 192.

Interval: 60 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only affects PIM-SM operation. Only one group access list can be specified for each interface. The latest configuration overrides the previous one.

This command can be issued multiple times for different interfaces.

This command causes the router to send a PIMv2 message advertising itself as a candidate RP to the BSR.

Example

This example shows how to configure the router with the interface VLAN 1 to be advertised as the candidate RP with a priority of 10.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 pim bsr candidate rp vlan1 priority 10
ZEQUOxxxxRE(config)#
```

9.9.5 ipv6 pim dr-priority

This command is used to change the Designated Router (DR) priority value inserted into the DR priority option of the PIM Hello messages. Use the **no** form of this command to revert to the default setting.

Syntax

- `ipv6 pim dr-priority PRIORITY`
- `no ipv6 pim dr-priority`

Parameters

Parameters	description
<i>PRIORITY</i>	Specifies the value of the DR priority in the range of 0 to 4294967295. A larger value means a higher priority.

Default

By default, this value is 1.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only valid for the VLAN interface. This command only takes effective when the interface is PIM-SM mode enabled. When a DR is a candidate for election, the following conditions apply:

- The router with the highest priority value configured on an interface will be elected as the DR. If multiple routers have the same highest priority, then the router with the highest IPv6 address configured on the interface will be elected as the DR.
- If a router does not advertise a priority value in its hello messages, the router is regarded as having the highest priority and will be elected as the DR. If there are multiple routers do not include the DR priority option in their hello messages, then the router with the highest IPv6 address will be elected as the DR.

Example

This example shows how to set the DR priority of the VLAN 1 interface to 200.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 pim dr-priority 200
ZEQUOxxxxRE(config-if)#
```

9.9.6 ipv6 pim hello-interval

This command is used to configure the frequency of PIM hello messages. Use the **no** form of this command to revert to the default setting.

Syntax

- **ipv6 pim hello-interval** *SECONDS*
- **no ipv6 pim hello-interval**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval, in seconds, between Hello messages. The range is from 1 to 18000.

Default

By default, this value is 30 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only valid for the VLAN interface. A PIM router learns PIM neighbors via the hello message. Routers configured for IP multicast send PIM hello messages to detect PIM routers. For SM, hello messages are also used to determine which router will be elected as the designated router for each LAN segment.

Example

This example shows how to configure the PIM hello interval to 45 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 pim hello-interval 45
ZEQUOxxxxRE(config-if)#
```

9.9.7 ipv6 pim join-prune-interval

This command is used to configure the frequency of PIM periodic join and prune message. Use the **no** form of this command to revert to the default setting.

Syntax

- **ipv6 pim join-prune-interval** *SECONDS*
- **no ipv6 pim join-prune-interval**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval, in seconds, between Join and Prune messages. The range is from 1 to 18000.

Default

By default, this value is 60 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only valid for the VLAN interface. This command only takes effect when the interface is PIM-SM enabled.

When configuring the Join/Prune interval, the user needs to consider the factors, such as configured bandwidth and expected average number of multicast route entries for the attached network or link (for example, the period would be longer for lower-speed links, or for routers in the center of the network that expect to have a larger number of entries).

For SM-mode, the router will periodically send the join message based on this interval. The hold-time in a Join/Prune message is 3.5 times the join-prune-interval. The receiving router will start a timer based on this hold-time, and prune the interface if no join message is received on this interface.

Example

This example shows how to configure the PIM Join/Prune timer to 120 seconds on interface VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 pim join-prune-interval 120
ZEQUOxxxxRE(config-if)#
```

9.9.8 ipv6 pim passive

This command is used to specify an interface running in the passive mode. Use the **no** form of this command to disable passive mode.

Syntax

- **ipv6 pim passive**
- **no ipv6 pim passive**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the interface is IPv6 PIM enabled. When the passive mode is enabled, the interface will neither send PIM messages out nor accept PIM messages from this interface. The router will act as it is the only PIM router on the network. Use this command only when there is only one PIM router on the LAN.

Example

This example shows how to configure VLAN 100 as a PIM passive interface.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan100
ZEQUOxxxxRE(config-if)# ipv6 pim passive
ZEQUOxxxxRE(config-if)#
```

9.9.9 ipv6 pim register-checksum-wholepkt

This command is used to configure the router to calculate the checksum of register message over the entire PIM message including the data portion. Use the **no** form of this command to revert to the default setting.

Syntax

- **ipv6 pim register-checksum-wholepkt**
- **no ipv6 pim register-checksum-wholepkt**

Parameters

None.

Default

By default, this option is disabled.

By default, the register checksum methodology is PIM RFC-compliant, excluding the data portion in the Register message.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only affects PIM-SM operation. If this command is specified, then the setting will be applied to all RP addresses.

Example

This example shows how to enable the register checksum over the whole register message.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 pim register-checksum-wholepkt
ZEQUOxxxxRE(config)#
```

9.9.10 ipv6 pim register-probe

This command is used to configure the register-probe time. Use the **no** form of this command to revert to the default setting.

Syntax

- **ipv6 pim register-probe** *SECONDS*
- **no ipv6 pim register-probe**

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the register probe time value in seconds. The range is from 1 to 127.

Default

By default, this value is 5 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The register-probe time is the time before the Register-Stop Timer (RST) expires when a DR may send a Null-Register to the RP to cause it to resend a Register-Stop message.

Example

This example shows how to configure the register-probe time to 10 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 pim register-probe 10
ZEQUOxxxxRE(config)#
```

9.9.11 ipv6 pim register-suppression

This command is used to configure the register-suppression time. Use the **no** form of this command to revert to the default setting.

Syntax

- `ipv6 pim register-suppression SECONDS`
- `no ipv6 pim register-suppression`

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the register suppression timeout value in seconds. The range is from 3 to 65535.

Default

By default, this value is 60 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only affects PIM-SM operation.

When a DR receives the register-stop message, it will start the suppression timer. During the suppression time a DR will stop sending Register-encapsulated data to the RP. This timer should be configured on the designated router. The value of the Register Probe Time must be less than half the value of the Register Suppression Time to prevent a possible negative value in the setting of the Register-Stop Timer. The minimal value for Register Suppression Time is 3.

Example

This example shows how to configure the register suppression time to 30 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 pim register-suppression 30
ZEQUOxxxxRE(config)#
```

9.9.12 ipv6 pim rp embedded

This command is used to enable embedded RP support in PIMv6. Use the **no** form of this command to disable embedded RP support.

Syntax

- **ipv6 pim rp embedded**
- **no ipv6 pim rp embedded**

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the interface is PIM-SM enabled. Embedded RP defines an address allocation policy in which the address of the RP is encoded in an IPv6 multicast group address. This allows an easy deployment of scalable inter-domain multicast and simplifies the intra-domain multicast configuration as well. IPv6 Multicast group addresses embedded with RP information start with ff70::/12 where the flag value of 7 means embedded RP. Because embedded RP support is enabled by default, the **no** form of this command is generally used, which turns off embedded RP support. The **ipv6 pim rp embedded** command applies only to the embedded RP group ranges ff7x::/12.

Example

This example shows how to disable embedded RP support in IPv6 PIM-SM.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# no ipv6 pim rp embedded
ZEQUOxxxxRE(config)#
```

9.9.13 ipv6 pim rp-address

This command is used to configure the address of a PIM RP for a particular group range. Use the **no** form of this command to remove an RP address.

Syntax

- **ipv6 pim rp-address** *IPV6-ADDRESS* [*GROUP-ACCESS-LIST*] [*override*]
- **no ipv6 pim rp-address** *IPV6-ADDRESS*

Parameters

Parameters	description
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of a router to be a PIM RP.
<i>GROUP-ACCESS-LIST</i>	(Optional) Specifies the name of an access list that defines which multicast groups the RP should be used. If no access list is configured, the RP is used for all groups.
override	(Optional) Specifies that the static RP overrides dynamically learned RP.

Default

No RP addresses are preconfigured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only affects PIM-SM operation. Use this command to statically define the RP address for multicast groups that are to operate in sparse mode. Users can use a single RP for more than one group. The conditions specified by the access list determine for which groups the RP can be used. Multiple RP can be defined, each with a single access list. The new setting overrides the old one. All routers in a domain should have a consistent multicast group to RP mapping. The first hop router that initiates a register message will use the mapping entries to determine the RP for sending the PIM register message destined for a specific group. The last hop router that initiates a join message uses the mapping entries to determine the RP for sending the join and prune message for a specific group. When a router receives a join message, it will check the mapping entries for forwarding of the message. When a RP receives a register message, if the router is not the right RP for the multicast group, a register-stop message will be sent. If the PIM domain is using embedded-RP, only the RP needs to be statically configured as the RP for the embedded RP ranges. The other routers will discover the RP address from the IPv6 group address. If these routers want to select a static RP instead of the embedded RP, the specific embedded RP group range must be configured in the access list of the static RP.

Example

This example shows how to configure the RP address 3ffe:6000:3000::123 for the group access list "G1".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 access-list G1
ZEQUOxxxxRE(config-ipv6-acl)# permit any ff75::/16
ZEQUOxxxxRE(config-ipv6-acl)# exit
ZEQUOxxxxRE(config)# ipv6 pim rp-address 3ffe:6000:3000::123 G1
ZEQUOxxxxRE(config)#
```

9.9.14 ipv6 pim spt-threshold

This command is used to configure the PIM Shortest Path Tree (SPT) threshold value for the specified groups. Use the **no** form of this command to revert to the default setting.

Syntax

- `ipv6 pim spt-threshold {0 | infinity}`
- `no ipv6 pim spt-threshold`

Parameters

Parameters	description
0	Specifies to establish the source tree right at the arrival of the first packet.
infinity	Specifies to always rely on the shared tree.

Default

By default, this option is configured as **infinity**.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Using the **infinity** parameter enables all sources for the specified groups to use the shared tree. Using the **0** parameter to join the SPT immediately after the first packet arrives from a new source.

Example

This example shows how to configure the PIM last-hop router to stay on the shared.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 pim spt-threshold infinity
ZEQUOxxxxRE(config)#
```

9.9.15 ipv6 pim sg-keepalive-time

This command is used to configure the PIM6-SM multicast routing entry keep-alive timer. Use the **no** form of this command to revert to the default setting.

Syntax

- `ipv6 pim sg-keepalive-time SECONDS`
- `no ipv6 pim sg-keepalive-time`

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the period during which the PIM router will maintain the (S, G) state in the absence of explicit (S, G) local membership or (S, G) join messages received to maintain it. The time range is from 120 to 65535 seconds.

Default

By default, this value is 210 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only affects IPv6 PIM-SM. This command is used to configure the keep-alive timer, which is the period during which the PIM router will maintain the (S, G) state in the absence of explicit (S, G) local membership or (S, G) join messages received to maintain it.

Example

This example shows how to configure the (S, G) keep-alive time to 300 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 pim sg-keepalive-time 300
ZEQUOxxxxRE(config)#
```

9.9.16 show ipv6 pim

This command is used to display the PIM global information.

Syntax

- `show ipv6 pim sparse-mode`

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the global information of PIM.

Example

This example shows how to display PIM global information.

```
ZEQUOxxxxRE#show ipv6 pim sparse-mode

Register checksum wholepkt: Enabled
Register probe time       : 10 seconds
Register suppression time : 60 seconds
SPT Threshold             : Infinity
(S,G) keepalive time      : 300 seconds
Embedded RP support       : Enabled

RP Address
  3FFE:6000:3000::123, group-list: G1

RP Candidate
  vlan100, group-list: rp-cand, interval: 60, priority: 192

BSR Candidate
  vlan100, hash-mask-length: 30, priority: 1

ZEQUOxxxxRE#
```

9.9.17 show ipv6 pim bsr

This command is used to display BSR information.

Syntax

- show ipv6 pim bsr { candidate-rp | election | rp-cache }

Parameters

Parameters	description
candidate-rp	Specifies to display the C-RP state on routers that are configured as C-RPs.
election	Specifies to display the BSR state, BSR election, and bootstrap message (BSM) related timers.
rp-cache	Specifies to display the candidate rendezvous point (C-RP) cache learned from unicast C-RP announcements on the elected BSR.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display details of the BSR election-state machine, C-RP advertisement state machine, and the C-RP cache. Information on the C-RP state machine is displayed only on a router configured as a C-RP.

Example

This example shows how to display BSR election information.

```
ZEQUOxxxxRE# show ipv6 pim bsr election

PIMv2 BSR information
BSR Election Information
This system is the Bootstrap Router (BSR)
BSR Address: 3FFE:6000:3000::123
Uptime: 0DT00H18M50S, BSR Priority: 0, Hash mask length: 126
BS Timer: 0DT00H00M21S
```

```
ZEQUOxxxxRE#
```

This example shows how to display information that has been learned from various C-RPs at the BSR. In this example, two candidates RPs have sent advertisements for the FF00::/8 or the default IPv6 multicast range.

```
ZEQUOxxxxRE# show ipv6 pim bsr rp-cache

PIMv2 BSR C-RP Cache
BSR Candidate RP Cache
Group(s) FF00::/8
RP 3FFE:1000:10:5::153
Priority 192
Uptime: 0DT00H08M36S, expires: 0DT00H01M21S
RP 3FFE:2000:10:5::100
Priority 192
Uptime: 0DT00H08M36S, expires: 0DT00H01M21S
```

```
ZEQUOxxxxRE#
```

This example shows how to display the candidate RP information that had configured on the router.

```
ZEQUOxxxxRE# show ipv6 pim bsr candidate-rp
```

```
PIMv2 C-RP information
Candidate RP: 3FFE:1000:10:5::100(vlan10)
  Priority 192, Holdtime 150
  Advertisement interval 60 seconds
  Next advertisement in 0DT00H00M54S
```

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
This system is the Bootstrap Router (BSR)	Indicates this router is the BSR and provides information on the parameters associated with it.
BS Timer	On the elected BSR, the BS timer shows the time in which the next BSM will be originated. On all other routers in the domain, the BS timer shows the time at which the elected BSR expires.

9.9.18 show ipv6 pim group-map

This command is used to display the group to RP mapping information.

Syntax

- show ipv6 pim group-map [*IPv6-GROUP-ADDR/PREFIX-LENGTH*] [info-source { bsr | embedded-rp | static }]

Parameters

Parameters	description
<i>IPv6-GROUP-ADDR/PREFIX-LENGTH</i>	(Optional) Specifies the IPv6 multicast group address range.
info-source	(Optional) Specifies to display all mappings learned from a specific source, such as the BSR or static configuration.
bsr	Specifies to display ranges learned through the BSR.
embedded-rp	Specifies to display group ranges learned through the embedded RP.
static	Specifies to display ranges enabled by static configuration.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

If this command is issued without any parameters, all group mappings will be displayed. Specify the group address range or learned source to filter the group mappings.

Example

This example shows how to display the RP mapping of group FF04::10.

```
ZEQUOxxxxRE# show ipv6 pim group-map ff04::10/128

FF04::10/128
  RP: 3FFE:10:10:5::153
  Info source: 3FFE:10:10:5::153, via bootstrap

ZEQUOxxxxRE#
```

This example shows how to display the RP mappings learned from a specific source enabled by static configurations.

```
ZEQUOxxxxRE# show ipv6 pim group-map info-source static

FF00::/8
  RP: 2013:1:1:11::1
  Info source: static

ZEQUOxxxxRE#
```

This example shows how to display the RP mappings learned through the embedded RP.

```
ZEQUOxxxxRE# show ipv6 pim group-map info-source embedded-rp

FF7E:640:2002:6666::/96
  RP: 2002:6666::6
  Info source: embedded

ZEQUOxxxxRE#
```

9.9.19 show ipv6 pim interface

This command is used to display the configuration for PIM on interface(s).

Syntax

- `show ipv6 pim interface sparse-mode [INTERFACE-ID] [detail]`

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies an interface for display
<i>detail</i>	(Optional) Specifies to display interface information in detail.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to check if PIM is enabled on an interface, the number of neighbors, and the designated router (DR) on the interface. If no interface is specified, the IPv6 PIM information on for all applicable interfaces will be shown.

Example

This example shows how to display how to display the information of the PIM sparse mode interface.

```
ZEQUOxxxxRE#show ipv6 pim interface sparse-mode
```

```
PIM6-SM Interface Table
```

Interface	Mode	Nbr Count	DR Priority	Hello Interval	J/P Interval	BSR Border
vlan1	Sparse	1	1	30	60	enabled
		Address	: FE80::207:E9FF:FE02:81D			
		Global Address	: 3FFE:192:168:1::53			
		DR	: FE80::21D:E0FF:FE26:F402			
vlan2	Sparse 2	1	30	60	disabled	
		Address	: FE80::207:E9FF:FE02:21A2			
		Global Address	: 3FFE:192:168:10::53			
		DR	: this system			

```
Total Entries : 2
```

```
ZEQUOxxxxRE#
```

This example shows how to display the PIM information on the interface VLAN 1 in detail.

```
ZEQUOxxxxRE#show ipv6 pim interface sparse-mode vlan1 detail
```

```
Interface : vlan1
Interface Link-Local Address : ::
Interface Global Address : ::
Mode : None
Designated Router : Not elected
Designated Router Priority : 1
Designated Router Priority Enabled : True
Generation ID : 0
Hello Interval : 30 seconds
Triggered Hello Interval : 5 seconds
Hello Holdtime : 105 seconds
Join Prune Interval : 60 seconds
Join Prune Holdtime : 210 seconds
LAN Delay Enabled : True
Propagation Delay : 1 seconds
Override Interval : 3 seconds
Effective Propagation Delay : 1 seconds
Effective Override Interval : 3 seconds
Join Suppression Enabled : False
Bidirectional Capable : False
BSR Domain Border : Disabled
PIM Passive Mode : Disabled
```

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Interface	The Interface ID that is configured to perform PIM Sparse mode.
Mode	The PIM mode of this interface.
Nbr Count	The number of PIM neighbors that have been learnt on the interface.
DR Priority	The DR priority that is configured on the interface.
Hello Interval	The hello interval value that is configured on the interface.
J/P Interval	The Join-Prune interval value that is configured on the interface.
BSR Border	The BSR Border state whether is enabled or disabled.
Address	The Link-Local IPv6 address of the interface.
Global Address	The Global IPv6 address of the interface.
DR	The IPv6 address of the designated router of the interface.
Designated Router Priority Enabled	Evaluates if all routers on this interface are using the DR Priority option.
LAN Delay Enabled	Evaluates if all routers on this interface are using the LAN Prune Delay option.
Propagation Delay	The Propagation Delay value of the interface.
Override Interval	The Override Interval value of the interface.
Effective Propagation Delay	The Effective Propagation Delay on this interface.
Effective Override Interval	The Effective Override Interval on this interface.
Join Suppression Enabled	Displays whether join suppression is enabled on this interface.

9.9.20 show ipv6 pim mroute

This command is used to display the PIM IPv6 multicast routing table.

Syntax

- show ipv6 pim mroute sparse-mode

Parameters

None.

Default

None.

Command Mode

User EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display all entries in the IPv6 multicast routing table. The Switch populates the multicast routing table by creating source, group (S,G) entries from star, group (*,G) entries. The star (*) refers to all source addresses, the "S" refers to a single source address, and the "G" is the destination multicast group address. In creating (S,G) entries, the software uses the best path to that destination group found in the unicast routing table, through Reverse Path Forwarding (RPF).

Example

This example shows how to display the PIM-SM multicast routing table.

```
ZEQUOxxxxRE# show ipv6 pim mroute sparse-mode

PIM-SM Multicast Routing Table:
JP State- Join Prune State, ET - Expiry Timer, PPT - Prune Pending Timer,
KAT - Keep Alive Timer

Flags: S - Sparse, T - SPT-bit set, s - SSM Group.

(*, FF13::10) Uptime: 0DT00H04M43S, Flags:S
RP: 3ffe:6000:1005::36, RPF nbr: FE80::217:55FF:FEC0:16, RPF interface: vlan101
Upstream interface:
Join State: Joined, Join Timer: 17 secs
Downstream Interface List:
vlan11:
JP State: Join, ET: 166 secs, PPT: off
Assert State: No Info, Assert Timer: off
Assert Winner: ::, Metric: 0, Pref: 0

(3FFE:6000:1005::DD, ff13::10) Uptime: 0DT00H00M05S, Flag:ST
RPF nbr: FE80::217:55FF:FEC0:16, RPF Interface: vlan101
Upstream Interface:
Join State: Joined, Join Timer: 55 secs, KAT: off
Downstream Interface List:
vlan11:
JP State: Join, ET: 205 secs, PPT: off
Assert State: No Info, Assert Timer: off
Assert Winner: ::, Metric: 0, Pref: 0

(3FFE:6000:1005::DD, ff13::10, rpt) Uptime: 0DT00H00M05S, Flags:S
RP: 3ffe:6000:1005::36, RPF nbr: FE80::217:55FF:FEC0:16, RPF Interface: vlan101
Upstream Interface:
Prune State: Not Pruned, Override Timer: off
Downstream Interface List:
vlan11:
Prune State: No Info, ET: off, PPT: off

Total Entries: 3

ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Uptime	The time that entry has been created.
Flags	The entry's Sparse/SPT-bit information.
RP	The Rendezvous Point (RP) of the (*, G) mroute entry.
RPF nbr	The Reserve Path Forwarding (RPF) neighbor address.
RPF interface	The local interface name that connect to the upstream router.
Join State	The upstream Join state whether the local router should join the RP tree for the group or join the shortest-path tree for the source and group represented by this entry.

Parameters	description
Join Timer	The time remaining before the local router next sends a periodic Join message.
Downstream Interface List	The downstream interface(s) protocol state information.
vlan11	The interface name of the downstream interface.
JP State	The state resulting from (*, G) or (S, G) Join/Prune messages received on this interface.
PPT	The Prune Pending Timer. The remaining time that allows other router to override the join or prune.
ET	The Expiry Timer. The remaining time before the Join state for the interface expire.
Assert State	The assert state of the interface.
Assert Timer	The Assert Timer. If the interface is an Assert Winner, then this timer is the remaining time before the interface to send a assert message. If the interface is an Assert Loser, then this timer is the remaining time before the Assert State expires.
Assert Winner	When the Assert State is Loser, this field is the IP address of the Assert Winner. Otherwise, it is always "::".
Metric	When the Assert State is Loser, this field is metric of the route to the RP/Source that is advertised by the Assert Winner.
Pref	The Preference. When the Assert State is Loser, this field is metric preference of the route to the RP/Source that advertised by the Assert Winner.

9.9.21 show ipv6 pim neighbor

This command is used to display PIM neighbor information.

Syntax

- show ipv6 pim neighbor sparse-mode [detail] [*INTERFACE-ID*]

Parameters

Parameters	description
detail	(Optional) Specifies to display IPv6 PIM neighbor information in detail.
<i>INTERFACE-ID</i>	(Optional) Specifies the interface of which to display the PIM neighbor information. If the interface ID is not specified, the information on all interfaces will be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to determine which routers on the LAN are configured for PIMv6.

Example

This example shows how to display the sparse-mode neighbor information.

```
ZEQUOxxxxRE# show ipv6 pim neighbor sparse-mode
```

```
Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,  
G - Supports Generation ID  
Neighbor-Address Interface Uptime/Expires Ver DR Pri/Mode
```

```
-----  
FE80::233:38FF:FE10:1700  
      vlan1 0DT00H55M33S/0DT00H01M32S v2 1 /G  
FE80::200:FF:FE26:6667  
      vlan2 0DT00H55M30S/0DT00H01M20S v2 1 /DR,G
```

```
Total Entries: 2
```

```
ZEQUOxxxxRE
```

```
#
```

Display Parameters

Parameters	description
Neighbor-Address	The IPv6 address of the PIM neighbor (link-local address).
Interface	The neighbor's interface name.
Uptime	The length of time that the router has known about this neighbor.
Expires	The time after which the information about this neighbor expires. If the router does not receive any hello messages in this time, it will discard information about this neighbor.
Ver	Indicates the PIM version used by this neighbor.

Parameters	description
DR Pri/Mode	The priority and mode of the designated router (DR). DR Priority: Uses N to indicate that the neighbor does not support the DR Priority option in the Hello message, otherwise, the DR priority value will be displayed. The meaning of indicating codes for Mode are as follows: DR: Indicates that the neighbor is the Designated Router. B: The neighbor is capable of PIM in the bidirectional mode. G: The neighbor supports a Generation ID, which reduces the re-convergence times after a switchover.

9.10 IP Multicast (IPMC) Commands [ZEQUO6700RE/6600RE]

9.10.1 ip multicast-routing

This command is used to enable IP multicast routing. Use the **no** form of this command to disable IP multicast routing.

Syntax

- ip multicast-routing
- no ip multicast-routing

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When IP multicast routing is disabled, the system will stop routing multicast packets even though the multicast routing protocol is enabled.

Example

This example shows how to enable IP multicast routing.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip multicast-routing
ZEQUOxxxxRE(config)#
```

9.10.2 show ip multicast

This command is used to display multicast information of the system or any IP interface.

Syntax

- `show ip multicast [interface INTERFACE-ID]`

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface name to display IP multicast information.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display IP multicast interface information. If the keyword `interface` is not specified, the global state of IP multicast routing will be displayed. If the keyword `interface` is specified but the interface ID is not specified, this command will display the information for all interfaces.

Example

This example shows how to display the global state of IP multicast routing.

```
ZEQUOxxxxRE#show ip multicast

IP multicast-routing global state: Enabled

ZEQUOxxxxRE#
```

This example shows how to display IP multicast interface information.

```
ZEQUOxxxxRE#show ip multicast interface
```

Interface Name	IP Address	Multicast Routing
vlan100	90.1.1.1/8	PIM-SM
vlan200	192.168.1.1/24	PIM-SM
vlan300	30.1.1.1/24	N/A

```
Total Entries: 3
```

```
ZEQUOxxxxRE#
```

9.10.3 show ip mroute

This command is used to display the content of the IP multicast routing table

Syntax

- `show ip mroute` `[{[GROUP-ADDRESS [SOURCE-ADDRESS] | dense | sparse | dvmrp | summary}]`

Parameters

Parameters	description
<i>GROUP-ADDRESS</i>	(Optional) Specifies the group IP address.
<i>SOURCE-ADDRESS</i>	Specifies the multicast source IP address.
sparse	(Optional) Specifies to display only the PIM-SM routes.
dense	(Optional) Specifies to display only the PIM-DM routes.
dvmrp	(Optional) Specifies to display only the DVMRP routes.
summary	(Optional) Specifies to display a one-line abbreviated summary of each entry in the IP multicast routing table.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Display the content of the IP multicast table. The uptime timer describes the time that the entry has been created. The expires timer is a keep-alive timer of the multicast data stream. The expires timer value is based on either the PIM Sparse or Dense Mode. If multicast data continues to arrive at the device, the timer will refresh. If the network address is specified, the Switch displays the entries with source addresses that match the specified address.

Example

This example shows how to display multicast route brief information.

```
ZEQUOxxxxRE#show ip mroute summary

IP Multicast Routing Table: 2 entries
Flags: D - PIM-DM, S - PIM-SM, V - DVMRP
Timers: Uptime/Expires

(10.10.1.52, 224.0.1.3), vlan1, 0DT00H01M32S/0DT00H03M20S, Flags: D
(20.1.1.1, 228.10.2.1), vlan10, 0DT00H05M10S/0DT00H03M11S, Flags: S
```

```
ZEQUOxxxxRE#
```

This example shows how to display multicast route entries.

```
ZEQUOxxxxRE#show ip mroute

IP Multicast Routing Table
Flags: D - PIM-DM, S - PIM-SM, V - DVMRP, s - SSM Group, F - Register flag
      P - Pruned, R - (S, G) RPT-bit set, T - SPT-bit set
Outgoing interface flags: W - Assert winner
Timers: Uptime/Expires

(10.10.1.52, 224.0.1.3), 0DT05H29M15S/0DT00H02M59S, flags: ST
  Incoming interface: vlan1, RPF neighbor: 10.3.4.5
  Outgoing interface list:
    vlan121, Forwarding 0DT00H01M23S/0DT00H03M34S
    vlan125, Forwarding 0DT00H01M23S/null

(20.1.1.1, 228.0.0.20), 0DT05H29M15S/0DT00H02M59S flags: D
  Incoming interface: vlan10, RPF neighbor: 10.3.4.5
  Outgoing interface list: NULL

Total Entries: 2

ZEQUOxxxxRE#
```

This example shows how to display a multicast sparse mode route entry.

```
ZEQUOxxxxRE# show ip mroute sparse

(10.10.1.52, 224.0.1.3), 0DT05H29M15S/0DT00H02M59S, flags: ST
  Incoming interface: vlan1, RPF neighbor: 10.3.4.5
  Outgoing interface list:
    vlan126, Forwarding 0DT00H00M03S/0DT00H04M07S
    vlan127, Forwarding 0DT00H00M03S/0DT00H04M11S

Total Entries: 1

ZEQUOxxxxRE#
```

9.10.4 show ip mroute forwarding-cache

This command is used to display the content of the IP multicast routing forwarding cache database.

Syntax

- **show ip mroute forwarding-cache** [**group-addr** *GROUP-ADDRESS* [**source-addr** *SOURCE-ADDRESS*]]

Parameters

Parameters	description
group-addr <i>GROUP-ADDRESS</i>	(Optional) Specifies the group IP address.
source-addr <i>SOURCE-ADDRESS</i>	(Optional) Specifies the multicast source IP address.

Default

None.

Command Mode

User EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Display the content of the IP multicast forwarding cache information. IP multicast forwarding cache is a summary table from the IP multicast route table, IGMP snooping group member table, and multicast router ports.

Example

This example shows how to display the IP multicast routing forwarding cache.

```
ZEQUOxxxxRE# show ip mroute forwarding-cache

(10.1.1.1, 239.0.0.0) VLAN0060
  Outgoing interface list: 1/0/1, port-channel2

(*,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

ZEQUOxxxxRE#
```

9.11 IPMCv6 (IP Multicast Version 6) Commands[ZEQUO6700RE/6600RE]

9.11.1 ipv6 multicast-routing

This command is used to enable IPv6 multicast routing. Use the **no** form of this command to disable IPv6 multicast routing.

Syntax

- `ipv6 multicast-routing`
- `no ipv6 multicast-routing`

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When IPv6 multicast routing is disabled, the system will stop routing multicast packets even though the multicast routing protocol is enabled.

Example

This example shows how to enable IPv6 multicast routing.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(Config)# ipv6 multicast-routing
ZEQUOxxxxRE(Config)#
```

9.11.2 show ipv6 multicast

This command is used to display basic multicast information of the IPv6 interface.

Syntax

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

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface name for which to display IPv6 multicast information. If no specific interface ID is specified, all interface will be displayed. If the keyword interface is not specified, the state of IPv6 multicast routing will be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the basic multicast information of the IPv6 interface or display the state of IPv6 multicast routing. If the interface ID is not specified, this command will display the information for all IPv6 interfaces.

Example

This example shows how to display the state of IPv6 multicast routing.

```
ZEQUOxxxxRE# show ipv6 multicast

IPv6 multicast-routing global state: Enabled

ZEQUOxxxxRE#
```

This example shows how to display IPv6 multicast interface information.

```
ZEQUOxxxxRE# show ipv6 multicast interface
```

```
Interface      Owner Module
-----
vlan100        PIM-SM
vlan200        PIM-SM
```

```
Total Entries: 2
```

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Interface	The interface name of the interface.
Owner Module	Indicates whether the module is enabled on the interface. PIM-SM: PIM Sparse Mode is enabled on this interface.

9.11.3 show ipv6 mroute

This command is used to display the content of the IPv6 dynamic multicast routing table.

Syntax

- show ipv6 mroute [*GROUP-ADDRESS* [*SOURCE-ADDRESS*] | summary]

Parameters

Parameters	description
<i>GROUP-ADDRESS</i>	(Optional) Specifies the group IPv6 address.
<i>SOURCE-ADDRESS</i>	(Optional) Specifies the multicast source IPv6 address.
summary	(Optional) Specifies to display a one-line, abbreviated summary of each entry in the IPv6 multicast routing table.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the content of the IPv6 multicast table. The “Uptime” timer describes the time that the entry has been created. The “Expires” timer is the keep-alive timer of the multicast data stream. The expires timer value is based on the PIM Sparse-mode. If the multicast data continues to arrive on the device, this timer will refresh. If the network address is specified, the Switch displays the entries with source addresses that match the specified address. If no optional keyword is specified, all dynamic multicast routes will be displayed.

Example

This example shows how to display multicast route brief information.

```
ZEQUOxxxxRE# show ipv6 mroute summary

IPv6 Multicast Routing Table: 2 entries
Flags: S - Sparse, s - SSM Group
Timers: Uptime/Expires

(2000::1010:134, FF07::1), vlan1, 0DT00H01M32S/0DT00H03M20S, Flags: S
(2000::2001:101, FF06::100), vlan10, 0DT00H05M10S/0DT00H03M11S, Flags: S

ZEQUOxxxxRE#
```

This example shows how to display multicast route entries.

```
ZEQUOxxxxRE# show ipv6 mroute

IPv6 Multicast Routing Table : 2 entries
Flags: S - Sparse, s - SSM Group
Timers: Uptime/Expires

(2000::1010:0134, FF07::1), 0DT05H29M15S/0DT00H02M59S, Flags: S
Incoming interface: vlan1
RPF nbr: FE80::200:FF:FE26:6667
Outgoing interface list:
    vlan2
    vlan3

(2000::2001:0101, FF06::20), 0DT05H29M15S/0DT00H02M59S Flags: S
Incoming interface: vlan10
RPF nbr: FE80::200:FF:FE26:6668
Outgoing interface list:
    vlan20

ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Flags	Provides information about the entry. S - Sparse. Entry is operating in sparse mode. s - SSM Group. The Entry is SSM group.
Timers: Uptime/Expires	"Uptime" indicates per interface how long (in day, hours, minutes, and seconds) the entry has been in the IPv6 multicast routing table. "Expires" indicates per interface how long (in day, hours, minutes, and seconds) until the entry will be removed from the IPv6 multicast routing table
Incoming interface	Expected interface for a multicast packet from the source. If the packet is not received on this interface, it is discarded.
RPF nbr	The IPv6 address of the upstream router to the RP or source.
Outgoing interface	Interfaces through which packets will be forwarded. For (S,G) entries, this list will not include the interfaces inherited from the (*,G) entry.

9.11.4 show ipv6 mroute forwarding-cache

This command is used to display the content of the IPv6 multicast routing forwarding cache database.

Syntax

- **show ipv6 mroute forwarding-cache** [**group-addr** *GROUP-ADDRESS* [**source-addr** *SOURCE-ADDRESS*]]

Parameters

Parameters	description
group-addr <i>GROUP-ADDRESS</i>	(Optional) Specifies the group IPv6 address.
source-addr <i>SOURCE-ADDRESS</i>	Specifies the multicast source IPv6 address.

Default

None.

Command Mode

User EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the content of the IPv6 multicast forwarding cache information. IPv6 multicast forwarding cache is a summary table from the IPv6 multicast route table, MLD snooping group member table, and multicast router ports.

Example

This example shows how to display the IPv6 multicast routing forwarding cache.

```
ZEQUOxxxxRE# 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

ZEQUOxxxxRE#
```

10 Network Management

10.1 SNMP (Simple Network Management Protocol) Commands

10.1.1 show snmp

This command is used to display the SNMP settings.

Syntax

- `show snmp { community | host | view | group | engineID }`

Parameters

Parameters	description
community	Specifies to display SNMP community information.
host	Specifies to display SNMP trap recipient information.
view	Specifies to display SNMP view information.
group	Specifies to display SNMP group information.
engineID	Specifies to display SNMP local engine ID information.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command displays the SNMP information. When displaying SNMP community strings, the SNMPv1 or SNMPv2c user created will not be displayed.

Example

This example shows how to display SNMP community information.

```
ZEQUOxxxxRE#show snmp community
```

```
Community : public
Access : read-only
View : CommunityView
```

```
Community : private
Access : read-write
View : CommunityView
```

```
Total Entries: 2
```

```
ZEQUOxxxxRE#
```

This example shows how to display the SNMP server host setting.

```
ZEQUOxxxxRE#show snmp host
```

```
Host IP Address : 10.90.90.1
SNMP Version : V1
Community Name : public
UDP Port : 162
```

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

This example shows how to display the MIB view setting.

```
ZEQUOxxxxRE#show snmp view
```

```
restricted(included) 1.3.6.1.2.1.1
restricted(included) 1.3.6.1.2.1.11
restricted(included) 1.3.6.1.6.3.10.2.1
restricted(included) 1.3.6.1.6.3.11.2.1
restricted(included) 1.3.6.1.6.3.15.1.1
CommunityView(included) 1
CommunityView(excluded) 1.3.6.1.6.3
CommunityView(included) 1.3.6.1.6.3.1
```

```
Total Entries: 8
```

```
ZEQUOxxxxRE#
```

This example shows how to display the SNMP group setting.

```

ZEQUOxxxxRE#show snmp group

GroupName: public                               SecurityModel: v1
  ReadView      : CommunityView                 WriteView      :
  NotifyView    : CommunityView
  IP access control list:

GroupName: public                               SecurityModel: v2c
  ReadView      : CommunityView                 WriteView      :
  NotifyView    : CommunityView
  IP access control list:

GroupName: initial                             SecurityModel: v3/noauth
  ReadView      : restricted                     WriteView      :
  NotifyView    : restricted
  IP access control list:

GroupName: private                             SecurityModel: v1
  ReadView      : CommunityView                 WriteView      : CommunityView
  NotifyView    : CommunityView
  IP access control list:

GroupName: private                             SecurityModel: v2c
  ReadView      : CommunityView                 WriteView      : CommunityView
  NotifyView    : CommunityView
--More--

```

This example shows how to display the SNMP engine ID.

```

ZEQUOxxxxRE#show snmp engineID

Local SNMP engineID: 800000ab03f07d6834001000

ZEQUOxxxxRE#

```

10.1.2 show snmp user

This command is used to display information about the configured SNMP user.

Syntax

- `show snmp user [USER-NAME]`

Parameters

Parameters	description
<i>USER-NAME</i>	(Optional) Specifies the name of a specific user to display SNMP information.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

When the username argument is not specified, all configured users will be displayed. The community string created will not displayed by this command.

Example

This example shows how to display SNMP users.

```
ZEQUOxxxxRE#show snmp user
```

```
User Name: initial
  Security Model: 3
  Group Name: initial
  Authentication Protocol: None
  Privacy Protocol: None
  Engine ID: 800000ab03f07d6834001000
  IP access control list:
```

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

10.1.3 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.

Syntax

- **snmp-server community** [0 | 7] *COMMUNITY-STRING* [**view** *VIEW-NAME*] [**ro** | **rw**] [**access** *IP-ACL-NAME*] [**context** *CONTEXT*]
- **no snmp-server community** [0 | 7] *COMMUNITY-STRING*

Parameters

Parameters	description
0 <i>COMMUNITY-STRING</i>	(Optional) Specifies the community string in the plain text form with a maximum of 32 alphanumeric characters. This is the default option.
7 <i>COMMUNITY-STRING</i>	(Optional) Specifies the community string in the encrypted form.
view <i>VIEW-NAME</i>	(Optional) Specifies a view name of a previously defined view. It defines the view accessible by the SNMP community.
ro	(Optional) Specifies read-only access.
rw	(Optional) Specifies read-write access.
access <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.
context <i>CONTEXT</i>	(Optional) Specifies the SNMP context name.

Default

Community	View Name	Access right
private	CommunityView	Read/Write
public	CommunityView	Read Only

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command provides an easy way to create a community string for SNMPv1 and SNMPv2c management. When creating a community with the **snmp-server community** command, two SNMP group entries, one for SNMPv1 and one for SNMPv2c, which has the community name as their group names are created. If the view is not specified, it is permitted to access all objects.

Example

This example shows how a MIB view “interfacesMibView” is created and a community string “comaccess” which can do read write access the interfacesMibView view is created.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server view interfacesMibView 1.3.6.1.2.1.2 included
ZEQUOxxxxRE(config)# snmp-server community comaccess view interfacesMibView rw
ZEQUOxxxxRE(config)#
```

10.1.4 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.

Syntax

- **snmp-server engineID local** *ENGINEID-STRING*
- **no snmp-server engineID local**

Parameters

Parameters	description
<i>ENGINEID-STRING</i>	Specifies the engine ID string of a maximum of 24 characters.

Default

A default SNMP engine ID is automatically generated.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server engineID local 3322
ZEQUOxxxxRE(config)#
```

10.1.5 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.

Syntax

- **snmp-server group** *GROUP-NAME* {v1 | v2c | v3 {auth | noauth | priv}} [read *READ-VIEW*] [write *WRITE-VIEW*] [notify *NOTIFY-VIEW*] [access *IP-ACL-NAME*] [context *CONTEXT*]
- **no snmp-server group** *GROUP-NAME* {v1 | v2c | v3 {auth | noauth | priv}}

Parameters

Parameters	description
<i>GROUP-NAME</i>	Specifies the group name of a maximum of 32 characters. The syntax is general string that does not allow space.
v1	Specifies that the group user can use the SNMPv1 security model.
v2c	Specifies that the group user can use the SNMPv2c security model.
v3	Specifies that the group user can use the SNMPv3 security model.
auth	Specifies to authenticate the packet but not encrypt it.
noauth	Specifies not to authenticate and not to encrypt the packet.
priv	Specifies to authenticate and encrypt the packet.
read <i>READ-VIEW</i>	(Optional) Specifies a read-view that the group user can access.
write <i>WRITE-VIEW</i>	(Optional) Specifies a write-view that the group user can access.
notify <i>NOTIFY-VIEW</i>	(Optional) Specifies a notify-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.

Parameters	description
access <i>IP-ACL-NAME</i>	(Optional) Specifies the standard IP access control list (ACL) to associate with the group.
context <i>CONTEXT</i>	(Optional) Specifies the SNMP context name.

Default

Group Name	Version	Security Level	Read View Name	Write View Name	Notify View Name
Initial	SNMPv3	noauth	Restricted	None	Restricted
ReadGroup	SNMPv1	noauth	Community View	None	Community View
ReadGroup	SNMPv2c	noauth	Community View	None	Community View
WriteGroup	SNMPv1	noauth	Community View	Community View	Community View
WriteGroup	SNMPv2c	noauth	Community View	Community View	Community View

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

An SNMP group defines a user group by specifying the allowed security model, the read-view, the write-view, and the notification view. The security model defines that the group user is allowed to use the specified version of SNMP to access the SNMP agent,

The same group name can be created with security models SNMPv1, SNMPv2c, and SNMPv3 at the same time. For SNMPv3, it can be created for SNMPv3 auth and SNMPv3 priv at the same time.

To update the view profile for a group for a specific security mode, delete and create the group with the new view profile.

The read-view defines the MIB objects that the group user is allowed to read. If read-view is not specified, then Internet OID space 1.3.6.1 can be read.

The write-view defines the MIB objects that the group user is allowed to write. If write-view is not specified, then no MIB objects can be written.

The notification view defines the MIB objects that the system can report its status in the notification packets to the trap managers that are identified by the specified group user (act as community string). If notify-view is not specified, then no MIB objects can be reported.

Example

This example shows how to create the SNMP server group "guestgroup" for SNMPv3 access and SNMPv2c.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server view interfacesMibView 1.3.6.1.2.1.2 included
ZEQUOxxxxRE(config)# snmp-server group guestgroup v3 auth read interfacesMibView
ZEQUOxxxxRE(config)# snmp-server group guestgroup v2c read CommunityView write
CommunityView
ZEQUOxxxxRE(config)#
```

10.1.6 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.

Syntax

- **snmp-server host** { *IP-ADDRESS* | *IPV6-ADDRESS* } [version { 1 | 2c | 3 {auth | noauth | priv} }] *COMMUNITY-STRING* [port *PORT-NUMBER*]
- **no snmp-server host** { *IP-ADDRESS* | *IPV6-ADDRESS* }

Parameters

Parameters	description
<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.
version	(Optional) Specifies the version of the SNMP used to send the traps. If not specified, the default is SNMPv1 1 - SNMPv1. 2c - SNMPv2c. 3 - SNMPv3.
auth	(Optional) Specifies to authenticate the packet but not to encrypt it.
noauth	(Optional) Specifies not to authenticate and to encrypt the packet.
priv	(Optional) Specifies to both authenticate and to encrypt the packet.

Parameters	description
<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 snmp-server user command.
port <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.

Command Default Level

Level: 15.

Usage Guideline

SNMP notifications are sent as trap packets. The user should create at least one recipient of a SNMP notification by using the **snmp-server host** command in order for the Switch to send the SNMP notifications. Specify the version of the notification packet for the created user. For SNMPv1 and SNMPv2c, the notification will be sent in the trap protocol data unit (PDU). For SNMPv3, the notification will be sent in the SNMPv2-TRAP-PDU with the SNMPv3 header. When specifying to send the trap packets in SNMPv1 or SNMPv2c to a specific host, the specified community string acts as the community string in the trap packets.

When specifying to send the trap packets in SNMPv3 to a specific host, whether to do authentication and encryption in the sending of the packet should be specified. The specified community string acts as the username in the SNMPv3 packet. The user must be created first using the **snmp-server user** command or **snmp-server user v3** command.

In the sending of the trap packet, the system will check the notification view associated with the specified user (or community name). If the binding variables to be sent with the trap packet are not in the notification view, the notification will not be sent to this host.

NOTE

When using the link aggregation on your device, if the system logs and SNMP traps regarding the link status of the physical port cannot be normally transmitted to the SYSLOG server or SNMP server, you may be able to solve issue by using **logtrap linkchange delay** command.

Example

This example shows how to configure the trap recipient 163.10.50.126 with version 1 with community string "comaccess".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server community comaccess rw
ZEQUOxxxxRE(config)# snmp-server host 163.10.50.126 version 1 comaccess
ZEQUOxxxxRE(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".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server group groupaccess v3 auth read CommunityView write
CommunityView
ZEQUOxxxxRE(config)# snmp-server user useraccess groupaccess v3 auth md5 12345678
ZEQUOxxxxRE(config)# snmp-server host 163.10.50.126 version 3 auth useraccess
ZEQUOxxxxRE(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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server community comaccess rw
ZEQUOxxxxRE(config)# snmp-server host 163.10.50.126 version 1 comaccess port 50001
ZEQUOxxxxRE(config)#
```

10.1.7 snmp-server source-interface traps

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

Syntax

- **snmp-server source-interface traps** *INTERFACE-ID*
- **no snmp-server source-interface traps**

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interface whose IP address will be used as the source address for sending the SNMP trap packet.

Default

The IP address of the closest interface will be used.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to specify the interface whose IP address will be used as the source address for sending the SNMP trap packet.

Example

This example shows how to configure VLAN 100 as the sourcing interface for sending SNMP trap packets.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server source-interface traps vlan100
ZEQUOxxxxRE(config)#
```

10.1.8 snmp-server user

This command is used to create an SNMP user. Use the **no** form of this command to remove an SNMP user.

Syntax

- 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

Parameters	description
<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.
v1	Specifies that the user uses the SNMPv1 security mode.
v2c	Specifies that the user uses the SNMPv2c security mode.
v3	Specifies that the user uses the SNMPv3 security mode.
encrypted	(Optional) Specifies that the following password is in encrypted format.
auth	(Optional) Specifies the authentication level.
md5	(Optional) Specifies to use HMAC-MD5-96 authentication.
sha	(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 encrypted parameter is specified, the length is 32 for MD5 and 40 for SHA. The format is a hexadecimal value.
priv	(Optional) Specifies the type of encryption.
<i>PRIV-PASSWORD</i>	Specifies the private password in the plain-text form. This password can be up to 64 characters. If the encrypted parameter is specified, the length is fixed to 16 octets
access <i>IP-ACL-NAME</i>	(Optional) Specifies the standard IP ACL to associate with the user.

Default

By default, there is one user.

User Name: initial.

Group Name: initial.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

To create an 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 the plain-text password is configured for the user "user1" in the SNMPv3 group public.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server user user1 public v3 auth md5 authpassword priv
privpassword
ZEQUOxxxxRE(config)#
```

This example shows how the MD5 digest string is used instead of the plain text password.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server user user1 public v3 encrypted auth md5
00112233445566778899AABBCCDDEEFF
ZEQUOxxxxRE(config)#
```

10.1.9 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.

Syntax

- **snmp-server view** *VIEW-NAME* *OID-TREE* {included | excluded}
- **no snmp-server view** *VIEW-NAME*

Parameters

Parameters	description
<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.

Parameters	description
included	Specifies the sub-tree to be included in the SNMP view.
excluded	Specifies the sub-tree to be excluded from the SNMP view.

Default

VIEW-NAME	OID-TREE	View Type
Restricted	1.3.6.1.2.1.1	Included
Restricted	1.3.6.1.2.1.11	Included
Restricted	1.3.6.1.6.3.10.2.1	Included
Restricted	1.3.6.1.6.3.11.2.1	Included
Restricted	1.3.6.1.6.3.15.1.1	Included
CommunityView	1	Included
CommunityView	1.3.6.1.6.3	Excluded
CommunityView	1.3.6.1.6.3.1	Included

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to create a view of MIB objects.

Example

This example shows how to create a MIB view called "interfacesMibView" and define an SNMP group "guestgroup" with "interfacesMibView" as the read view.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server view interfacesMibView 1.3.6.1.2.1.2 included
ZEQUOxxxxRE(config)# snmp-server group guestgroup v3 auth read interfacesMibView
ZEQUOxxxxRE(config)#
```

10.1.10show snmp trap link-status

This command is used to display the per interface link status trap state.

Syntax

- show snmp trap link-status [interface *INTERFACE-ID* [, | -]]

Parameters

Parameters	description
interface <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.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display per interface link up/down trap state.

Example

This example shows how to display the interface's link up/down trap state for GigabitEthernet1/0/1 to 1/0/9.

```
ZEQUOxxxxRE#show snmp trap link-status interface gi1/0/1-9
```

Interface	Trap state
-----	-----
Gi1/0/1	Enabled
Gi1/0/2	Enabled
Gi1/0/3	Enabled
Gi1/0/4	Enabled
Gi1/0/5	Enabled
Gi1/0/6	Enabled
Gi1/0/7	Enabled
Gi1/0/8	Enabled
Gi1/0/9	Enabled

```
ZEQUOxxxxRE#
```

10.1.11 show snmp-server

This command is used to display the SNMP server's global state settings and trap related settings.

Syntax

- **show snmp-server [traps]**

Parameters

Parameters	description
traps	(Optional) Specifies to display trap related settings.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use the **show snmp-server** command to display the SNMP server global state settings.

Use the **show snmp-server traps** command to display trap related settings.

Example

This example shows how to display the SNMP server configuration.

```
ZEQUOxxxxRE#show snmp-server

SNMP Server   : Enabled
Name          : Switch
Location      :
Contact       :
SNMP UDP Port   : 161
SNMP Response Broadcast Request : Enabled

ZEQUOxxxxRE#
```

This example shows how to display trap related settings.

```
ZEQUOxxxxRE#show snmp-server traps

Global Trap State : Enabled
Individual Trap State:
  Authentication      : Enabled
  Linkup              : Enabled
  Linkdown            : Enabled
  Coldstart           : Disabled
  Warmstart           : Disabled

ZEQUOxxxxRE#
```

10.1.12show snmp-server trap-sending

This command is used to display the per port SNMP trap sending state.

Syntax

- show snmp-server trap-sending [interface *INTERFACE-ID* [, | -]]

Parameters

Parameters	description
interface <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.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the per port trap sending state. If no optional parameter is specified, all ports will be displayed.

Example

This example shows how to display the trap sending state for gi1/0/1 to 1/0/9.

```
ZEQUOxxxxRE#show snmp-server trap-sending interface gi1/0/1-9
```

Port	Trap Sending
-----	-----
Gi1/0/1	Enabled
Gi1/0/2	Enabled
Gi1/0/3	Enabled
Gi1/0/4	Enabled
Gi1/0/5	Enabled
Gi1/0/6	Enabled
Gi1/0/7	Enabled
Gi1/0/8	Enabled
Gi1/0/9	Enabled
ZEQUOxxxxRE#	

10.1.13snmp-server

This command is used to enable the SNMP agent. Use the **no** form of this command to disable the SNMP agent.

Syntax

- snmp-server
- no snmp-server

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The SNMP manager manages a SNMP agent by sending SNMP requests to agents and receiving SNMP responses and notifications from agents. The SNMP server on the agent must be enabled before the agent can be managed.

Example

This example shows how to enable the SNMP server.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server
ZEQUOxxxxRE(config)#
```

10.1.14snmp-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.

Syntax

- **snmp-server contact** *TEXT*
- **no snmp-server contact**

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

This command configures the system contact information for management of the device.

Example

This example shows how to configure the system contact information with the string MIS Department II.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server contact MIS Department II
ZEQUOxxxxRE(config)#
```

10.1.15snmp-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.

Syntax

- **snmp-server enable traps**
- **no snmp-server enable traps**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command enables the device to send the SNMP notification traps globally. To configure the router to send these SNMP notifications, enter the **snmp-server enable traps** command to enable the global setting.

Example

This example shows how to enable the SNMP traps global sending state.

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

10.1.16snmp-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 sending of all or specific SNMP notifications.

Syntax

- **snmp-server enable traps snmp** [authentication] [linkup] [linkdown] [coldstart] [warmstart]
- **no snmp-server enable traps snmp** [authentication] [linkup] [linkdown] [coldstart] [warmstart]

Parameters

Parameters	description
authentication	(Optional) Specifies to control the sending of SNMP authentication failure notifications. An authenticationFailuretrap is generated when the device receives an SNMP message that is not properly authenticated. The authentication method depends on the version of SNMP being used. For SNMPv1 or SNMPv2c, authentication failure occurs if packets are formed with an incorrect community string. For SNMPv3, authentication failure occurs if packets are formed with an incorrect SHA/MD5 authentication key.
linkup	(Optional) Specifies to control the sending of SNMP linkUp notifications. A linkup (3) trap signifies is generated when the device recognizes that one of the communication links has come up.
linkdown	(Optional) Specifies to control the sending of SNMP linkDown notifications. A linkDown (2) trap is generated when the device recognizes a failure in one of the communication links.
coldstart	(Optional) Specifies to control the sending of SNMP coldStart notifications.
warmstart	(Optional) Specifies to control the sending of SNMP warmStart notifications.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command controls the sending of SNMP standard notification traps. To enable the sending of notification traps, the global setting must be enabled too.

Example

This example shows how to enable the router to send all SNMP traps to the host 10.9.18.100 using the community string defined as public.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server enable traps
ZEQUOxxxxRE(config)# snmp-server enable traps snmp
ZEQUOxxxxRE(config)# snmp-server host 10.9.18.100 version 2c public
ZEQUOxxxxRE(config)#
```

This example shows how to enable the SNMP authentication traps.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server enable traps snmp authentication
ZEQUOxxxxRE(config)#
```

10.1.17snmp-server location

This command is used to configure the system's location information. Use the **no** form of this command to remove the setting.

Syntax

- **snmp-server location** *TEXT*
- **no snmp-server location**

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the system's location information on the Switch.

Example

This example shows how to configure the system's location information with the string "HQ 15F".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server location HQ 15F
ZEQUOxxxxRE(config)#
```

10.1.18snmp-server name

This command is used to configure the system's name information. Use the **no** form of this command to remove the setting.

Syntax

- **snmp-server name** *NAME*
- **no snmp-server name**

Parameters

Parameters	description
<i>NAME</i>	Specifies the string that describes the host name information. The maximum length is 255 characters.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the system's name information on the Switch.

Example

This example shows how to configure the system's name to "SiteA-switch".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server name SiteA-switch
ZEQUOxxxxRE(config)#
```

10.1.19snmp-server trap-sending disable

This command is used to disable the port's trap sending state. Use the **no** form of this command to enable the port's trap sending state.

Syntax

- snmp-server trap-sending disable
- no snmp-server trap-sending disable

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to disable the port to send SNMP notification traps out of the configured port. If the sending is disabled, then SNMP notification traps generated by the system are not allowed to transmit out of the port. The SNMP traps generated by other system and forwarded to the port is not subject to this restriction.

Example

This example shows how to disable the sending of the notification traps out of GigabitEthernet1/0/8.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/8
ZEQUOxxxxRE(config-if)# snmp-server trap-sending disable
ZEQUOxxxxRE(config-if)#
```

10.1.20snmp-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.

Syntax

- **snmp-server service-port** *PORT-NUMBER*
- **no snmp-server service-port**

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the SNMP 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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server service-port 50000
ZEQUOxxxxRE(config)#
```

10.1.21 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.

Syntax

- snmp-server response broadcast-request
- no snmp-server response broadcast-request

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enable or disable the server to response to broadcast SNMP GetRequest packet. NMS tools would send broadcast SNMP GetRequest packets to discover networks device. To support this function, the response to the broadcast get request packet needs to be enabled.

Example

This example shows how to enable the server to respond to the broadcast SNMP get request packet.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server response broadcast-request
ZEQUOxxxxRE(config)#
```

10.1.22snmp 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.

Syntax

- snmp trap link-status
- no snmp trap link-status

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enable or disable the sending of link-up and link-down traps on an interface.

Example

This example shows how to disable the generation of link-up and link-down traps on GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# no snmp trap link-status
ZEQUOxxxxRE(config-if)#
```

10.2 LLDP (Link Layer Discovery Protocol) Commands

LLDP (Link Layer Discovery Protocol) is a function to periodically collect connected device information. If devices, such as an IP phone, printer, and network camera, support LLDP, you can learn what devices are connected where. This function also allows you to identify configuration errors based on collected information and change the protocol settings or switch operations according to the information.

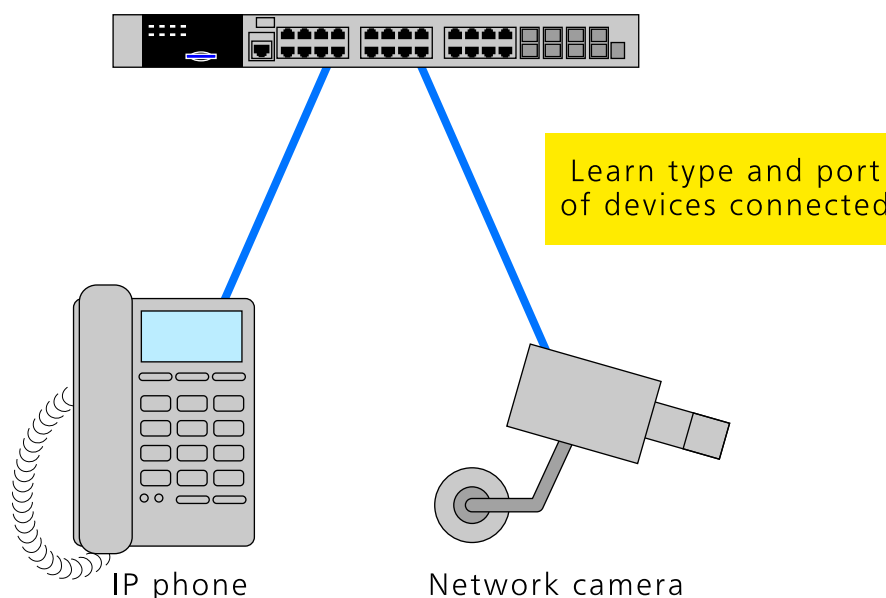


Figure 69-1 LLDP overview

10.2.1 clear lldp counters

This command is used to delete LLDP statistics.

Syntax

- `clear lldp counters [all | interface INTERFACE-ID [, | -]]`

Parameters

Parameters	description
all	(Optional) Specifies to clear LLDP counter information for all interfaces and global LLDP statistics.
interface <i>INTERFACE-ID</i>	(Optional) Specifies the interface to clear LLDP counter information. Valid interfaces are physical 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

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command with the **interface** keyword to reset LLDP statistics of the specified interface(s). If the command **clear lldp counters** is issued with the **all** keyword to clear global LLDP statistics and the LLDP statistics on all interfaces. When no optional parameter is configured, only the LLDP global counters will be cleared.

Example

This example shows how to clear all LLDP statistics.

```
ZEQUOxxxxRE# clear lldp counters all
ZEQUOxxxxRE#
```

10.2.2 clear lldp table

This command is used to delete all LLDP information learned from neighboring devices.

Syntax

- clear lldp table {all | interface *INTERFACE-ID* [, | -]}

Parameters

Parameters	description
all	Specifies to clear LLDP neighboring information for all interfaces.
<i>INTERFACE-ID</i>	Specifies the interface ID. Valid interfaces are physical 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

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

If this command is issued without the **interface** keyword, all neighboring information on all interfaces will be cleared.

Example

This example shows how to clear all neighboring information on all interfaces.

```
ZEQUOxxxxRE# clear lldp table all
ZEQUOxxxxRE#
```

10.2.3 lldp dot1-tlv-select

This command is used to specify which optional type-length-value settings (TLVs) in the IEEE 802.1 organizationally specific TLV set will be transmitted and encapsulated in LLDPDUs, and sent to neighbor devices. Use the **no** form of this command to disable the transmission of TLVs.

Syntax

- `lldp dot1-tlv-select { port-vlan | protocol-vlan VLAN-ID [, | -] | vlan-name [VLAN-ID [, | -]] | protocol-identity [PROTOCOL-NAME] }`
- `no lldp dot1-tlv-select { port-vlan | protocol-vlan [VLAN-ID [, | -]] | vlan-name [VLAN-ID [, | -]] | protocol-identity [PROTOCOL-NAME] }`

Parameters

Parameters	description
port-vlan	Specifies the port VLAN ID TLV to send. The Port VLAN ID TLV is an optional fixed length TLV that allows a VLAN bridge port to advertise the port VLAN identifier (PVID) that will be associated with untagged or priority tagged frames.
protocol-vlan	Specifies the Port and Protocol VLAN ID (PPVID) TLV to send. The PPVID TLV is an optional TLV that allows a bridge port to advertise a port and protocol VLAN ID.
<i>VLAN-ID</i>	Specifies the ID of the VLAN in the PPVID TLV. The VLAN ID range is 1 to 4094. If no VLAN ID is specified, all configured PPVID VLANs will be cleared and no PPVID TLV will be sent.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.
vlan-name	Specifies the VLAN name TLV to send. The VLAN name TLV is an optional TLV that allows an IEEE 802.1Q-compatible IEEE 802 LAN station to advertise the assigned name of any VLAN with which it is configured.
<i>VLAN-ID</i>	(Optional) 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 separate a range of VLANs from a previous range. No space is allowed before and after the comma.

Parameters	description
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.
protocol-identity	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 <i>PROTOCOL-NAME</i> are: eapol - Extensible Authentication Protocol (EAP) over LAN lACP - Link Aggregation Control Protocol GVRP - GARP VLAN Registration Protocol STP - Spanning Tree Protocol

Default

No IEEE 802.1 organizationally specific TLV is selected.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port configurations. If the optional TLVs advertisement state is enabled, they will be encapsulated in LLDPDUs and sent to other devices.

The protocol identity TLV optional data type indicates whether to advertise the corresponding local system protocol identity instance on the port. The protocol identity TLV provides a way for devices to advertise protocols that are important to the operation of the network. For example, protocols like Spanning Tree Protocol, Link Aggregation Control Protocol, and numerous vendor proprietary variations are responsible for maintaining the topology and connectivity of the network. When both of the protocol functions are working and the protocol identity is enabled for advertising on a port, the protocol identity TLV will be advertised.

Only when the configured VLAN ID matches the configuration of the protocol VLAN on that interface and the VLAN exists, then the PPVID TLV for that VLAN will be sent. Only when the interface is a member port of the configured VLAN ID, the VLAN will be advertised in VLAN Name TLV.

Example

This example shows how to enable advertising Port VLAN ID TLV.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# lldp dot1-tlv-select port-vlan
ZEQUOxxxxRE(config-if)#
```

This example shows how to enable advertising Port and Protocol VLAN ID TLV. The advertised VLAN includes 1 to 3.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# lldp dot1-tlv-select protocol-vlan 1-3
ZEQUOxxxxRE(config-if)#
```

This example shows how to enable the VLAN Name TLV advertisement from vlan1 to vlan3.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# lldp dot1-tlv-select vlan-name 1-3
ZEQUOxxxxRE(config-if)#
```

This example shows how to enable the LACP Protocol Identity TLV advertisement.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# lldp dot1-tlv-select protocol-identify lacp
ZEQUOxxxxRE(config-if)#
```

10.2.4 lldp dot3-tlv-select

This command is used to specify which optional type-length-value settings (TLVs) in the IEEE 802.3 organizationally specific TLV set will be encapsulated in LLDPDUs and sent to neighbor devices. Use the **no** form of this command to disable the transmission of the TLVs.

Syntax

- `lldp dot3-tlv-select [mac-phy-cfg | link-aggregation | max-frame-size]`
- `no lldp dot3-tlv-select [mac-phy-cfg | link-aggregation | max-frame-size]`

Parameters

Parameters	description
mac-phy-cfg	(Optional) Specifies the MAC/PHY configuration/status TLV to send. The MAC/PHY configuration/status TLV is an optional TLV that identifies (1) the duplex and bit-rate capability of the sending IEEE 802.3 LAN node, and (2) the current duplex and bit-rate settings of the sending IEEE 802.3 LAN node.
link-aggregation	(Optional) Specifies the link aggregation TLV to send. The link aggregation TLV 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.
max-frame-size	(Optional) Specifies the maximum frame size TLV to send. The maximum frame size TLV indicates the maximum frame size capability of the implemented MAC and PHY.

Default

No IEEE 802.3 organizationally specific TLV is selected.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port configuration. This command enables the advertisement of the optional IEEE 802.3 organizationally specific TLVs. The respective TLV will be encapsulated in LLDPDU and sent to other devices if the advertisement state is enabled.

When no optional parameter is specified, all supported IEEE 802.3 organizationally specific TLVs are selected or de-selected in this command.

Example

This example shows how to enable the advertising MAC/PHY Configuration/Status TLV.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# lldp dot3-tlv-select mac-phy-cfg
ZEQUOxxxxRE(config-if)#
```

10.2.5 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.

Syntax

- **lldp fast-count** *VALUE*
- **no lldp fast-count**

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

When an LLDP-MED capabilities TLV is detected, the application layer will start the fast start mechanism. This command is used to configure the fast start repeat count which indicates the number of LLDP message transmissions for one complete fast start interval.

Example

This example shows how to configure the LLDP MED fast start repeat count.


```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# lldp fast-count 10
ZEQUOxxxxRE(config)#
```

10.2.6 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.

Syntax

- lldp hold-multiplier *VALUE*
- no hold-multiplier

Parameters

Parameters	description
<i>VALUE</i>	Specifies the multiplier on the LLDPDU transmission interval that used to compute the TTL value of an LLDPDU. This value must be between 2 and 10.

Default

By default, this value is 4.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This parameter is a multiplier on the LLDPDU 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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# lldp hold-multiplier 3
ZEQUOxxxxRE(config)#
```

10.2.7 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.

Syntax

- **lldp management-address** [*IP-ADDRESS* | *IPV6-ADDRESS*]
- **no lldp management-address** [*IP-ADDRESS* | *IPV6-ADDRESS*]

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port configuration. This command specifies the IPv4/IPv6 address that is carried in the management address TLV on the specified port. If an IP address is specified, but the address is not associated with one of the interfaces on the system, then the address will not be sent.

When no address is specified using the **lldp management-address** command, the Switch will find at least one IPv4 and IPv6 address in the VLAN with the lowest VLAN ID. If no applicable IPv4/IPv6 address exists, then no management address TLV will be advertised. Once the administrator configures an address, both of the default IPv4 and IPv6 management address will become inactive and will not 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 enable GigabitEthernet1/0/1 and 1/0/2 for setting the management address entry (IPv4).

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface range gil/0/1-1/0/2
ZEQUOxxxxRE(config-if-range)# lldp management-address 10.1.1.1
ZEQUOxxxxRE(config-if-range)#
```

This example shows how to enable GigabitEthernet1/0/3 and 1/0/4 for setting the management address entry (IPv6).

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface range gil/0/3-1/0/4
ZEQUOxxxxRE(config-if-range)# lldp management-address FE80::250:A2FF:FEBF:A056
ZEQUOxxxxRE(config-if-range)#
```

This example shows how to delete the management address 10.1.1.1 from GigabitEthernet1/0/1 and 1/0/2. If 10.1.1.1 is the last one, no management address TLV will be sent.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface range gil/0/1-1/0/2
ZEQUOxxxxRE(config-if-range)# no lldp management-address 10.1.1.1
ZEQUOxxxxRE(config-if-range)#
```

This example shows how to delete the management address FE80::250:A2FF:FEBF:A056 from GigabitEthernet1/0/3. and 1/0/4.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface range gil/0/3-1/0/4
ZEQUOxxxxRE(config-if-range)# no lldp management-address FE80::250:A2FF:FEBF:A056
ZEQUOxxxxRE(config-if-range)#
```

This example shows how to delete all management addresses from GigabitEthernet1/0/5 and then no management address TLV will be sent on GigabitEthernet1/0/5.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/5
ZEQUOxxxxRE(config-if)# no lldp management-address
ZEQUOxxxxRE(config-if)#
```

10.2.8 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.

Syntax

- lldp med-tlv-select [capabilities | inventory-management | network-policy]
- no lldp med-tlv-select [capabilities | inventory-management | network-policy]

Parameters

Parameters	description
capabilities	(Optional) Specifies to transmit the LLDP-MED capabilities TLV.
inventory-management	(Optional) Specifies to transmit the LLDP-MED inventory management TLV.
network-policy	(Optional) Specifies to transmit the LLDP-MED network policy TLV.

Default

No LLDP-MED TLV is selected.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port configuration. This command is used to enable or disable transmitting LLDP-MED TLVs.

When disabling the transmission of the capabilities TLV, LLDP-MED on the physical interface will be disabled at the same time. In other words, all LLDP-MED TLVs will not be sent, even when other LLDP-MED TLVs are enabled.

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 receives LLDP packets only.

Example

This example shows how to enable transmitting LLDP-MED TLVs and LLDP-MED Capabilities TLVs.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# lldp med-tlv-select capabilities
ZEQUOxxxxRE(config-if)#
```

10.2.9 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.

Syntax

- lldp receive
- no lldp receive

Parameters

None.

Default

LLDP is enabled on all supported interfaces.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port configuration. This command is used to enable a physical interface to receive LLDP messages. When LLDP is not running, the Switch does not receive LLDP messages.

Example

This example shows how to enable a physical interface to receive LLDP messages.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# lldp receive
ZEQUOxxxxRE(config-if)#
```

10.2.10 lldp reinit

This command is used to configure the minimum re-initialization the delay on the Switch. Use the **no** form of this command to revert to the default setting.

Syntax

- lldp reinit *SECONDS*
- no lldp reinit

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

A re-enabled LLDP physical interface will wait for the re-initialization delay after the last disable command before reinitializing.

Example

This example shows how to configure the re-initialization delay interval to 5 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# lldp reinit 5
ZEQUOxxxxRE(config)#
```

10.2.11 lldp run

This command is used to enable the LLDP globally. Use the **no** form of this command to revert to the default setting.

Syntax

- lldp run
- no lldp run

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to globally enable LLDP so that the Switch can start to transmit LLDP packets and receive and process the LLDP packets. 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. 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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# lldp run
ZEQUOxxxxRE(config)#
```

10.2.12 lldp forward

This command is used to enable the LLDP forwarding state. Use the **no** form of this command to revert to the default setting.

Syntax

- **lldp forward**
- **no lldp forward**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This is a global control for the LLDP forward. When the LLDP global state is disabled and LLDP forwarding is enabled, the received LLDPDU packet will be forwarded.

Example

This example shows how to enable the LLDP global forwarding state.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# lldp forward
ZEQUOxxxxRE(config)#
```

10.2.13 lldp tlv-select

This command is used to select the TLVs in the 802.1AB basic management set and will be transmitted and encapsulated in the LLDPDUs and sent to neighbor devices. Use the **no** form of this command to revert to the default setting.

Syntax

- lldp tlv-select [port-description | system-capabilities | system-description | system-name]
- no lldp tlv-select [port-description | system-capabilities | system-description | system-name]

Parameters

Parameters	description
port-description	(Optional) Specifies the port description TLV to send. The port description TLV allows for the IEEE 802 LAN station's port description to be advertised.
system-capabilities	(Optional) Specifies the system capabilities TLV to send. The system capabilities field will contain a bit-map of the capabilities that defines the primary functions of the system.

Parameters	description
system-description	(Optional) Specifies the system description TLV to send. The system description should include the full name and version identification of the system's hardware type, software operating system, and networking software.
system-name	(Optional) Specifies the system name TLV to send. The system name should be the system's fully qualified domain name.

Default

No optional 802.1AB basic management TLV is selected.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port configuration. This command is used to select the optional TLVs to be transmitted. If the optional TLVs advertisement is selected, they will be encapsulated in the LLDPDU and sent to other devices.

Example

This example shows how to enable all supported optional 802.1AB basic management TLVs.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# lldp tlv-select
ZEQUOxxxxRE(config-if)#

```

This example shows how to enable advertising the system name TLV.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# lldp tlv-select system-name
ZEQUOxxxxRE(config-if)#

```

10.2.14 lldp transmit

This command is used to enable the LLDP advertise (transmit) capability. Use the **no** form of this command to disable LLDP transmission.

Syntax

- lldp transmit
- no lldp transmit

Parameters

None.

Default

LLDP transmit is enabled on all supported interfaces.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port configuration. This command is used to enable LLDP transmission on a physical interface. When LLDP is not running, the Switch does not transmit LLDP messages.

Example

This example shows how to enable LLDP transmission.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# lldp transmit
ZEQUOxxxxRE(config-if)#
```

10.2.15 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.

Syntax

- lldp tx-delay *SECONDS*
- no lldp tx-delay

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

The LLDP transmission interval must be greater than or equal to four times of the transmission delay timer.

Example

This example shows how to configure the transmission delay timer to 8 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# lldp tx-delay 8
ZEQUOxxxxRE(config)#
```

10.2.16 lldp tx-interval

This command is used to configure the LLDPDU's transmission interval on the Switch. Use the **no** form of this command to revert to the default setting.

Syntax

- `lldp tx-interval SECONDS`
- `no lldp tx-interval`

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

This interval controls the rate at which LLDP packets are sent.

Example

This example shows how to configure LLDP updates to be sent every 50 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# lldp tx-interval 50
ZEQUOxxxxRE(config)#
```

10.2.17 snmp-server enable traps lldp

This command is used to enable the LLDP and LLDP-MED trap state. Use the **no** form of this command disable this feature.

Syntax

- **snmp-server enable traps lldp [med]**
- **no snmp-server enable traps lldp [med]**

Parameters

Parameters	description
med	(Optional) Specifies to enable the LLDP-MED trap state.

Default

The LLDP and LLDP-MED trap states are disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **snmp-server enable traps lldp** command to enable the sending of LLDP notifications.

Use the **snmp-server enable traps lldp med** command to enable the sending of LLDP-MED notifications.

Example

This example shows how to enable the LLDP MED trap.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server enable traps lldp med
ZEQUOxxxxRE(config)#
```

10.2.18 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 this feature.

Syntax

- **lldp [med] notification enable**
- **no lldp [med] notification enable**

Parameters

Parameters	description
med	(Optional) Specifies to enable the LLDP-MED notification state.

Default

The LLDP and LLDP-MED notification states are disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **lldp notification enable** command to enable the sending of LLDP notifications.

Use the **lldp med notification enable** command to enable the sending of LLDP-MED notifications.

Example

This example shows how to enable the sending of LLDP MED notifications for GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# lldp med notification enable
ZEQUOxxxxRE(config-if)#
```

10.2.19 lldp subtype

This command is used to configure the subtype of LLDP TLV(s).

Syntax

- `lldp subtype port-id { mac-address | local }`

Parameters

Parameters	description
<code>port-id</code>	Specifies the subtype of the port ID TLV.
<code>mac-address</code>	Specifies the subtype of the port ID TLV as "MAC Address (3)" and the field of "port ID" to be encoded with the MAC address.
<code>local</code>	Specifies the subtype of the port ID TLV as "Locally assigned (7)" and the field of "port ID" to be encoded with the port number.

Default

The subtype of port ID TLV is local (port number).

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the subtype of LLDP TLV(s). A port ID subtype is used to indicate how the port is being referenced in the port ID field.

Example

This example shows how to configure the subtype of the port ID TLV to mac-address.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# lldp subtype port-id mac-address
ZEQUOxxxxRE(config-if)#
```


10.2.20 show lldp

This command is used to display the general LLDP configuration of the Switch.

Syntax

- show lldp

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the LLDP global configuration of the Switch.

Example

This example shows how to display the LLDP global configuration of the Switch.

```
ZEQUOxxxxRE#show lldp
```

```
LLDP System Information
  Chassis ID Subtype       : MAC Address
  Chassis ID               : 00-50-40-xx-xx-xx
  System Name              :
  System Description       : Gigabit Ethernet Switch
  System Capabilities Supported: Repeater, Bridge
  System Capabilities Enabled  : Repeater, Bridge
LLDP-MED System Information:
  Device Class             : Network Connectivity Device
  Hardware Revision         : A1
  Firmware Revision        : V1.0.0.06
  Software Revision         : V2.0.0.00
  Serial Number            : 73Sxxxxxxxx
  Manufacturer Name        : Panasonic
  Model Name               : ZEQUOxxxxRE
  Asset ID                 :

LLDP Configurations
  LLDP State                : Disabled
  LLDP Forward State        : Disabled
  Message TX Interval       : 30
  Message TX Hold Multiplier: 4
  ReInit Delay              : 2
```

```
--More--
```

10.2.21 show lldp interface

This command is used to display the LLDP configuration on the physical interface.

Syntax

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

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies to the interface ID to be displayed. Valid interfaces are physical 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.

Command Default Level

Level: 1.

Usage Guideline

This command displays the LLDP information of each physical interface.

Example

This example shows how to display a specific physical interface's LLDP configuration.

```
ZEQUOxxxxRE#show lldp interface gi1/0/1
```

```
Port ID: Gi1/0/1
```

```
-----
Port ID                               :Gi1/0/1
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 Port_and_Protocol_VLAN_ID
    (None)
  Enabled VLAN Name
    (None)
  Enabled Protocol_Identity
    (None)
```

```
IEEE 802.3 Organizationally Specific TLVs:
```

```
--More--
```

Display Parameters

Parameters	description
Enabled Management Address	Displays the enabled IPv4/IPv6 addresses. '(None)' means that the user did not configure the management address with the lldp management-address command or the enabled default IPv4 and IPv6 addresses are not applicable.
Enabled Port and Protocol VLAN ID	Displays enabled port and protocol VLANs. The VLAN list is the configured and enabled VLANs. If there is no configured PPVID VLAN, '(None)' is displayed.
Enabled VLAN Name	Displays enabled VLANs for sending VLAN Name TLVs. The VLAN list includes the configured and enabled VLANs. If there is no configured VLAN for the VLAN Name TLV, '(None)' is displayed.
Enabled Protocol Identity	Displays the enabled protocol string for protocol identity TLVs. If there is no enabled protocol for the protocol identity TLV, '(None)' is displayed.

10.2.22show 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.

Syntax

- show lldp local interface *INTERFACE-ID* [, | -] [brief | detail]

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interface ID. Valid interfaces are physical 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.
brief	(Optional) Specifies to display the information in brief mode.
detail	(Optional) Specifies to display the information in detailed mode. If neither brief nor detail is specified, display the information in the normal mode.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays each physical interface's local LLDP information currently available for populating outbound LLDP advertisements.

Example

This example shows how to display the local information of port 1 in detailed mode.

```
ZEQUOxxxxRE#show lldp local interface gi1/0/1 detail
```

```
Port ID: Gi1/0/1
```

```
-----
Port ID Subtype           : Local
Port ID                   : Gi1/0/1
Port Description          : Panasonic ZEQUOxxxxRE HW A1
                           : firmware V2.0.0.00 Port 1 on Unit 1
Port PVID                 : 1
Management Address Count  : 2
```

```
    Address 1 : (default)
      Subtype           : IPv4
      Address           : 192.168.70.124
      IF Type           : IfIndex
      OID               : 1.3.6.1.4.1.396.5.4.1.40
```

```
    Address 2 :
      Subtype           : IPv4
      Address           : 192.168.70.124
      IF Type           : IfIndex
      OID               : 1.3.6.1.4.1.396.5.4.1.40
```

```
PPVID Entries Count      : 0
      (None)
--More--
```

This example shows how to display the local information of port 1 in normal mode.

```
ZEQUOxxxxRE#show lldp local interface gil/0/1

Port ID: Gil/0/1
-----
Port ID Subtype           : Local
Port ID                   : Gil/0/1
Port Description           : Panasonic ZEQUOxxxxRE HW A1
                           : firmware V2.0.0.00 Port 1 on Unit 1
Port PVID                  : 1
Management Address Count  : 1
PPVID Entries Count       : 0
VLAN Name Entries Count   : 1
Protocol Identity Entries Count : 0
MAC/PHY Configuration/Status : (See Detail)
Link Aggregation          : (See Detail)
Maximum Frame Size        : 1518
LLDP-MED capabilities     : (See Detail)
Network Policy            : (See Detail)
```

ZEQUOxxxxRE#

This example shows how to display local information of port 1 in brief mode.

```
ZEQUOxxxxRE#show lldp local interface gil/0/1 brief

Port ID: Gil/0/1
-----
Port ID Subtype           : Local
Port ID                   : Gil/0/1
Port Description           : Panasonic ZEQUOxxxxRE HW A1
                           : firmware V2.0.0.00 Port 1 on Unit 1
```

ZEQUOxxxxRE#

10.2.23 show lldp management-address

This command is used to display the management address information.

Syntax

- show lldp management-address [*IP-ADDRESS* | *IPV6-ADDRESS*]

Parameters

Parameters	description
<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.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the management address information.

Example

This example shows how to display all management address information.

```
ZEQUOxxxxRE# show lldp management-address
```

```
Address 1 : (default)
```

```
-----
Subtype                : IPv4
Address                : 10.90.90.90
IF Type                : IfIndex
OID                   : 1.3.6.1.4.1.171.10.118.2
Advertising Ports      : -
```

```
Address 2 :
```

```
-----
Subtype                : IPv4
Address                : 10.90.90.90
IF Type                : IfIndex
OID                   : 1.3.6.1.4.1.171.10.118.2
Advertising Ports      : -
```

```
Total Entries : 2
```

```
ZEQUOxxxxRE#
```

10.2.24 show lldp neighbor interface

This command is used to display the information currently learned from the neighbor on the specific physical interface.

Syntax

- `show lldp neighbors interface INTERFACE-ID [, | -] [brief | detail]`

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interface ID. Valid interfaces are physical 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.
brief	(Optional) Specifies to display the information in brief mode.
detail	(Optional) Specifies to display the information in detailed mode. If neither brief nor detail is specified, display the information in normal mode.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command display the information learned from the neighbor devices.

Example

This example shows how to display information about neighboring devices learned by LLDP on GigabitEthernet1/0/9 in detailed mode.

```
ZEU06600RE#show lldp neighbors interface gil/0/9 detail
```

```
Port ID: Gil/0/9
```

```
-----
Remote Entities Count : 1
```

```
Entity 1
```

Chassis ID Subtype	: MAC Address
Chassis ID	: 00-50-40-xx-xx-xx
Port ID Subtype	: Local
Port ID	: Gil/0/7
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
(None)	
MAC/PHY Configuration/Status	: (None)
Power Via MDI	: (None)
Link Aggregation	: (None)
Maximum Frame Size	: 0
Unknown TLVs Count	: 0
(None)	

```
LLDP-MED Capabilities Enabled:
```

Capabilities	: Not Support
Network Policy	: Not Support
Location Identification	: Not Support
Extended Power Via MDI	: Not Support
Inventory	: Not Support

```
Inventory Management:
```

```
None
```

```
ZEQUOxxxxRE#
```

This example shows how to display remote LLDP information in the normal mode.

```

ZEQUOxxxxRE# show lldp neighbor interface gil/0/1

Port ID : 1
-----
Remote Entities Count : 2
Entity 1
  Chassis ID Subtype      : MAC Address
  Chassis ID              : 00-01-02-03-04-01
  Port ID Subtype         : Local
  Port ID                 : Gil/0/1
  Port Description        : RMON Port 1 on Unit 1
  System Name             : Switch1
  System Description      : Stackable Ethernet Switch
  System Capabilities Supported : Repeater, Bridge
  System Capabilities Enabled  : Repeater, Bridge
  Management Address Count  : 1
  Port VLAN ID            : 1
  PPVID Entries Count      : 5
  VLAN Name Entries Count  : 3
  Protocol ID Entries Count : 2
  MAC/PHY Configuration Status : (See Detail)
  Power Via MDI            : (See Detail)
  Link Aggregation        : (See Detail)
  Maximum Frame Size      : 1536
  LLDP-MED capabilities    : (See Detail)
  Network policy          : (See Detail)
  Extended Power Via MDI   : (See Detail)
  Inventory Management     : (See Detail)
  Unknown TLVs Count      : 2
Entity 2
  Chassis ID Subtype      : MAC Address
  Chassis ID              : 00-01-02-03-04-02
  Port ID Subtype         : Local
  Port ID                 : Gil/0/1
  Port Description        : RMON Port 1 on Unit 2
  System Name             : Switch2
  System Description      : Stackable Ethernet Switch
System Capabilities Supported : Repeater, Bridge
System Capabilities Enabled  : Repeater, Bridge
  Management Address Count  : 2
  Port VLAN ID            : 1
  PPVID Entries Count      : 5
  VLAN Name Entries Count  : 3
  Protocol Id Entries Count : 2
  MAC/PHY Configuration Status : (See Detail)
  Power Via MDI            : (See Detail)
  Link Aggregation        : (See Detail)
  Maximum Frame Size      : 1536
  LLDP-MED capabilities    : (See Detail)
  Extended power via MDI   : (See Detail)
Network policy             : (See Detail)
  Inventory Management     : (See Detail)
Unknown TLVs Count        : 2

ZEQUOxxxxRE#

```

This example shows how to display the neighbor information on GigabitEthernet1/0/1 to 1/0/2 in brief mode.

```
ZEQUOxxxxRE# show lldp neighbor interface gi1/0/1-1/0/2 brief
```

```
Port ID: Gi1/0/1
```

```
-----
```

```
Remote Entities Count : 2
```

```
Entity 1
```

```
Chassis ID Subtype      : MAC Address
Chassis ID              : 00-01-02-03-04-01
Port ID Subtype         : Local
Port ID                 : Gi1/0/1
Port Description        : RMON Port 1 on Unit 3
```

```
Entity 2
```

```
Chassis ID Subtype      : MAC Address
Chassis ID              : 00-01-02-03-04-02
Port ID Subtype         : Local
Port ID                 : Gi1/0/2
Port Description        : RMON Port 1 on Unit 4
```

```
Port ID : Gi1/0/2
```

```
-----
```

```
Remote Entities Count : 3
```

```
Entity 1
```

```
Chassis ID Subtype      : MAC Address
Chassis ID              : 00-01-02-03-04-03
Port ID Subtype         : Local
Port ID                 : Gi1/0/4
Port Description        : RMON Port 2 on Unit 1
```

```
Entity 2
```

```
Chassis ID Subtype      : MAC Address
Chassis ID              : 00-01-02-03-04-04
Port ID Subtype         : Local
Port ID                 : Gi1/0/5
Port Description        : RMON Port 2 on Unit 2
```

```
Entity 3
```

```
Chassis ID Subtype      : MAC Address
Chassis ID              : 00-01-02-03-04-05
Port ID Subtype         : Local
Port ID                 : Gi1/0/6
Port Description        : RMON Port 2 on Unit 3
```

```
Total Entries: 2
```

```
ZEQUOxxxxRE#
```

10.2.25show lldp traffic

This command is used to display the system's global LLDP traffic information.

Syntax

- show lldp traffic

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

The global LLDP traffic information displays an overview of neighbor detection activities on the Switch.

Example

This example shows how to display global LLDP traffic information.

```
ZEQUOxxxxRE#show lldp traffic
```

```
Last Change Time   : 0D0H1M30S
Total Inserts      : 2
Total Deletes      : 0
Total Drops        : 0
Total Ageouts      : 1
```

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Last Change Time	The amount of time since the last update to the remote table in days, hours, minutes, and seconds.
Total Inserts	Total number of inserts to the remote data table.
Total Deletes	Total number of deletes from the remote data table.
Total Drops	Total number of times that the remote data was received but not inserted due to insufficient resources.
Total Ageouts	Total number of times a complete remote data entry was deleted because the Time to Live interval expired.

10.2.26 show lldp traffic interface

This command is used to display the LLDP traffic information on the specific physical interface.

Syntax

- show lldp traffic interface *INTERFACE-ID* [, | -]

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interface ID. Valid interfaces are physical 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.

Command Default Level

Level: 1.

Usage Guideline

This command displays LLDP traffic on each physical interface.

Example

This example shows how to display statistics information of port 1.

```
ZEQUOxxxxRE#show lldp traffic interface gi1/0/1
```

```
Port ID : Gi1/0/1
```

```
-----
Total Transmits      : 0
Total Discards       : 0
Total Errors         : 0
Total Receives       : 0
Total TLV Discards   : 0
Total TLV Unknowns   : 0
Total Ageouts        : 0
```

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Total Transmits	The total number of LLDP packets transmitted on the port.
Total Discards	The total number of LLDP frames discarded on the port for any reason.
Total Errors	The number of invalid LLDP frames received on the port.
Total Receives	The total number of LLDP packets received on the port.
Total TLV Discards	The number of TLVs discarded.
Total TLV Unknowns	The total number of LLDP TLVs received on the port where the type value is in the reserved range, and not recognized.
Total Ageouts	The total number of times a complete remote data entry was deleted for the port because the Time to Live interval expired.

10.3 SMTP (Simple Mail Transfer Protocol) Commands

10.3.1 smtp server

This command is used to configure the SMTP server and port setting.

Syntax

- `smtp server { IP-ADDRESS | IPV6-ADDRESS } [port PORT]`
- `no smtp server [port]`

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IPv4 address of the SMTP server.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the SMTP server.
port <i>PORT</i>	Specifies the TCP port number used to contact the SMTP server. The valid range is from 1 and 65535.

Default

By default, no server address is configured.
By default, the port number is 25.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The system provides the service to send SYSLOG messages to email receivers via SMTP. Email messages will only be sent only when the mail server, recipient, and own mail address are configured. The Switch acts as the SMTP client and sends the SYSLOG message to the SMTP server, then the server will delivers email messages to the recipient. Up to one SMTP server can be configured for a switch.

Example

This example shows how to configure the server IP to 172.18.208.9 and the TCP port to 587.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# smtp server 172.18.208.9 port 587
ZEQUOxxxxRE(config)#
```

10.3.2 smtp self

This command is used to configure the email address which represents the Switch that sends the email message. Use the **no** form of this command to remove the self email address.

Syntax

- **smtp self** *EMAIL-ADDRESS*
- **no smtp self**

Parameters

Parameters	description
self <i>EMAIL-ADDRESS</i>	Specifies the email address that which represents the Switch.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the email address that represents the Switch. Only one email address can be configured for this switch.

Example

This example shows how to configure the Switch's email sender address as switch@domain.com.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# smtp self switch@domain.com
ZEQUOxxxxRE(config)#
```

10.3.3 smtp recipient

This command is used to configure the recipient where the email will be sent. Use the **no** form of this command to remove a recipient.

Syntax

- **smtp recipient** *EMAIL-ADDRESS*
- **no smtp recipient** { *all* | *EMAIL-ADDRESS* }

Parameters

Parameters	description
<i>EMAIL-ADDRESS</i>	Specifies a recipient to receive the email.
all	Specifies all recipients to be removed.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The system provides the service to send SYSLOG messages to email receivers via SMTP. Use the **smtp recipient** command to configure the email address to receive the email message. By default, no messages will be sent. Use the **logging smtp** command to enable the sending of SYSLOG messages to the email recipients and configure the filtering criteria.

Example

This example shows how to add the receiver mail address as receiver@domain.com.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# smtp recipient receiver@domain.com
ZEQUOxxxxRE(config)#
```

10.3.4 smtp interval

This command is used to configure the SMTP interval time. Use the **no** form of this command to revert to the default setting.

Syntax

- **smtp interval** *MINUTES*
- **no smtp interval**

Parameters

Parameters	description
<i>MINUTES</i>	Specifies the SMTP sending interval. If set to 0, the Switch will send a mail for each event immediately.

Default

By default, this value is 30 minutes.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the SMTP sending interval that the Switch uses.

Example

This example shows how to configure the interval to 10 minutes.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# smtp interval 10
ZEQUOxxxxRE(config)#
```

10.3.5 show smtp

This command is used to display SMTP information.

Syntax

- show smtp

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display information of SMTP.

Example

This example shows how to display SMTP information.

```
ZEQUOxxxxRE#show smtp

SMTP IPv4 Server Address: 172.18.208.9
SMTP IPv4 Server Port   : 587
SMTP IPv6 Server Address: 1000::1111
SMTP IPv6 Server Port   : 25
Self Mail Address       : switch@domain.com
Send Interval           : 10

Index   Mail Receiver Address
-----
1       receiver@domain.com
2       receiver2@domain.com
3       receiver3@domain.com
4       receiver4@domain.com
5       receiver5@domain.com
6       receiver6@domain.com
7       receiver7@domain.com
8       receiver8@domain.com
ZEQUOxxxxRE#
```

10.3.6 smtp send-testmsg

This command is used to check the reachability of the SMTP server.

Syntax

- smtp send-testmsg

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to check the reachability of the SMTP server. An email will be sent to all of the configured recipients.

Example

This example shows how to send a test mail to all users currently configured in the recipient list.

```
ZEQUOxxxxRE#smtp send-testmsg
```

```
Subject:Test SMTP  
Content:This is the text message.
```

```
Sending mail, please wait...  
ZEQUOxxxxRE#
```

11 IP packet relay and IP additional functions

11.1 DHCP Client Commands

ARP (Address Resolution Protocol) is used to calculate a MAC address from an IP address if the destination MAC address is unknown.

Gratuitous ARP is a special ARP packet sent when an IP interface is booted, sending an inquiry by setting its own IP address instead of the destination IP address. If other device responds to Gratuitous ARP, it means the IP address is duplicated.

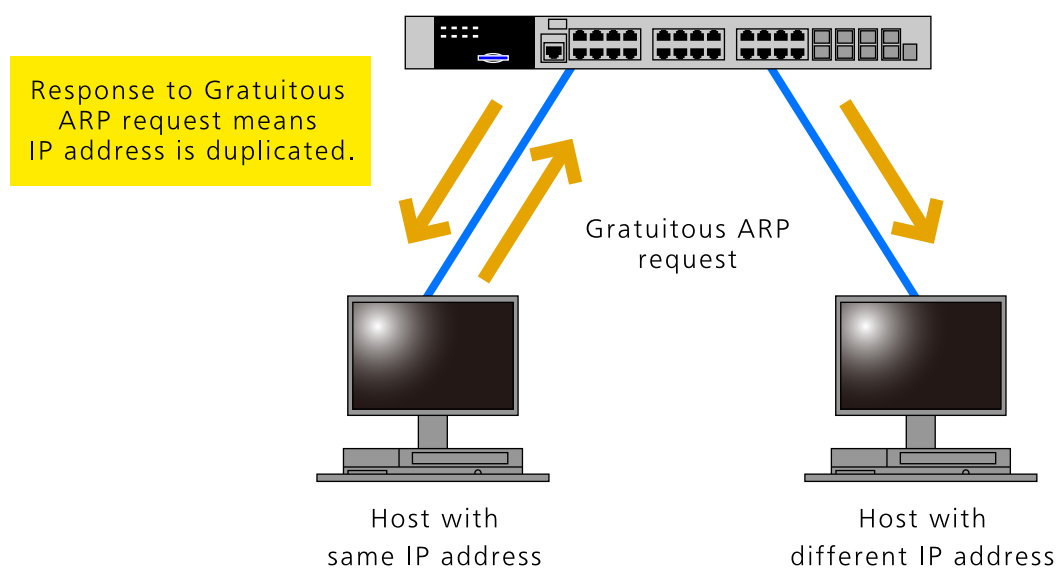


Figure 71-1 Gratuitous ARP overview

11.1.1 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.

Syntax

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

Parameters

Parameters	description
<i>STRING</i>	Specifies the vendor class identifier in the string form. The maximum length of the string is 32.
<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.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. 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.

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


11.1.2 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.

Syntax

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

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration. 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.

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

11.1.3 ip dhcp client hostname

This command is used to specify the value of the host name option to be sent with the DHCP discover message. Use the **no** form of this command to revert to the default setting.

Syntax

- ip dhcp client hostname *HOST-NAME*
- no ip dhcp client hostname

Parameters

Parameters	description
<i>HOST-NAME</i>	Specifies the host name. The maximum length is 64 characters. The host name must start with a letter, end with a letter or digit, and only with interior characters letters, digits, and hyphens.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration.

se this command to specify the host name string (Option 12) to be sent with the DHCP discover message. The specification only applies to the subsequent sending of the DHCP discover messages. The setting only takes effect when the DHCP client is enabled on the interface to acquire the IP address from the DHCP server. If this option is not configured, the name defined by the **snmp-server name** command will be sent as Option 12 with the message.

Example

This example shows how to set the host name option value to Site-A-Switch.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan 100
ZEQUOxxxxRE(config-if)# ip dhcp client hostname Site-A-Switch
ZEQUOxxxxRE(config-if)#
```

11.1.4 ip dhcp client lease

This command is used to specify the preferred lease time for the IP address to request from the DHCP server. Use the **no** form of this command to disable sending of the lease option.

Syntax

- **ip dhcp client lease** *DAYS* [*HOURS* [*MINUTES*]]
- **no ip dhcp client lease**

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for VLAN interface configuration.

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.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan 100
ZEQUOxxxxRE(config-if)# ip address dhcp
ZEQUOxxxxRE(config-if)# ip dhcp client lease 5
ZEQUOxxxxRE(config-if)#
```

11.2 DHCP Server Commands

DHCP (Dynamic Host Configuration Protocol) is a function to obtain an IP address from the DHCP server when the client is booted. This switch can be used as a DHCP server.

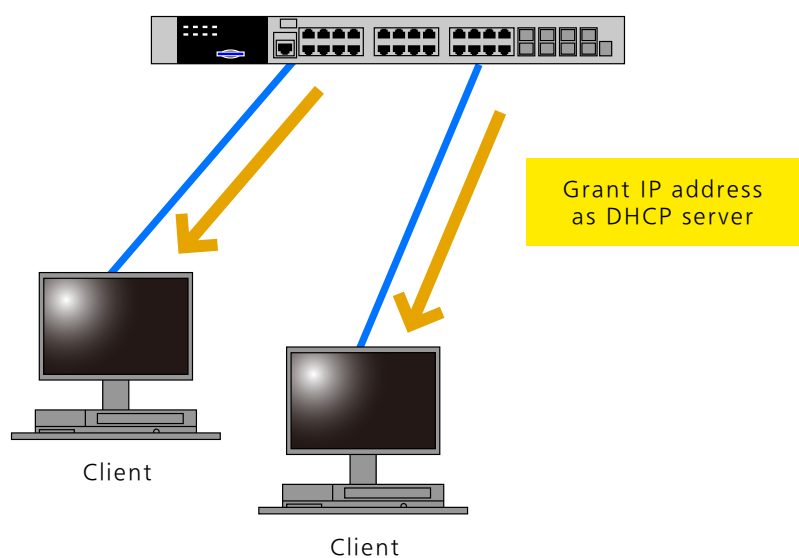


Figure 72-1

To use this switch as a DHCP server, you need to configure the range and expiration time of an IP address assigned to the client. (Up to 1024 IP addresses can be issued.)

For devices using a static IP address, you can create a mapping between MAC addresses and IP addresses and assign it to the devices.

Setting changes are applied after this switch is rebooted.

11.2.1 address range

This command is used to specify an IP address range to be associated with a DHCP class in a DHCP address pool. Use the **no** form of this command to remove the address range to be associated with a DHCP class.

Syntax

- **address range** *START-IP-ADDRESS END-IP-ADDRESS*
- **no address range** *START-IP-ADDRESS END-IP-ADDRESS*

Parameters

Parameters	description
<i>START-IP-ADDRESS</i>	Specifies the address or the first address in a range of addresses.
<i>END-IP-ADDRESS</i>	Specifies the last address in a range of addresses.

Default

None.

Command Mode

DHCP Pool Class Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **address range** command and the **class** command in a DHCP address pool to restrict the allocation of IP address from a subnet in the address pool. The network for allocating addresses is partitioned based on the DHCP option value of the request. If an address pool has classes defined, the allocation of address will be based on the class from this address pool if the IP DHCP use class setting is enabled.

When the server attempts to allocate an address from an address pool and if the address pool has classes defined, the server will check first whether the pool contains the subnet appropriate for the request. If the subnet of the address pool contains the GIADDR (if not zero) or the subnet of the received interface, then the server will directly match the class definition of the address pool to allocate the address. The server will only allocate an address from the matched class.

To remove an address range, only the exact range of addresses that are previously configured can be specified.

Example

This example shows how a DHCP class "Customer-A" is created with the relay information option matching pattern. They are associated with an address range in the DHCP address pool "pool1".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp class Customer-A
ZEQUOxxxxRE(config-dhcp-class)# option 82 hex 1234 *
ZEQUOxxxxRE(config-dhcp-class)# exit
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# network 172.28.5.0/24
ZEQUOxxxxRE(config-dhcp-pool)# class Customer-A
ZEQUOxxxxRE(config-dhcp-pool-class)# address range 172.28.5.1 172.28.5.12
witch(config-dhcp-pool-class)#
```

11.2.2 bootfile

This command is used to specify the configuration file or image file for the DHCP client to boot the device. Use the **no** form of this command to remove the specification of the boot file.

Syntax

- **bootfile** *URL*
- **no bootfile**

Parameters

Parameters	description
<i>URL</i>	Specifies the boot file URL. This URL can be up to 64 characters long.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the configuration file or the image file for the DHCP client to boot the device. The **next-server** command specifies the location of the server where the boot file resides.

Example

This example shows how to specify “mdubootfile.rom” as the name of the boot file for DHCP pool 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# bootfile mdubootfile.rom
ZEQUOxxxxRE(config-dhcp-pool)#
```

11.2.3 clear ip dhcp binding

This command is used to delete the address binding entry from the DHCP server database.

Syntax

- clear ip dhcp {all | pool *NAME*} binding { * | *IP-ADDRESS*}

Parameters

Parameters	description
all	Specifies to clear the binding entries for all pools.
pool <i>NAME</i>	Specifies the name of the DHCP pool.
*	Specifies to clear all binding entries associated with the specified pool.
<i>IP-ADDRESS</i>	Specifies the IP address of the binding entry to be deleted.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to delete the binding of addresses. If **pool** is specified but the IP address is specified as *****, then all automatic binding entries associated with the pool will be deleted. If **pool** is specified as **all** and the IP address is specified, then the automatic binding entry specific to the IP address will be deleted regardless of the pool that contains the binding entry. If both **pool** and the IP address are specified, then the automatic entry of the specified IP address in the specific pool will be cleared.

Example

This example shows how to delete the address binding 10.12.1.99 from the DHCP server database.

```
ZEQUOxxxxRE# clear ip dhcp all binding 10.12.1.99
ZEQUOxxxxRE#
```

This example shows how to delete all bindings from all pools.

```
ZEQUOxxxxRE# clear ip dhcp all binding *
ZEQUOxxxxRE#
```

This example shows how to delete address binding 10.13.2.99 from the address pool named pool2.

```
ZEQUOxxxxRE# clear ip dhcp pool pool2 binding 10.13.2.99
ZEQUOxxxxRE#
```

11.2.4 clear ip dhcp conflict

This command is used to clear the DHCP conflict entry from the DHCP server database.

Syntax

- `clear ip dhcp {all | pool NAME} conflict { * | IP-ADDRESS}`

Parameters

Parameters	description
all	Specifies to clear conflict entries for all pools.
pool <i>NAME</i>	Specifies the name of the DHCP pool.
*	Specifies to clear all conflict entries associated with the specified pool.
<i>IP-ADDRESS</i>	Specifies the IP address of the conflict entry to be deleted.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to delete the address from the conflict table. The deleted address will be returned to the address pool and free to be assigned. The DHCP server detects the conflict of an IP address by using a ping operation.

If **pool** is specified but the IP address is specified as *, then all conflict entries specific to the pool will be deleted. If **pool** is specified as all and the IP address is specified, then the specified conflict entry will be deleted regardless of the pool that contains the conflict entry. If both **pool** and the IP address are specified, then the specified conflict entry specific to the specific pool will be cleared.

Example

This example shows how to clear an address conflict of 10.12.1.99 from the DHCP server database.

```
ZEQUOxxxxRE# clear ip dhcp all conflict 10.12.1.99
ZEQUOxxxxRE#
```

This example shows how to delete the all conflict addresses from the DHCP server database.

```
ZEQUOxxxxRE# clear ip dhcp all conflict *
ZEQUOxxxxRE#
```

This example shows how to delete all address conflicts from the address pool named pool 1.

```
ZEQUOxxxxRE# clear ip dhcp pool pool1 conflict *
ZEQUOxxxxRE#
```

This example shows how to delete an address conflict 10.13.2.99 from the address pool named pool 2.

```
ZEQUOxxxxRE# clear ip dhcp pool pool2 conflict 10.13.2.99
ZEQUOxxxxRE#
```

11.2.5 clear ip dhcp server statistics

This command is used to reset all DHCP server counters.

Syntax

- clear ip dhcp server statistics

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear all of DHCP statistic counters.

Example

This example shows how to reset all DHCP counters to zero.

```
ZEQUOxxxxRE# clear ip dhcp server statistics  
ZEQUOxxxxRE#
```

11.2.6 class (DHCP Relay & Server)

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

Syntax

- class *NAME*
- no class *NAME*

Parameters

Parameters	description
<i>NAME</i>	Specifies the DHCP class name. This name can be up to 32 characters long.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12

Usage Guideline

Use the **address range** command and the **class** command in a DHCP address pool to restrict the allocation of IP address from subnet in the address pool. Thus, the network for allocating addresses is partitioned based on the DHCP option value of the request.

If an address pool has classes defined, the allocation of addresses from this address pool will be based on the class if the IP DHCP use class setting is enabled. In a DHCP relay pool, the user can further use the **class** command to associate a DHCP pool class and then use relay targets to set a list of relay target addresses for DHCP packet forwarding. If the client request matches a relay pool which is configured with classes, then the client must match a class configured in the pool in order to be relayed. If no DHCP class is configured, then the request will only be matched against the relay pool and will be relayed to the relay destination server specified for the matched relay pool.

Example

This example shows how two DHCP classes Customer-A and Customer-B are created with option matching patterns. They are associated with address ranges in the DHCP server address pool "srv-pool1".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp class Customer-A
ZEQUOxxxxRE(config-dhcp-class)# option 82 hex 1234 *
ZEQUOxxxxRE(config-dhcp-class)# exit
ZEQUOxxxxRE(config)# ip dhcp class Customer-B
ZEQUOxxxxRE(config-dhcp-class)# option 82 hex 5678 *
ZEQUOxxxxRE(config-dhcp-class)# exit
ZEQUOxxxxRE(config)# ip dhcp pool srv-pool1
ZEQUOxxxxRE(config-dhcp-pool)# network 172.28.5.0/24
ZEQUOxxxxRE(config-dhcp-pool)# class Customer-A
ZEQUOxxxxRE(config-dhcp-pool-class)# address-range 172.28.5.1 172.28.5.12
ZEQUOxxxxRE(config-dhcp-pool-class)# exit
ZEQUOxxxxRE(config-dhcp-pool)# class Customer-B
ZEQUOxxxxRE(config-dhcp-pool-class)# address-range 172.28.5.18 172.28.5.32
ZEQUOxxxxRE(config-dhcp-pool-class)#
```

This example shows how a DHCP class Service-A is configured and defined with a DHCP Option 60 matching pattern 0x112233 and 0x102030. Another class Service-B is configured and defined with a DHCP Option 60 matching pattern 0x556677 and 0x506070. A class Default-class is configured with no option hexadecimal command. These defined classes are used in the relay pool "pool1". The class Service-A is associated with relay target 10.2.1.2 and the class Service-B is associated with relay target 10.2.1.5. The class Default-class is associated with the relay target 10.2.1.32.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp class Service-A
ZEQUOxxxxRE(config-dhcp-class)# option 60 hex 112233
ZEQUOxxxxRE(config-dhcp-class)# option 60 hex 102030
ZEQUOxxxxRE(config-dhcp-class)# exit
ZEQUOxxxxRE(config)# ip dhcp class Service-B
ZEQUOxxxxRE(config-dhcp-class)# option 60 hex 556677
ZEQUOxxxxRE(config-dhcp-class)# option 60 hex 506070
ZEQUOxxxxRE(config-dhcp-class)# exit
ZEQUOxxxxRE(config)# ip dhcp class Default-class
ZEQUOxxxxRE(config-dhcp-class)# exit
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# relay source 172.19.18 255.255.255.0
ZEQUOxxxxRE(config-dhcp-pool)# class Service-A
ZEQUOxxxxRE(config-dhcp-pool-class)# relay target 10.2.1.2
ZEQUOxxxxRE(config-dhcp-pool-class)# exit
ZEQUOxxxxRE(config-dhcp-pool)# class Service-B
ZEQUOxxxxRE(config-dhcp-pool-class)# relay target 10.2.1.5
ZEQUOxxxxRE(config-dhcp-pool)# exit
ZEQUOxxxxRE(config-dhcp-pool)# class Default-class
ZEQUOxxxxRE(config-dhcp-pool-class)# relay target 10.2.1.32
ZEQUOxxxxRE(config-dhcp-pool)#
```

11.2.7 client-identifier

This command is used to specify the unique DHCP client ID of the manual binding entry in a DHCP address pool. Use the **no** form of this command to remove the specification of the client identifier.

Syntax

- **client-identifier** *IDENTIFIER*
- **no client-identifier**

Parameters

Parameters	description
<i>IDENTIFIER</i>	Specifies a DHCP client identifier in hexadecimal notation.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is valid for manual binding entries in a DHCP address pool. The client identifier is formatted by media type and the MAC address. Only one manual binding entry can be specified in a DHCP address pool. With a manual binding entry, the IP address can be either be bound with a client-identifier or bound with the hardware address of the host.

Use the **client-identifier** command and the **host** command to specify the manual binding entry based on the client-identifier in the DHCP packet.

Example

This example shows how a DHCP address pool “pool1” is created with a manual binding entry which binds the IP address 10.1.2.3/24 with client ID 0x01524153203124.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# client-identifier 01524153203124
ZEQUOxxxxRE(config-dhcp-pool)# host 10.1.2.3/24
ZEQUOxxxxRE(config-dhcp-pool)#
```

11.2.8 default-router

This command is used to specify default routers for the DHCP client. Use the **no** form of this command to remove the default router.

Syntax

- **default-router** *IP-ADDRESS* [*IP-ADDRESS2*...*IP-ADDRESS8*]
- **no default-router** *IP-ADDRESS* [*IP-ADDRESS2*...*IP-ADDRESS8*]

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IP address of the default router for the DHCP client.
<i>IP-ADDRESS2</i> ... <i>IP-ADDRESS8</i>	Specifies multiple IP addresses, separated by spaces. Up to eight addresses can be specified.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the default routers for the clients. The IP address of the router should be on the same subnet as the client's subnet. Routers are listed in the order of preference. If default routers are already configured, the default routers configured later will be added to the default interface list.

Example

This example shows how to specify 10.1.1.1 as the IP address of the default router in the DHCP address pool.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# default-router 10.1.1.1
```

11.2.9 domain-name

This command is used to specify the domain name for a DHCP client. Use the **no** form of this command to remove the domain name.

- **domain-name** *NAME*
- **no domain-name**

Parameters

Parameters	description
<i>NAME</i>	Specifies the domain name. This name can be up to 64 characters long.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command configures the domain name for the DHCP client. Only one domain name can be specified.

Example

This example shows how to specify the domain name as domain.com in the DHCP address pool.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# domain-name domain.com
```

11.2.10dns-server

This command is used to specify DNS servers for the DHCP client. Use the **no** form of this command to remove the specific DNS server

Syntax

- **dns-server** *IP-ADDRESS* [*IP-ADDRESS2*...*IP-ADDRESS8*]
- **no dns-server** *IP-ADDRESS* [*IP-ADDRESS2*...*IP-ADDRESS8*]

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies an IP addresses to be used by the DHCP client as the DNS server.
<i>IP-ADDRESS2</i> ... <i>IP-ADDRESS8</i>	Specifies multiple IP addresses, separated by spaces. Up to eight servers can be specified.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the command to configure the IP address that will be used by the client as the DNS server. Up to eight servers can be specified. Servers are listed in the order of preference. If DNS servers are already configured, the DNS servers configured later will be added to the DNS server list.

Example

This example shows how to specify 10.1.1.1 as the IP address of the DNS server in the DHCP address pool.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# dns-server 10.1.1.1
```

11.2.11 hardware-address

This command is used to specify the hardware address of the manual binding entry in the DHCP address pool. Use the **no** form of this command to remove the specification of the hardware address of the manual binding entry.

Syntax

- hardware-address *HARDWARE-ADDRESS*
- no hardware-address

Parameters

Parameters	description
<i>HARDWARE-ADDRESS</i>	Specifies the MAC address of the client.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A binding entry is a mapping between the IP address and the hardware address or the client identifier. By creating a manual binding entry, an IP address is manually assigned to a client.

Only one manual binding entry can be specified in a DHCP address pool. With a binding entry, the IP address can be either bound with a client identifier or bound with the hardware address of the host.

Use the **client-identifier** command and the **host** command to specify the manual binding entry based on client identifier in the DHCP packet. Use the **hardware-address** command and the **host** command to specify the manual binding entry based on hardware address.

Example

This example shows how a DHCP address pool "pool1" is created with a manual binding entry which binds the IP address 10.1.2.100/24 with the MAC address C2:F3:22:0A:12:F4.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# hardware-address C2F3.220A.12F4
ZEQUOxxxxRE(config-dhcp-pool)# host 10.1.2.100/24
ZEQUOxxxxRE(config-dhcp-pool)#
```

11.2.12host

This command is used to specify the IP address of the manual binding entry in a DHCP address pool. Use the **no** form of this command to remove the specification of the IP address from the entry.

Syntax

- **host** { *IP-ADDRESS MASK* | *IP-ADDRESS/PREFIX-LENGTH* }
- **no host**

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IP address of the manual binding entry.
<i>MASK</i>	Specifies the bits that mask the network part of the host address.
<i>PREFIX-LENGTH</i>	Specifies the prefix length of the network. It is an alternative way to specify the network mask.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Only one binding entry can be specified in a DHCP address pool. In a binding entry, the IP address can be either bound with a client identifier or bound with the hardware address of the host.

Use the **client-identifier** command with the **host** command to specify the manual binding entry based on client identifier. Use the **hardware-address** command with the **host** command to specify the manual binding entry based on hardware address.

Example

This example shows how a DHCP address pool "pool1" is created with a manual binding entry which binds the IP address 10.1.2.100/24 with the MAC address C2:F3:22:0A:12:F4.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# hardware-address C2:F3:22:0A:12:F4
ZEQUOxxxxRE(config-dhcp-pool)# host 10.1.2.100/24
ZEQUOxxxxRE(config-dhcp-pool)#
```

11.2.13ip dhcp class (DHCP Relay & Server)

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.

Syntax

- ip dhcp class *NAME*
- no ip dhcp class *NAME*

Parameters

Parameters	description
<i>NAME</i>	Specifies the DHCP class name. This name can be up to 32 characters long.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enter the DHCP class configuration mode and then use the **option hex** command to define the option matching pattern for the DHCP class. When a class has no option hexadecimal associated, the class will be matched by any packet.

Example

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

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

11.2.14ip dhcp excluded-address

This command is used to exclude a range of IP addresses from being allocated to the client. Use the **no** form of this command to remove a range of excluded addresses.

Syntax

- ip dhcp excluded-address** *START-IP-ADDRESS END-IP-ADDRESS*
- no ip dhcp excluded-address** *START-IP-ADDRESS END-IP-ADDRESS*

Parameters

Parameters	description
<i>START-IP-ADDRESS</i>	Specifies an address or the first address of a range of addresses to be excluded.
<i>END-IP-ADDRESS</i>	Specifies the last address of a range of addresses to be excluded.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The DHCP server automatically allocates addresses in DHCP address pools to DHCP clients. All the addresses except the interface's IP address on the router and the excluded address specified by the **ip dhcp excluded-address** command are available for allocation. Multiple ranges of addresses can be excluded. To remove a range of excluded addresses, administrators must specify the exact range of addresses previously configured.

Example

This example shows how the range of addresses 10.1.1.1 to 10.1.1.255 and 10.2.1.1 to 10.2.1.255 are excluded.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp excluded-address 10.1.1.1 10.1.1.255
ZEQUOxxxxRE(config)# ip dhcp excluded-address 10.2.1.1 10.2.1.255
```

11.2.15ip dhcp ping packets

This command is used to specify the number of packets that the DHCP server will send as a part of the ping operation. Use the **no** form of this command to revert to the default setting.

Syntax

- ip dhcp ping packets *COUNT*
- no ip dhcp ping packets

Parameters

Parameters	description
<i>COUNT</i>	Specifies the number of ping packets that the DHCP server will send.

Default

By default, this value is 2.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the number of packets that the DHCP server will send as part of the ping operation. The DHCP server performs the ping operation to detect whether there is a conflict in use of the IP address before assigning an IP address to the client. If there is no response after the specified number of attempts, the IP address will be assigned to the client, and it becomes an entry. If the server receives a response to the ping operation, the IP address will become a conflict entry.

Setting the number to 0 will disable the ping operation.

Example

This example shows how to configure the number of ping packets as 3.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp ping packets 3
ZEQUOxxxxRE(config)#
```

11.2.16ip dhcp ping timeout

This command is used to specify the time the DHCP server should wait for the ping reply packet. Use the **no** form of this command to revert to the default setting.

Syntax

- ip dhcp ping timeout *MILLI-SECONDS*
- no ip dhcp ping timeout

Parameters

Parameters	description
<i>MILLI-SECONDS</i>	Specifies the interval of time the DHCP server will wait for the ping reply. The maximum timeout is 10000 milliseconds (10 seconds). The specified value should be multiples of 100.

Default

By default, this value is 500 milliseconds (0.5 seconds).

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the timeout length for the ping operation. The DHCP server performs the ping operation to an IP address to detect whether there is a conflict in the use of the IP address before assigning the IP address to a client. If there is no response after the specified number of attempts, the IP address will be assigned to the client, and it becomes an entry. If the server receives a response to the ping operation, the IP address will become a conflict entry.

Example

This example shows how to configure the waiting time for a ping reply.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp ping timeout 800
ZEQUOxxxxRE(config)#
```

11.2.17ip dhcp pool (DHCP Server)

This command is used to configure a DHCP address pool on the DHCP server and enter the DHCP Pool Configuration Mode. Use the **no** form of this command to remove a DHCP address pool.

Syntax

- ip dhcp pool *NAME*
- no ip dhcp pool *NAME*

Parameters

Parameters	description
<i>NAME</i>	Specifies the name of the address. This name can be up to 32 characters long.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A DHCP server receives requests from DHCP clients and services and then allocates an IP address from the address pool and replies the address to the client. An address pool can either contain a network of IP addresses or a single IP address. Use the **network** command in the DHCP Pool Configuration Mode to specify a network for the address pool or use the **client-identifier** or **hardware-address** command with the **host** command to specify a manual binding entry in a DHCP address pool.

Example

This example shows how a DHCP address pool "pool1" is created.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)#
```

11.2.18ip dhcp use class

This command is used to specify the DHCP server to use DHCP classes during address allocation. Use the **no** form of this command to disable the use of DHCP classes.

Syntax

- ip dhcp use class
- no ip dhcp use class

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the DHCP server to use DHCP classes during address allocation. Use the **no** command to disable the use of DHCP classes.

Example

This example shows how use of the DHCP class is disabled.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# no ip dhcp use class
ZEQUOxxxxRE(config)#
```

11.2.19lease

This command is used to configure the duration of the lease for an IP address that is assigned from the address pool. Use the **no** form of this command to revert to the default setting.

Syntax

- lease { *DAYS* [*HOURS* [*MINUTES*]] | infinite }
- no lease

Parameters

Parameters	description
<i>DAYS</i>	Specifies the number of days for the duration of the lease.
<i>HOURS</i>	(Optional) Specifies the number of hours for the duration of the lease.
<i>MINUTES</i>	(Optional) Specifies the number of minutes for the duration of the lease.
infinite	Specifies that the lease time is unlimited.

Default

By default, the lease time is 1 day.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the duration of the lease for an IP address that is assigned from the address pool. The least setting will not be inherited from the parent address pool.

Example

This example shows how to configure the lease in the address pool "pool1" to 1 day.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# lease 1
```

This example shows how to configure the lease in the address pool "pool1" to 1 hour.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# lease 0 1
```

11.2.20netbios-node-type

This command is used to configure the NetBIOS node type for Microsoft DHCP clients. Use the **no** form of this command to remove the configuration of the NetBIOS node type.

Syntax

- **netbios-node-type** *NTYPE*
- **no netbios-node-type**

Parameters

Parameters	description
<i>NTYPE</i>	Specifies the NetBIOS node type of the Microsoft client. The following are the valid types: b-node - Broadcast p-node - Peer-to-peer m-node - Mixed h-node - Hybrid

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the NetBIOS node type of the Microsoft DHCP client. The node type of the h-node (Hybrid) is recommended. The node type determines the method NetBIOS use to register and resolve names. The broadcast system uses broadcasts. A p-node system uses only point-to-point name queries to a name server (WINS). An m-node system broadcasts first, and then queries the name server. A hybrid system queries the name server first, and then broadcasts.

Example

This example shows how to configure the NetBIOS node type as h-node.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# netbios-node-type h-node
ZEQUOxxxxRE(config-dhcp-pool)#
```

11.2.21 netbios-name-server

This command is used to specify WINS name servers for the Microsoft DHCP client. Use the **no** form of this command to remove the configuration of specific WINS servers.

Syntax

- **netbios-name-server** *IP-ADDRESS* [*IP-ADDRESS2*...*IP-ADDRESS8*]
- **no netbios-name-server** *IP-ADDRESS* [*IP-ADDRESS2*...*IP-ADDRESS8*]

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the WINS name server IP address for the DHCP client.
<i>IP-ADDRESS2...IP-ADDRESS8</i>	Specifies multiple IP addresses, separated by spaces. Up to eight servers can be specified.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the WINS name server IP addresses that are available to the Microsoft client. Up to eight servers can be specified. Servers are listed in the order of preference. If name servers are already configured, the name server configured later will be added to the default interface list.

Example

This example shows how to configure 10.1.1.100 and 10.1.1.200 as WINS servers for the address pool "pool1".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# netbios-name-server 10.1.1.100 10.1.1.200
ZEQUOxxxxRE(config-dhcp-pool)#
```

11.2.22next-server

This command is used to specify the BOOT server for the DHCP client. Use the **no** form of this command to remove boot servers.

Syntax

- **next-server** *IP-ADDRESS*

- no next-server

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the boot server IP address for the client to get the boot file.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the server IP address for the client to boot the image. The server is typically a TFTP server. Only one boot server can be specified.

Example

This example shows how to configure 10.1.1.1 as the IP address of next server in the DHCP client's boot process in the pool named pool1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# next-server 10.1.1.1
```

11.2.23network

This command is used to configure the network with its associated mask for a DHCP address pool. Use the **no** form of this command to remove the network.

Syntax

- network {*NETWORK-ADDRESS MASK* | *NETWORK-ADDRESS/PREFIX-LENGTH*}
- no network

Parameters

Parameters	description
<i>NETWORK-ADDRESS</i>	Specifies the network address for the address pool.
<i>MASK</i>	Specifies the bits that mask the network part of the address.
<i>PREFIX-LENGTH</i>	Specifies the prefix length of the network. It is an alternative way to specify the network mask.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command in the DHCP Pool Configuration Mode to configure a network for the address pool. The user cannot configure the manual binding entry in the address pool that was configured with the network.

When the DHCP server receives a request from a client, the server will select an address pool or subnet in the address pool based on the following rules for address allocation. When an IP address is allocated to a host, a binding entry is created.

- If the client is not directly connected to the DHCP server, the discover message is relayed by the relay agent. The server will select the address pool configured with a subnet that contains the GIADDR of the packet. If an address pool is selected, the server will try to allocate the address from the subnet.
- If the client is directly connected to the server, then the server will look for the subnet of the address pool that contains or match the primary subnet of the received interface. If not found, the server will look for the subnet of the address pool that contains or match the secondary subnet of the received interface.

If an address is allocated from a specific subnet, the network mask associated with the subnet will be replied as the network mask to the user. The network configured for a DHCP address pool can be a natural network or a sub-network. The configured DHCP address pools are organized as a tree. The root of the tree

is the address pool that contains the natural network. The address pools that contain the sub-network are branches under the root, and the address pools that contain the manual binding entry is the leave under the branch or under the root. Based on the tree structure, the child address pool will inherit the attributes configured for its parent address pool. The only exception to this inheritance is lease attribute.

Example

This example shows how the subnet 10.1.0.0/16 is configured for the DHCP address pool pool1.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# network 10.1.0.0/16
ZEQUOxxxxRE(config-dhcp-pool)# default-router 10.1.1.1
ZEQUOxxxxRE(config-dhcp-pool)#

```

11.2.24option

This command is used to configure DHCP server options. Use the **no** form of this command to remove a specific option.

Syntax

- **option** *CODE* { *ascii STRING* | **hex** { *HEX-STRING* | **none** } | **ip** *IP-ADDRESS* [*IP-ADDRESS2*...*IP-ADDRESS8*]
- **no option** *CODE*

Parameters

Parameters	description
<i>CODE</i>	Specifies the DHCP option number in decimals.
ascii <i>STRING</i>	Specifies an ASCII string for the DHCP option with a maximum of 255 bytes.
hex	Specifies the hexadecimal format for the DHCP option with a maximum of 254 characters.
<i>HEX-STRING</i>	Specifies the hexadecimal string for the DHCP option.
none	Specifies the zero-length hexadecimal string.
ip <i>IP-ADDRESS</i>	Specifies the IP addresses. Up to eight IP addresses can be specified.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command configures DHCP options in a DHCP pool. DHCP options can also be configured by other commands such as the **default-router** command in the DHCP Pool Configuration Mode. The DHCP server will carry all the configured DHCP options in all reply packets. All of the configured DHCP options will be carried in the DHCP packet replied by the server.

The length of the configured hexadecimal string must be even (For example, 001100 is correct and 11223 is incorrect). Only one string can be specified for the same option number.

There is a restriction on the total length of DHCP options. The restriction may be specified by the client or determined by the server if the client didn't specify this. If not specified, then the maximum length is 312.

The following options can be configured by other DHCP pool configuration mode commands and should not be configured by the option command.

- Option 1 (Subnet Mask, configured by the network).
- Option 3 (Router Option, configured by the default router).
- Option 6 (Domain Name Server, configured by the DNS server).
- Option 15 (Domain Name, configured by the domain name).
- Option 44 (NetBIOS Name Server, configured by the NetBIOS name server).
- Option 46 (NetBIOS Node Type, configured by the NetBIOS node type).
- Option 51 (IP Address Lease Time, configured by the lease).
- Option 58 (Renewal (T1) Time Value, configured by the lease).
- Option 59 (Rebinding (T2) Time Value, configured by the lease).

The following options cannot be configured through this command:

- Option 12 (Host name default option).
- Option 50 (Requested address, default option).
- Option 53 (DHCP Message Type, default option).
- Option 54 (Server Identifier, default option).
- Option 55 (Parameter request list, default option).
- Option 61 (Client Identifier, default option).
- Option 82 (Relay agent information option, default option).

Example

This example shows how to specify the DHCP server Option 69 (SMTP server option) in the hexadecimal format. The hexadecimal string is c0a800fe (192.168.0.254).

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# option 69 hex c0a800fe
```

This example shows how to specify the DHCP server Option 40 (the name of the client's NIS domain) in the ASCII string format.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(config-dhcp-pool)# option 40 ascii net.market
```

This example shows how to specify the DHCP server Option 72 (WWW server option) in the IP format. Two WWW servers are configured, 172.19.10.1 and 172.19.10.100.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp pool pool1
ZEQUOxxxxRE(dhcp-config)# option 72 ip 172.19.10.1 172.19.10.100
```

11.2.25option hex (DHCP Relay & Server)

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.

Syntax

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

Parameters

Parameters	description
<i>CODE</i>	Specifies the DHCP option number.
<i>PATTERN</i>	Specifies the hexadecimal pattern of the specified DHCP option.
*	Specifies the remaining bits of the option that will not be matched. If * is not specified, the bit length of the pattern should be the same as the bit length of the option.

Parameters	description
<i>MASK</i>	Specifies the hexadecimal bit mask for the masking of the pattern. The masked pattern bits will be matched. If the mask is not specified, all the bits specified by the pattern will be checked. The bit set as 1 will be checked. The input format should be the same as the pattern.

Default

None.

Command Mode

DHCP Class Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The user can use the **ip dhcp class** command with the **option hex** command to define a DHCP class. The classes in a pool are matched in the order that the class is configured in a pool.

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

The following are some commonly used option codes:

- Option 60 (Vendor Class Identifier).
- Option 61 (Client Identifier).
- Option 77 (User Class).
- Option 82 (Relay Agent Information Option).
- Option 124 (Vendor-identifying Vendor Class).
- Option 125 (Vendor-identifying Vendor-specific Information).

Example

This example shows how a DHCP class Service-A is configured and defined with the DHCP Option 60 matching pattern 0x112233 and 0x102030. Another class Service-B is configured and defined with the DHCP Option 60 matching pattern 0x5566* and 0x5060*.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp class Service-A
ZEQUOxxxxRE(config-dhcp-class)# option 60 hex 112233
ZEQUOxxxxRE(config-dhcp-class)# option 60 hex 102030
ZEQUOxxxxRE(config-dhcp-class)# exit
ZEQUOxxxxRE(config)# ip dhcp class Service-B
ZEQUOxxxxRE(config-dhcp-class)# option 60 hex 5566 *
ZEQUOxxxxRE(config-dhcp-class)# option 60 hex 5060 *
ZEQUOxxxxRE(config-dhcp-class)# exit
ZEQUOxxxxRE(config)# ip dhcp class Service-B
ZEQUOxxxxRE(config-dhcp-class)#
```

11.2.26service dhcp

This command is used to enable the DHCP server and relay service on the Switch. Use the **no** form of this command to disable the DHCP server and relay service.

Syntax

- service dhcp
- no service dhcp

Parameters

None.

Default

By default, the state is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable the DHCP server and relay service on the Switch.

Example

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

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

11.2.27show ip dhcp binding

This command is used to display the address binding entries on the DHCP Server.

Syntax

- show ip dhcp binding [*IP-ADDRESS*]

Parameters

Parameters	description
<i>IP-ADDRESS</i>	(Optional) Specifies the binding entry to display. If the IP address is not specified, all binding entries or the binding entry specific to the specified pool are displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

The IP address, hardware address, lease start and lease expiration of the entry will be displayed.

Example

This example shows how to display the binding status of all bound IP addresses.

```
ZEQUOxxxxRE#show ip dhcp binding
```

IP address	Client-ID/ Hardware address	Lease expiration	Type
10.0.0.1	01002211223344	Feb 25 2016 08:18 AM	Automatic

```
ZEQUOxxxxRE#
```

This example shows how to display the binding status of IP address 10.1.1.1 in the DHCP address pool.

```
ZEQUOxxxxRE#show ip dhcp binding
```

IP address	Client-ID/ Hardware address	Lease expiration	Type
10.1.1.1	01002211223344	Feb 25 2016 08:21 AM	Automatic

```
ZEQUOxxxxRE#
```

11.2.28show ip dhcp conflict

This command is used to display the conflict IP addresses while the DHCP Server attempts to assign the IP address for a client.

Syntax

- show ip dhcp conflict [*IP-ADDRESS*]

Parameters

Parameters	description
<i>IP-ADDRESS</i>	(Optional) Specifies the conflict entry to display. If the IP address is not specified, all conflict entries or the conflict entry specific to the specified pool are displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

The DHCP server detects the conflict of IP addresses by using the ping operation. If a conflict address is found, then this IP address will be removed from the address pool and marked as a conflict. The conflict address will not be assigned until the network administrator clears the conflict address.

Example

This example shows how to display the conflict status of the IP address 10.1.1.1.

```
ZEQUOxxxxRE# show ip dhcp conflict 10.1.1.1
```

IP address	Detected Method	Detection time
10.1.1.1	Ping	Oct 23 2013 09:12 AM

```
ZEQUOxxxxRE#
```

This example shows how to display the conflict status of all DHCP IP addresses in the pool.

```
ZEQUOxxxxRE#show ip dhcp conflict
```

IP address	Detected Method	Detection time
10.1.1.1	Ping	Oct 23 2013 09:12 AM

```
ZEQUOxxxxRE#
```

11.2.29show ip dhcp pool

This command is used to display information about the DHCP pools.

Syntax

- show ip dhcp pool [*NAME*]

Parameters

Parameters	description
<i>NAME</i>	(Optional) Specifies to display information about a specific DHCP pool. If not specified, information about all DHCP pools will be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to examine the configuration settings of the pool or all the pools if the name parameter is not used.

Example

This example shows how to display the DHCP pool "pool1" configuration information.

```
ZEQUOxxxxRE#show ip dhcp pool pool1
```

```
Pool name: pool1
Network: 10.0.0.0/8
Boot file:
Default router:
DNS server:
NetBIOS server:
Domain name:
Lease: 1 days 0 hours 0 minutes
NetBIOS node type:
Next server: 0.0.0.0
Remaining unallocated address number: 1023
Number of leased addresses: 1
```

```
ZEQUOxxxxRE#
```

11.2.30show ip dhcp server

This command is used to display the current status of the DHCP server.

Syntax

- show ip dhcp server

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the DHCP server status and user configured address pool.

Example

This example shows how to display the status of the DHCP server.

```
ZEQUOxxxxRE# show ip dhcp server
```

```
DHCP Service: Disable
Ping packets number: 3
Ping timeout: 500 ms
Excluded Addresses
10.1.1.1-10.1.1.255
```

```
List of DHCP server configured address pool
pool1          pool2          pool3          pool4
pool5          pool6          pool7          pool8
pool9          pool10         pool11         pool12
```

```
ZEQUOxxxxRE#
```

11.2.31 show ip dhcp server statistics

This command is used to display DHCP server statistics.

Syntax

- show ip dhcp server statistics

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays DHCP counters. All counters are cumulative.

Example

This example shows how to display DHCP server statistics.

```
ZEQUOxxxxRE# show ip dhcp server statistics
```

```
Address pools           3
Automatic bindings      100
Manual binding          2
Malformed messages      0
Renew messages          0
```

```
Message                Received
BOOTREQUEST            12
DHCPDISCOVER            200
DHCPREQUEST            178
DHCPDECLINE             0
DHCPRELEASE             0
DHCPINFORM              0
```

```
Message                Sent
BOOTREPLY               12
DHCPOFFER               190
DHCPACK                 172
DHCPNAK                  6
```

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Address pools	The number of configured address pools in the DHCP database.
Malformed messages	The number of truncated or corrupted messages that were received by the DHCP server.
Renew messages	The number of renewed messages for a DHCP lease. The counter is incremented when a new renew message has arrived after the first renew message.
Message	The DHCP message type.
Received	The number of DHCP messages that were received by the DHCP server.
Sent	The number of DHCP messages that were sent by the DHCP server.

11.3 DHCP Server Protect Commands

11.3.1 based-on hardware-address

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

Syntax

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

Parameters

Parameters	description
<i>CLIENT-HARDWARE-ADDRESS</i>	Specifies the MAC address of the client.

Default

None.

Command Mode

Configure DHCP Server Protect Mode.

Command Default Level

Level: 12.

Usage Guideline

The server message with the specified server IP address and client address in the payload will be permitted. These binding entries restrict that only specific servers are allowed to offer addresses to service specific clients.

Example

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

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#dhcp-server-protect profile campus-profile
ZEQUOxxxxRE(config-dhcp-server-protect)#based-on hardware-address 00-12-34-02-03-04
ZEQUOxxxxRE(config-dhcp-server-protect)#based-on hardware-address 00-12-34-03-00-01
ZEQUOxxxxRE(config-dhcp-server-protect)#
```

11.3.2 clear ip dhcp snooping server-protect log

This command is used to clear the server protect log buffer.

Syntax

- clear ip dhcp snooping server-protect log

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear the server protect log buffer. The DHCP server protect 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 protect 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 protect log.

```
ZEQUOxxxxRE# clear ip dhcp snooping server-protect log
ZEQUOxxxxRE#
```

11.3.3 dhcp-server-protect profile

This command is used to define a server protect profile and enter the server protect configure mode. Use the **no** form of this command to delete the specified server protect profile.

Syntax

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

Parameters

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

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enter the DHCP server protect configuration mode to define a server protect profile. The profile can be used to define the DHCP server protect entry

Example

This example shows how to enter the DHCP server protect configure mode to define the profile "campus".

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#service dhcp
ZEQUOxxxxRE(config)#dhcp-server-protect profile campus
ZEQUOxxxxRE(config-dhcp-server-protect)#
```

11.3.4 ip dhcp snooping server-protect

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

Syntax

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

Parameters

Parameters	description
<i>SERVER-IP-ADDRESS</i>	(Optional) Specifies the trust DHCP sever IP address.
profile <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.

Command Default Level

Level: 12.

Usage Guideline

The command is available for physical porst and port channels.

The DHCP server protect 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 protect on the interface. By default, the DHCP server protect is disabled on all interfaces. If enabled, the DHCP server protect, on a specific interface, will filter all DHCP server packets from the interface and only forward trusted server packets.

If a server protect 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 protect profile named "campus" and associate it with a DHCP server protect entry for Gigabit Ethernet port 1/0/3.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/3
ZEQUOxxxxRE(config-if)#ip dhcp snooping server-protect 10.1.1.2 profile campus
ZEQUOxxxxRE(config-if)#
```

11.3.5 ip dhcp snooping server-protect log-buffer

This command is used to configure the DHCP server protect log buffer parameter. Use the **no** form of this command to revert to the default setting.

Syntax

- ip dhcp snooping server-protect log-buffer entries *NUMBER*
- no ip dhcp snooping server-protect log-buffer entries

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the maximum entry number of the log buffer. The DHCP server protect 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 protect 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.

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

11.3.6 show ip dhcp server-protect log

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

Syntax

- show ip dhcp server-protect log

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the content of the DHCP server protect 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 protect log buffer.

```
ZEQUOxxxxRE#show ip dhcp server-protect 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, 2017-02-07
100	10.58.2.30	10-22-33-44-50-60	06:31:42, 2017-02-07

```
Total Entries: 2
```

```
ZEQUOxxxxRE#
```

11.4 DHCP Relay Commands

DHCP (Dynamic Host Configuration Protocol) is a function to obtain an IP address from the DHCP server when the client is booted. In general, a series of packets to obtain an IP address is broadcasted. For this reason, the client and DHCP server must be on the same network. DHCP Relay is a function to transfer DHCP packets to a DHCP server on a different network. This does no longer require a DHCP server installed for each network, making it easier for you to manage the DHCP server.

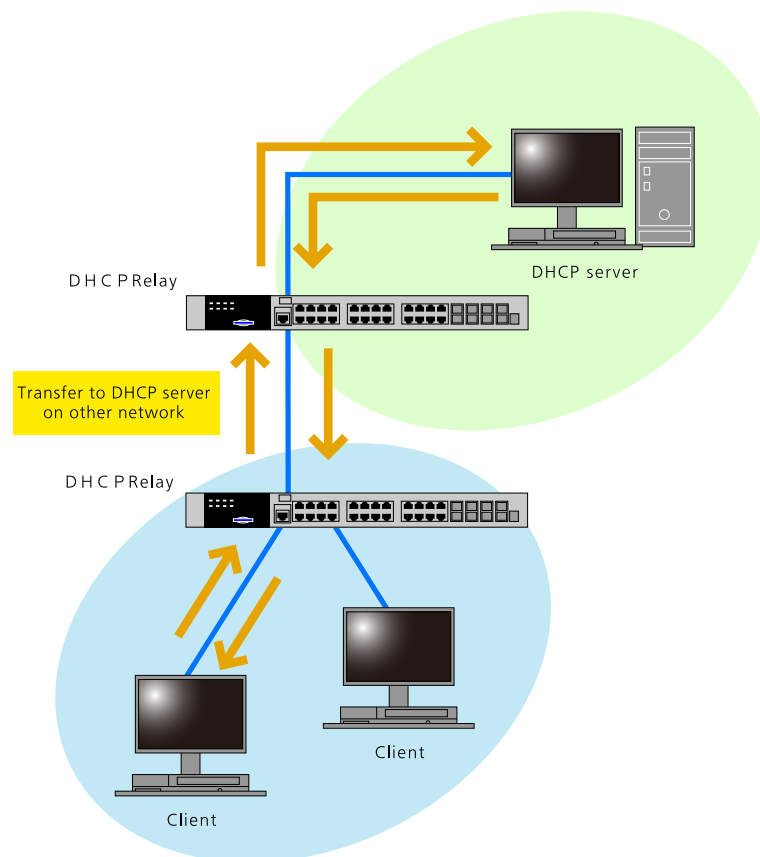


Figure 74-1 DHCP Relay overview

option 82

This is a function to add the switch's MAC address and the client's connection port number to packets when relaying the DHCP packets. A DHCP server supporting option 82 can use option 82 information to apply the policy required to assign an IP address. Original option 82 information is also added to return packets from the DHCP server, so that the packets to the client are transferred to the destination port instead of being broadcasted.

11.4.1 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

Syntax

- `ip dhcp pool NAME`
- `no ip dhcp pool NAME`

Parameters

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

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

In addition to DHCP relay packets, based on the **ip helper-address** command, the relay destination of the DHCP server can be specified in the DHCP relay pool. To do this, use the **ip dhcp pool** command to enter the DHCP pool configuration, use the **relay source** command to specify the source subnet of the client requests, and use the **relay destination** command to specify the relay destination server address. (The maximum number of DHCP relay settings is 64.)

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. Otherwise, the packet is relayed based on the IP helper-address configured on the received interface. To relay based on the relay pool, if the request packet is a relayed packet, the Gateway IP Address (GIADDR) of the packet is the source of the request. If the GIADDR is zero, the subnet of the received interface is the source of the packet.

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

Example

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

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

11.4.2 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.

Syntax

- ip dhcp relay information check
- no ip dhcp relay information check

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command takes effect when the DHCP service is enabled.

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

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

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

Example

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

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

11.4.3 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.

Syntax

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

Parameters

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

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command only takes effect when the DHCP service is enabled.

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

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

Example

This example shows how to disable the global DHCP relay agent check but enables the DHCP relay agent check for the VLAN 100. The effect state of the check function for VLAN100 is enabled.

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

11.4.4 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.

Syntax

- ip dhcp relay information option
- no ip dhcp relay information option

Parameters

None.

Default

By default, Option 82 is not inserted.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command takes effect when the **service dhcp** command is enabled. When DHCP Option 82 is enabled, the DHCP packet received from the client will be inserted with an Option 82 field before being relayed to the server. The DHCP Option 82 contains two sub-options respectively the circuit ID sub-option and remote ID sub-option. Administrators can use the **ip dhcp relay information option remote-id** command to specify a user-defined string for the remote ID sub-option.

Example

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

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

11.4.5 ip dhcp relay information option-insert

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

Syntax

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

Parameters

Parameters	description
none	(Optional) Specifies to disable insertion of Option 82 in the relayed packet.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

11.4.6 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.

Syntax

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

Parameters

Parameters	description
drop	Specifies to discard the packet that already has the relay option.
keep	Specifies that the DHCP requests packet that already has the relay option is left unchanged and directly relayed to the DHCP server.
replace	Specifies that the DHCP request packet that already has the relay option will be replaced by a new option.

Default

By default, this option is replace.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command only takes effect when the DHCP service is enabled. Use this command to configure the global policy for the insertion of Option 82 on packets that already have Option 82.

Example

This example shows how to configure the relay agent option re-forwarding policy to keep. If the **ip dhcp relay information relay** command is configured in the global configuration mode but not configured in the interface configuration mode, the global configuration is applied to all interfaces.

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

11.4.7 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.

Syntax

- **ip dhcp relay information policy-action { drop | keep | replace }**
- **no ip dhcp relay information policy-action**

Parameters

Parameters	description
drop	Specifies to discard the packet that already has the relay option.
keep	Specifies that the DHCP request packet that already has the relay option is left unchanged and directly relayed to the DHCP server.
replace	Specifies that the DHCP request packet that already has the relay option will be replaced by a new option.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command only takes effect when the DHCP service is enabled. Use this command to configure the global policy for the insertion of Option 82 on packets that already have Option 82.

Example

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

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

11.4.8 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.

Syntax

- ip dhcp relay information option format remote-id {default | string *SENTENCE*}
- no ip dhcp relay information option format remote-id

Parameters

Parameters	description
default	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>
<i>SENTENCE</i>	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: <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>

Default

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

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

11.4.9 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.

Syntax

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

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

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

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

Example

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

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

11.4.10ip 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.

Syntax

- ip dhcp relay information trusted
- no ip dhcp relay information trusted

Parameters

None.

Default

By default, information is not trusted.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

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

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

Example

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

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

11.4.11 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.

Syntax

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

Parameters

Parameters	description
<i>VLAN-ID</i>	Specifies the VLAN used.
,	(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.

Parameters	description
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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.

NOTE When the **ip dhcp relay** command is disabled on an interface, the interface will not relay or locally relay received DHCP packets.

Example

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

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

11.4.12ip dhcp smart-relay

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

Syntax

- ip dhcp smart-relay
- no ip dhcp smart-relay

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

By default, when the received interface of the packet has secondary addresses, the relay agent set the gateway address field of the packet to the primary address of the interface. When smart relay is enabled, relay agent will count the number that a client retries the sending of the DISCOVER message. The relay agent will switch the gateway address to the secondary address of the received interface after retrying 3 times.

Example

This example shows how to enable the smart relay function.

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

11.4.13 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.

Syntax

- **relay destination** [global] *IP-ADDRESS*
- **no relay destination** [global] *IP-ADDRESS*

Parameters

Parameters	description
global	(Optional) Specifies that the IP address is selected from the global address space.
<i>IP-ADDRESS</i>	Specifies the relay destination DHCP server IP address.

Default

None.

Command Mode

DHCP Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

In addition to the relay DHCP packet based on **ip helper-address**, the relay destination of the DHCP server can be specified in the DHCP relay pool. To do this, use the **ip dhcp pool** command to enter the DHCP pool configuration mode and then use the **relay source** command to specify the source subnet of the client requests. Use the **relay destination** command to specify the relay destination server address. Multiple relay sources and multiple relay destinations can be specified in a pool. If a packet matches anyone of the relay sources, the packet will be forwarded to all of the relay destinations.

When receiving a DHCP request packet, if the subnet that the packet comes from matches the relay source of a relay pool, the packet will be relayed based on this relay pool. Otherwise, the packet is relayed based on the IP helper address configured for the received interface. To relay a packet based on the relay pool, if the request packet is a relayed packet, the GIADDR of the packet is the source of the request. If the request packet is not a relayed packet, the subnet of the received interface is the source of the packet.

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

Example

This example shows how a DHCP relay pool “pool1” is created. In the relay pool, the subnet 172.19.10.0/255.255.255.0 is specified as the source subnet and 10.2.1.1 is specified as the relay destination address.

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

11.4.14 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

Syntax

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

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

In addition to relay DHCP packets based on the **ip helper-address** command, the relay destination of DHCP server can be specified in DHCP relay pool. To do this, use the **ip dhcp pool** command to enter the DHCP pool configuration mode, use the **relay source** command to specify the source subnet of the client requests and use the **relay destination** command to specify the relay destination server address. Multiple relay sources and multiple relay destinations can be specified in a pool. If a packet matches anyone of the relay source, the packet will be forwarded to all of the relay destinations.

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

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

Example

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

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

11.4.15 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.

Syntax

- **relay target** [global] *IP-ADDRESS*
- **no relay target** [global] *IP-ADDRESS*

Parameters

Parameters	description
global	(Optional) Specifies that the IP address is selected from the global address space.
<i>IP-ADDRESS</i>	Specifies the relay target server IP address for the class.

Default

None.

Command Mode

DHCP Pool Class Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

In a DHCP relay pool, administrators can further use the **class** command and the **relay target** command to associate a list of relay target addresses with a DHCP class. When the client request matches a relay pool and the DHCP relay pool is defined with classes, the client request must match a class specified in the pool in order to be relayed. If the packet does not match any class in the pool, the packet will not be relayed. If the matched relay pool has no class defined, then the request will be relayed to the relay destination of the matched relay pool.

Multiple relay target commands can be specified for a class. If a packet matches the class, the packet will be forwarded to all of the relay targets.

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

Example

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

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

11.4.16 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.

Syntax

- show ip dhcp relay information trusted-sources

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

This example shows how to use this command. Note that the display output lists the interfaces that are configured to be trusted sources.


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

List of trusted sources of relay agent information option:

```
vlan100          vlan200          vlan300          vlan400
vlan500
```

Total Entries: 5

```
ZEQUOxxxxRE#
```

This example shows how to display when all interfaces are trusted sources. Note that the display output does not list the individual interfaces.

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

All interfaces are trusted source of relay agent information option

```
ZEQUOxxxxRE#
```

11.4.17 show ip dhcp relay information option-insert

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

Syntax

- show ip dhcp relay information option-insert [interface *INTERFACE-ID* [, | -]]

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	(Optional) Specifies to display information related to the interface specified here. Enter the interface's ID after the keyword here. If no interface ID is specified, then information related to 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.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

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

Example

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

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

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

```
Total Entries: 3
```

```
ZEQUOxxxxRE#
```

11.4.18 show ip dhcp relay information policy-action

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

Syntax

- show ip dhcp relay information policy-action [interface *INTERFACE-ID* [, | -]]

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	(Optional) Specifies to display information related to the interface specified here. Enter the interface's ID after the keyword here. If no interface ID is specified, then information related to 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.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the relay information option policy action configuration information.

Example

This example shows how to display relay information Option 82 policy action configuration information for all VLANs.

```
ZEQUOxxxxRE# show ip dhcp relay information policy-action
```

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

```
Total Entries: 3
```

```
ZEQUOxxxxRE#
```

11.5 DHCP Snooping Commands

The commands are used to allow only clients with a regular IP address assigned by the DHCP server to communicate.

When this function is enabled, all ports are set to "untrusted." You need to change the DHCP server and DHCP relay ports to "trusted." In communications from clients connected on "untrusted" ports, only DHCP packets are authenticated first and other packets are discarded. The switch monitors communications with the DHCP server on a "trusted" port and stores a mapping between assigned IP addresses and MAC addresses in the Binding Table in the switch.

Only clients with an IP address and MAC address stored in the Binding Table are authorized for normal communication.

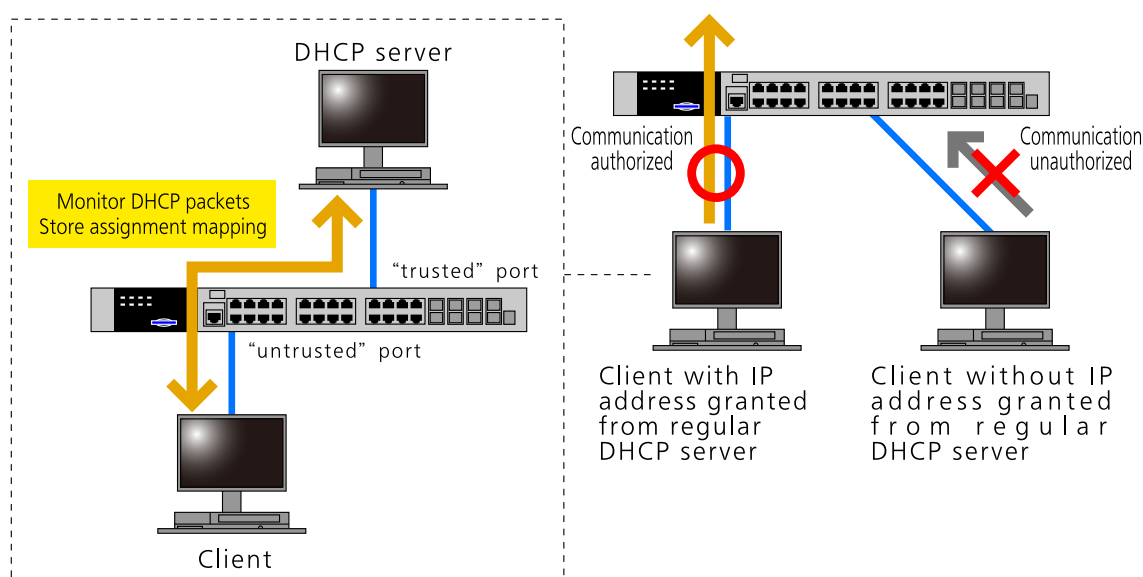


Figure 75-1

11.5.1 ip dhcp snooping

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

Syntax

- `ip dhcp snooping`

- no ip dhcp snooping

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The DHCP snooping function snoops the DHCP packets arriving at the untrusted interface on the VLAN that is enabled for DHCP snooping. With this function, the DHCP packets that come from the untrusted interface can be validated and a DHCP binding database will be constructed for the DHCP snooping enabled VLAN. The binding database provides IP and MAC binding information that can be further used by the IP source guard and dynamic ARP inspection process.

Example

This example shows how to enable DHCP snooping.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp snooping
ZEQUOxxxxRE(config)#
```

11.5.2 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.

Syntax

- ip dhcp snooping information option allow-untrusted

- no ip dhcp snooping information option allow-untrusted

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The DHCP snooping function validates the DHCP packets when it arrives at the port on the VLAN that is enabled for DHCP snooping. By default, the validation process will drop the packet if the gateway address is not equal to 0 or Option 82 is present.

Example

This example shows how to enable DHCP snooping for Option 82 to allow untrusted ports.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp snooping information option allow-untrusted
ZEQUOxxxxRE(config)#
```

11.5.3 ip dhcp snooping database

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

Syntax

- ip dhcp snooping database { *URL* | write-delay *SECONDS* }
- no ip dhcp snooping database [write-delay]

Parameters

Parameters	description
<i>URL</i>	Specifies the URL in one of the following forms: • tftp://location/filename • flash:/filename
write-delay <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.

Command Default Level

Level: 12.

Usage Guideline

Use this command to store the DHCP binding entry to local flash or remote server. Use the follow methods to store DHCP binding entries:

- **ftp**: Store the entries to remote site via FTP.
- **tftp**: Store the entries to remote site via TFTP.
- **local**: Store the entries to a file in local file system.

NOTE

The flash only includes the external memory such as the SD card.

Use the **ip dhcp snooping database flash:** command to save the DHCP snooping binding database in the stack switch. The database is not saved in a stack member switch.

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

Example

This example shows how to store the binding entry to a file in the file system.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp snooping database tftp: //10.0.0.2/store/dhcp-snp-bind
ZEQUOxxxxRE(config)#
```

11.5.4 clear ip dhcp snooping database statistics

This command is used to clear the DHCP binding database statistics.

Syntax

- clear ip dhcp snooping database statistics

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

When you enter this command, the Switch will clear the database statistics.

Example

This example shows how to clear the snooping database statistics.

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

11.5.5 clear ip dhcp snooping binding

This command is used to clear the DHCP binding entry.

Syntax

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

Parameters

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

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to clear the DHCP binding entry, including the manually configured binding entry.

Example

This example shows how to clear all snooping binding entries.

```
ZEQUOxxxxRE# clear ip dhcp snooping binding
ZEQUOxxxxRE#
```

11.5.6 renew ip dhcp snooping database

This command is used to renew the DHCP binding database.

Syntax

- renew ip dhcp snooping database *URL*

Parameters

Parameters	description
<i>URL</i>	Specifies load the bind entry database from the URL and add the entries to the DHCP snooping binding entry table. The URL format can be: • ftp://username:password@location:tcpport/filename • tftp://location/filename • local:/filename

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

11.5.7 ip dhcp snooping binding

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

Syntax

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

Parameters

Parameters	description
<i>MAC-ADDRESS</i>	Specifies the MAC address of the entry to add or delete.
vlan <i>VLAN-ID</i>	Specifies the VLAN of the entry to add or delete.
<i>IP-ADDRESS</i>	Specifies the IP address of the entry to add or delete.
interface <i>INTERFACE-ID</i>	Specifies the interface (physical port and port channel) on which to add or delete a binding entry.
expiry <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.

Command Default Level

Level: 12.

Usage Guideline

Use this command to create a dynamic DHCP snooping entry.

To successfully create DHCP snooping entries:

- DHCP snooping should globally be enabled.
- DHCP snooping should be enabled on the VLAN associated with the entry.
- The port of the entry should not be configured as trusted using the ip dhcp snooping trust command.
- The entry should not be listed as a conflict in the active binding table.
- The entry must contain a valid IP address.
- The entry must contain a valid MAC address.
- The maximum number of entries should not be exceeded.

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 GigabitEthernetv1/0/10 with an expiry time of 100 seconds.

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

11.5.8 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.

Syntax

- ip dhcp snooping trust
- no ip dhcp snooping trust

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Ports connected to the DHCP server or to other switches should be configured as trusted interfaces. The ports connected to DHCP clients should be configured as untrusted interfaces. DHCP snooping acts as a firewall between untrusted interfaces and DHCP servers.

When a port is configured as a untrusted interface, the DHCP message arrives at the port on a VLAN that is enabled for DHCP snooping. The Switch forwards the DHCP packet unless any of the following conditions occur (in which case the packet is dropped):

- The Switch port receives a packet (such as a DHCPOFFER, DHCPACK, DHCPNAK, or DHCPLEASEQUERY packet) from a DHCP server outside the firewall.
- If the **ip dhcp snooping verify mac-address** command is enabled, the source MAC in the Ethernet header must be the same as the DHCP client hardware address to pass the validation.
- The untrusted interface receives a DHCP packet that includes a relay agent IP address that is not 0.0.0.0 or the relay agent forward a packet that includes Option 82 to an untrusted interface.
- The router receives a DHCPRELEASE or DHCPDECLINE message from an untrusted host with an entry in the DHCP snooping binding table, and the interface information in the binding table does not match the interface on which the message was received.

In addition to doing the validation, DHCP snooping also create a binding entry based on the IP address assigned to client by the server in DHCP snooping binding database. The binding entry contains information including MAC address, IP address, the VLAN ID and port ID where the client is located, and the expiry of the lease time.

Example

This example shows how to enable DHCP snooping trust for GigabitEthernet1/0/3.

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

11.5.9 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.

Syntax

- **ip dhcp snooping limit entries** { *NUMBER* | **no-limit** }
- **no ip dhcp snooping limit entries**

Parameters

Parameters	description
<i>NUMBER</i>	Specifies the number of DHCP snooping binding entries limited on a port. The range of value is from 0 to 1024.
no-limit	Specifies no binding entry number limitation.

Default

By default, this option is no-limit.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is available for physical port and port-channel interface configuration. This command only takes effect on untrusted interfaces. The system will stop learning binding entries associated with the port if the maximums number is exceeded.

Example

This example shows how to configure the limit on binding entries allowed on GigabitEthernet1/0/1 to 100.

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

11.5.10ip 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.

Syntax

- ip dhcp snooping limit rate { *VALUE* | no-limit }

- no ip dhcp snooping limit rate

Parameters

Parameters	description
<i>VALUE</i>	Specifies the number of DHCP messages that can be processed per second. The valid range is from 1 to 300.
no-limit	Specifies no limitation on the rate.

Default

By default, this option is no-limit.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When the rate of the DHCP packet exceeds the limitation, the port will be changed to the error disable state.

Example

This example shows how to configure number of DHCP messages that a switch can receive per second on GigabitEthernet1/0/3.

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

11.5.11 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.

Syntax

- ip dhcp snooping station-move deny

- no ip dhcp snooping station-move deny

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When DHCP snooping station move is enabled, the dynamic DHCP snooping binding entry with the same VLAN ID and MAC address on the specific port can move to another port if it detects that a new DHCP process belong to the same VLAN ID and MAC address.

Example

This example shows how to disable the roaming state.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp snooping
ZEQUOxxxxRE(config)# ip dhcp snooping vlan 10
ZEQUOxxxxRE(config)# ip dhcp snooping station-move deny
ZEQUOxxxxRE(config)#
```

11.5.12ip 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.

Syntax

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

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The DHCP snooping function validates the DHCP packets when they arrive at the port on the VLAN that is enabled for DHCP snooping. By default, DHCP snooping will verify that the source MAC address in the Ethernet header is the same as the DHCP client hardware address to pass the validation.

Example

This example shows how to enable the verification that the source MAC address in a DHCP packet matches the client hardware address.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp snooping verify mac-address
ZEQUOxxxxRE(config)#
```

11.5.13ip dhcp snooping vlan

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

Syntax

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

Parameters

Parameters	description
<i>VLAN-ID</i>	Specifies the VLAN to enable or disable the DHCP snooping function.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

By default, DHCP snooping is disabled on all VLANs.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to globally enable DHCP snooping and use the **ip dhcp snooping vlan** command to enable DHCP snooping for a VLAN. The DHCP snooping function snoops the DHCP packets arriving at the untrusted interface on VLAN that is enabled for DHCP snooping. With this function, the DHCP packets come from the untrusted interface can be validated and a DHCP binding database will be constructed for the DHCP snooping enabled VLAN. The binding database provides IP and MAC binding information that can be further used by the IP source guard and dynamic ARP inspection process.

Example

This example shows how to enable DHCP snooping on VLAN 10.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip dhcp snooping vlan 10
ZEQUOxxxxRE(config)#
```

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

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

11.5.14show ip dhcp snooping

This command is used to display the DHCP snooping configuration.

Syntax

- show ip dhcp snooping

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display DHCP snooping configuration settings.

Example

This example shows how to display DHCP snooping configuration settings.

```
ZEQUOxxxxRE# show ip dhcp snooping

DHCP Snooping is enabled
DHCP Snooping is enabled on VLANs:
    10, 15-18
Verification of MAC address is disabled
Station move is permitted.
Information option is not allowed on un-trusted interface

Interface      Trusted    Rate Limit  Entry Limit
-----
Gi1/0/1        no         10          no_limit
Gi1/0/2        no         50          no_limit
Gi1/0/3        yes        no_limit    no_limit

ZEQUOxxxxRE#
```

11.5.15show ip dhcp snooping binding

This command is used to display DHCP snooping binding entries.

Syntax

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

Parameters

Parameters	description
<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.
vlan <i>VLAN-ID</i>	(Optional) Specifies to display the binding entry based on the VLAN.
interface <i>INTERFACE-ID</i>	(Optional) Specifies to display the binding entry based on the port 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.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display DHCP snooping binding entries.

Example

This example shows how to display DHCP snooping binding entries.

```
ZEQUOxxxxRE#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	Gi1/0/5
00-01-02-00-00-05	10.1.1.11	1495	dhcp-snooping	100	Gi1/0/5

Total Entries: 2

```
ZEQUOxxxxRE#
```

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

```
ZEQUOxxxxRE# show ip dhcp snooping binding 10.1.1.1
```

MAC Address	IP Address	Lease (seconds)	Type	VLAN	Interface
00-01-02-03-04-05	10.1.1.1	1500	dhcp-snooping	100	Gi1/0/5

Total Entries: 1

```
ZEQUOxxxxRE#
```

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

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

MAC Address	IP Address	Lease(seconds)	Type	VLAN	Interface
00-01-02-00-00-05	10.1.1.11	1495	dhcp-snooping	100	Gi1/0/5

Total Entries: 1

```
ZEQUOxxxxRE#
```

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

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

MAC Address	IP Address	Lease(seconds)	Type	VLAN	Interface
00-01-02-03-04-05	10.1.1.1	1500	dhcp-snooping	100	Gi1/0/5

Total Entries: 1

```
ZEQUOxxxxRE#
```

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

```
ZEQUOxxxxRE# 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	Gi1/0/5
00-01-02-00-00-05	10.1.1.11	1495	dhcp-snooping	100	Gi1/0/5

Total Entries: 2

```
ZEQUOxxxxRE#
```

This example shows how to display DHCP snooping binding entries by gi1/0/5.

```
ZEQUOxxxxRE# show ip dhcp snooping binding interface gi1/0/5
```

MAC Address	IP Address	Lease(seconds)	Type	VLAN	Interface
00-01-02-03-04-05	10.1.1.10	1500	dhcp-snooping	100	Gi1/0/5
00-01-02-00-00-05	10.1.1.11	495	dhcp-snooping	100	Gi1/0/5

Total Entries: 2

```
ZEQUOxxxxRE#
```

Display Parameters

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

11.5.16show ip dhcp snooping database

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

Syntax

- show ip dhcp snooping database

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display DHCP snooping database statistics.

Example

This example shows how to display DHCP snooping database statistics.

```
ZEQUOxxxxRE#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

ZEQUOxxxxRE#
```

Display Parameters

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

11.6 IP Source Guard Commands

11.6.1 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.

Syntax

- ip verify source vlan dhcp-snooping [ip-mac]
- no ip verify source vlan dhcp-snooping [ip-mac]

Parameters

Parameters	description
ip-mac	(Optional) Specifies to check both IP address and MAC address of the received IP packets.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is available for physical port and port channel configuration. Use this command to enable the IP source guard on the configured port. When a port is enabled for IP source guard, the IP packet that arrives at the port will be validated via the port ACL. Port ACL is a hardware mechanism and its entry can come from either a manual configured entry or the DHCP snooping binding database. The packet that fails to pass the validation will be dropped. There are two types of validations.

- If **ip-mac** is not specified, the validation is based on the source IP address and VLAN check only.
- If **ip-mac** is specified, the validation is based on the source MAC address, VLAN and IP address.

Example

This example shows how to enable IP Source Guard for GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# ip verify source vlan dhcp-snooping
ZEQUOxxxxRE(config-if)#
```

11.6.2 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.

Syntax

- **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

Parameters	description
<i>MAC-ADDRESS</i>	Specifies the MAC address of the IP-to-MAC address binding entry.
vlan <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.
interface <i>INTERFACE-ID</i>	Specifies the port that the valid host is connected.
,	(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.

Command Default Level

Level: 12.

Usage Guideline

Use this command to create a static binding entry used for IP source guard checking. Use the **no** command to delete a static binding entry. The parameters specified for the command must exactly match the configured parameters to be deleted.

If the MAC address and the VLAN for the configured entry already exist, the existing binding entry is updated. The interface specified for the command can be a physical port or a port-channel interface.

Example

This example shows how to configure an IP Source Guard entry with the IP address 10.1.1.1 and MAC address 00-01-02-03-04-05 at VLAN 2 on GigabitEthernet1/0/10.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ip source binding 00-01-02-03-04-05 vlan 2 10.1.1.1 interface
gil/0/10
ZEQUOxxxxRE(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 GigabitEthernet1/0/10.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# no ip source binding 00-01-02-03-04-05 vlan 2 10.1.1.1 interface
gil/0/10
ZEQUOxxxxRE(config)#
```

11.6.3 show ip source binding

This command is used to display an IP-source guard binding entry.

Syntax

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

Parameters

Parameters	description
<i>IP-ADDRESS</i>	(Optional) Specifies to display the IP-source guard binding entry based on IP address.
<i>MAC-ADDRESS</i>	(Optional) Specifies to display the IP-source guard binding entry based on MAC address.
dhcp-snooping	(Optional) Specifies to display the IP-source guard binding entry learned by DHCP binding snooping.
static	(Optional) Specifies to display the IP-source guard binding entry that is manually configured.
vlan <i>VLAN-ID</i>	(Optional) Specifies to display the IP-source guard binding entry based on VLAN.
interface <i>INTERFACE-ID</i>	(Optional) Specifies to display the IP-source guard binding entry based on ports.
,	(Optional) Specifies a series of interfaces or separates a range of interfaces from a previous range. No space is allowed before or after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

IP source guard binding entries are either manually configured or automatically learned by DHCP snooping to guard IP traffic.

Example

This example shows how to display IP Source Guard binding entries without any parameters.

```
ZEQUOxxxxRE#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	Gi1/0/3
00-01-01-01-01-10	10.1.1.11	3120	dhcp-snooping	100	Gi1/0/3

Total Entries: 2

```
ZEQUOxxxxRE#
```

This example shows how to display IP Source Guard binding entries by IP address 10.1.1.10.

```
ZEQUOxxxxRE# 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	Gi1/0/3

Total Entries: 1

```
ZEQUOxxxxRE#
```

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 GigabitEthernet1/0/3 and learning by DHCP snooping.

```
ZEQUOxxxxRE# show ip source binding 10.1.1.10 00-01-01-01-01-10 dhcp-snooping vlan 100 interface Gi1/0/3
```

MAC Address	IP Address	Lease(sec)	Type	VLAN	Interface
00-01-01-01-01-10	10.1.1.11	3564	dhcp-snooping	100	Gi1/0/3

Total Entries: 1

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
MAC Address	The client's hardware MAC address.
IP Address	The client's IP address assigned from the DHCP server or configured by the user.
Lease (sec)	The IP address lease time.
Type	The binding type. Static bindings are configured manually. Dynamic binding are learned from DHCP snooping.
VLAN	The VLAN number of the client interface.

Parameters	description
Interface	The interface that connects to the DHCP client host.

11.6.4 show ip verify source

This command is used to display the hardware port ACL entry on a particular interface.

Syntax

- show ip verify source [interface *INTERFACE-ID* [, | -]]

Parameters

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

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the 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.

```
ZEQUOxxxxRE#show ip verify source interface gi1/0/3
```

Interface	Filter-type	Filter-mode	IP address	MAC address	VLAN
Gi1/0/3	ip	active	10.1.1.1	-	100
Gi1/0/3	ip	active	deny-all	-	101-120

Total Entries: 2

```
ZEQUOxxxxRE#
```

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.

```
ZEQUOxxxxRE# show ip verify source interface Gi1/0/3
```

Interface	Filter-type	Filter-mode	IP address	MAC address	VLAN
Gi1/0/3	ip-mac	active	10.1.1.10	00-01-01-01-01-01	100
Gi1/0/3	ip-mac	active	10.1.1.11	00-01-01-01-01-10	101
Gi1/0/3	ip-mac	active	deny-all	-	102-120

Total Entries: 3

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Interface	The interface that has IP inspection enabled.
Filter-type	The type of IP Source Guard in operation. ip: Only use an IP address to authorize IP packets. ip-mac: Use the IP and MAC address to authorize IP packets.
Filter-Mode	active: Actively verify IP source entries. inactive-trust-port: Enable DHCP snooping to trust ports with no IP source entry verification active. inactive-no-snooping-vlan: No DHCP snooping VLAN configured with no IP source entry verification active.
IP address	The client's IP address assigned from the DHCP server or configured by the user.
MAC address	The client's MAC address.
VLAN	The VLAN number of the client interface.

11.7 DHCPv6 Client Commands

11.7.1 clear ipv6 dhcp client

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

Syntax

- clear ipv6 dhcp client *INTERFACE-ID*

Parameters

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

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command restarts the IPv6 DHCP client on the specified interface.

Example

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

```
ZEQUOxxxxRE# clear ipv6 dhcp client vlan1
ZEQUOxxxxRE#
```

11.7.2 ipv6 dhcp client pd

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

Syntax

- `ipv6 dhcp client pd { PREFIX-NAME | hint IPV6-PREFIX } [rapid-commit]`
- `no ipv6 dhcp client pd`

Parameters

Parameters	description
<i>PREFIX-NAME</i>	Specifies the IPv6 general prefix name with a maximum of 12 characters.
hint <i>IPV6-PREFIX</i>	Specifies the IPv6 prefix to be sent in the message as a hint.
rapid-commit	Specifies to use a two-message exchange instead of the standard four-message exchange between the Requesting Router (RR) and the Delegating Router (DR) to obtain the network configuration settings from the DHCPv6 Server.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

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.

If the **hint** parameter is specified for the command, the specified hint prefix will be included in the transmitted solicit or request message as a hint to the prefix delegation server. Only one hint prefix can be configured.

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

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

Example

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

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

11.7.3 show ipv6 dhcp

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

Syntax

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

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the VLAN interface to display the DHCPv6 related settings.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the device's DHCPv6 DUID or use the **show ipv6 dhcp interface** command to display DHCPv6 related setting for interfaces. If the interface ID is not specified, all interfaces with the DHCPv6 function will be displayed.

Example

This example shows how to display the DHCPv6 DUID for the device.

```
ZEQUOxxxxRE# show ipv6 dhcp
```

```
This device's DUID is 0001000111A8040D001FC6D1D47B.
```

```
ZEQUOxxxxRE#
```

This example shows how to display the DHCPv6 setting for interface VLAN 1, when VLAN 1 is DHCPv6 disabled.

```
ZEQUOxxxxRE# show ipv6 dhcp interface vlan1
```

```
vlan1 is not in DHCPv6 mode.
```

```
ZEQUOxxxxRE#
```

This example shows how to display the DHCPv6 setting for all VLANs. Only VLANs that are DHCPv6 enabled are displayed.

```
ZEQUOxxxxRE# 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

ZEQUOxxxxRE#
```

11.8 DHCPv6 Server Commands

11.8.1 address prefix

This command is used to specify an address prefix for address assignment. Use the **no** form of this command to remove the address prefix.

Syntax

- **address prefix** *IPV6-PREFIX/PREFIX-LENGTH* [**lifetime** *VALID-LIFETIME PREFERRED-LIFETIME*]
- **no address prefix**

Parameters

Parameters	description
<i>IPV6-PREFIX</i>	Specifies the IPv6 address prefix to assign to the client.
<i>PREFIX-LENGTH</i>	Specifies the length of the IPv6 address prefix.
lifetime <i>VALID-LIFETIME</i>	(Optional) Specifies the valid lifetime of the address prefix in seconds. The valid lifetime value should be greater than preferred lifetime. This value must be between 60 and 4294967295, or infinite. If the lifetime is not specified, the default valid lifetime value is 2592000 seconds (30 days).
<i>PREFERRED-LIFETIME</i>	(Optional) Specifies the preferred lifetime of the address prefix in seconds. This value must be between 60 and 4294967295, or infinite. If the lifetime value is not specified, the default lifetime value is 604800 seconds (7 days)

Default

None.

Command Mode

DHCPv6 Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure an address prefix in an IPv6 DHCP pool configuration. Only one address prefix can be configured for a DHCPv6 pool. The latter issued command will overwrite the previous.

When the server receives a request from a client, the server will check the IPv6 DHCP pool associated with the received interface. If static binding address entries are defined to assign the address for the request client, that static binding address will be assigned. Otherwise, the server will assign the address from the address prefix specified for the IPv6 DHCP pool.

Example

This example shows how to configure the address prefix 2001:0DB8::0/64 to the IPv6 DHCP pool "pool1".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 dhcp pool pool1
ZEQUOxxxxRE(config-dhcp)# address prefix 2001:0DB8::0/64 lifetime 200 100
ZEQUOxxxxRE(config-dhcp)#
```

11.8.2 address-assignment

This command is used to specify an address to be assigned to a specified client. Use the **no** form of this command to remove the static binding address.

Syntax

- **address-assignment** *IPV6-ADDRESS/PREFIX-LENGTH CLIENT-DUID* [**iaid** *IAID*] [**lifetime** *VALID-LIFETIME PREFERRED-LIFETIME*]
- **no address-assignment** *IPV6-ADDRESS/PREFIX-LENGTH CLIENT-DUID* [**iaid** *IAID*]

Parameters

Parameters	description
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address to assign to the specific client.
<i>PREFIX-LENGTH</i>	Specifies the length of the IPv6 prefix.
<i>CLIENT-DUID</i>	Specifies the DHCP unique identifier (DUID) of the client to get the address.
iaid <i>IAID</i>	(Optional) Specifies an identity association identifier (IAID). The IAID here uniquely identifies a collection of non-temporary addresses (IANA) assigned on the client.

Parameters	description
lifetime <i>VALID-LIFETIME</i>	(Optional) Specifies the valid lifetime of the address in seconds. The valid lifetime should be greater than the preferred lifetime. This value must be between 60 and 4294967295, or infinite. If the lifetime is not specified, the default valid lifetime is the pool's valid lifetime.
<i>PREFERRED-LIFETIME</i>	(Optional) Specifies the preferred lifetime of the address in seconds. This value must be between 60 and 4294967295, or infinite. If the lifetime is not specified, the default preferred lifetime is the pool's preferred lifetime.

Default

None.

Command Mode

DHCPv6 Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the command to configure a static binding address entry to specify the address to be assigned to specific client.

When the server receives a request from a client, the server will check the IPv6 DHCP pool associated with the received interface. If the request message includes the IANA option and there are free static entries that are configured with IAID and match both the DUID and IAID of the message, then the match entry will be assigned. If there is no match entry, then if there are free static entries without IAID specified and match the DUID of the message, then the match entry are replied.

If there are no match entries, the client will be assigned with the address from the address prefix specified in the IPv6 DHCP pool.

Example

This example shows how to configure a static binding address entry in an IPv6 DHCP pool named "pool1" and associates the IPv6 DHCP pool with VLAN 100.

```

ZEU0xxxxRE# configure terminal
ZEU0xxxxRE(config)# ipv6 dhcp pool pool1
ZEU0xxxxRE(dhcpv6-config)# address-assignment 2001:0DB8::1:2 000300010506BBCCDDEE
ZEU0xxxxRE(dhcpv6-config)# exit
ZEU0xxxxRE(config)# interface vlan100
ZEU0xxxxRE(dhcpv6-config)# ipv6 dhcp server pool1
ZEU0xxxxRE(dhcpv6-config)#

```

This example shows how to configure a static binding address entry in an IPv6 DHCP pool named "pool2" with IAID option and associates the IPv6 DHCP pool with VLAN 200.

```

ZEU0xxxxRE# configure terminal
ZEU0xxxxRE(config)# ipv6 dhcp pool pool2
ZEU0xxxxRE(dhcpv6-config)# address-assignment 2001:AAB8::2:2 00030001050611223344
iaid 1234
ZEU0xxxxRE(dhcpv6-config)# exit
ZEU0xxxxRE(config)# interface vlan200
ZEU0xxxxRE(config-if)# ipv6 dhcp server pool2
ZEU0xxxxRE(config-if)#

```

11.8.3 clear ipv6 dhcp binding

This command is used to delete the DHCPv6 server binding entries.

Syntax

- clear ipv6 dhcp binding {all | *IPV6-PREFIX*}

Parameters

Parameters	description
all	Specifies to clear all binding entries.
<i>IPV6-PREFIX</i>	Specifies the binding entry by prefix to be cleared.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the command to clear the DHCPv6 server binding entries. If an IPv6 prefix is specified for the command, the binding entry corresponding to the specified client is cleared. Otherwise, all binding entries will be cleared. The IPv6 prefix being freed will be returned to the pool it is originally allocated.

Example

This example shows how to clear all the binding entries in the DHCPv6 server binding table.

```
ZEQUOxxxxRE# clear ipv6 dhcp binding all
ZEQUOxxxxRE#
```

11.8.4 domain-name

This command is used to configure a domain name to be assigned to the requesting DHCPv6 client. Use the **no** form of this command to remove the domain name specification.

Syntax

- **domain-name** *DOMAIN-NAME*
- **no domain-name**

Parameters

Parameters	description
<i>DOMAIN-NAME</i>	Specifies the domain name.

Default

None.

Command Mode

DHCPv6 Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the domain name to be assigned to the requesting DHCPv6 client. Only one domain name can be specified.

Example

This example shows how to configure the domain name in a DHCPv6 server pool named "pool1".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 dhcp pool pool1
ZEQUOxxxxRE(config-dhcp)# domain-name v6domain
ZEQUOxxxxRE(config-dhcp)#
```

11.8.5 dns-server

This command is used to configure the DNS IPv6 server list to be assigned to the requesting IPv6 client. Use the **no** form of this command to remove a DNS server from the server list.

Syntax

- **dns-server** *IPV6-ADDRESS*
- **no dns-server** *IPV6-ADDRESS*

Parameters

Parameters	description
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the DNS server.

Default

None.

Command Mode

DHCPv6 Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the DNS IPv6 server address to be assigned to the requesting DHCPv6 client. Multiple server addresses can be configured by setting this command multiple times.

Example

This example shows how to configure a DNS IPv6 server in the DHCPv6 server pool named "pool1".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 dhcp pool pool1
ZEQUOxxxxRE(config-dhcp)# dns-server 2001:0DB8:3000:3000::42
ZEQUOxxxxRE(config-dhcp)#
```

11.8.6 ipv6 dhcp excluded-address

This command is used to specify IPv6 addresses that a DHCPv6 server should not assign to DHCP clients. Use the **no** form of this command to remove the excluded IPv6 address.

Syntax

- `ipv6 dhcp excluded-address LOW-ADDRESS [HIGH-ADDRESS]`
- `no ipv6 dhcp excluded-address LOW-ADDRESS [HIGH-ADDRESS]`

Parameters

Parameters	description
<i>LOW-ADDRESS</i>	Specifies the excluded IPv6 address or first IPv6 address in an excluded address range.
<i>HIGH-ADDRESS</i>	(Optional) Specifies the last IPv6 address in the excluded address range.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The DHCPv6 server assumes that all addresses (excluding the Switch's IPv6 address) can be assigned to clients. Use this command to exclude a single IPv6 address or a range of IPv6 addresses. The excluded addresses are only applied to the pool(s) for address assignment.

Example

This example shows how to configure the IPv6 address 3004:DB8::1:10 to the excluded address.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 dhcp excluded-address 3004:DB8::1:10
ZEQUOxxxxRE(config)#
```

11.8.7 ipv6 dhcp pool

This command is used to enter the DHCP pool configuration mode and configure the IPv6 DHCP pool. Use the **no** form of this command to remove the IPv6 DHCP pool.

Syntax

- **ipv6 dhcp pool** *POOL-NAME*
- **no ipv6 dhcp pool** *POOL-NAME*

Parameters

Parameters	description
<i>POOL-NAME</i>	Specifies the name for the address pool. The maximum length is 12 characters.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enter the IPv6 DHCP pool configuration mode and configure the IPv6 DHCP pool. Use the **ipv6 dhcp server** command to enable the DHCP IPv6 server service on an interface and specify the IPv6 DHCP pool used to service the DHCP request received on the interface.

Example

This example shows how to configure the address pool named "pool1".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 dhcp pool pool1
ZEQUOxxxxRE(config-dhcp)#
```

11.8.8 ipv6 dhcp server

This command is used to enable the DHCP IPv6 server service on an interface. Use the **no** form of this command to disable the DHCP Ipv6 server service on an interface.

Syntax

- **ipv6 dhcp server** *POOL-NAME* [**rapid-commit**] [**preference** *VALUE*] [**allow-hint**]
- **no ipv6 dhcp server**

Parameters

Parameters	description
<i>POOL-NAME</i>	Specifies the name of the IPv6 DHCP pool used to serve the request received on the interface.
rapid-commit	(Optional) Specifies to use a two-message exchange instead of the standard four-message exchange between the Requesting Router (RR) and the Delegating Router (DR) to obtain the network configuration settings from the DHCP Server. By default, two-message exchange is not allowed.

Parameters	description
preference <i>VALUE</i>	(Optional) Specifies the preference value to be advertised by the server. The range is from 0 to 255. The default value is 0. the higher the value, the higher the priority.
allow-hint	(Optional) Specifies to delegate the prefix based on the prefix hint by the client. By default, the prefix hint by client is ignored.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command enables DHCP for IPv6 server service on a specified interface. An IPv6 DHCP pool can be associated with multiple interfaces. The pool must be configured before it can be associated. Only one IPv6 DHCP pool can be associated with an interface. The DHCP for the IPv6 client, server, and relay functions are mutually exclusive on an interface.

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.

If the command is configured with a **preference** value other than 0, the preference value will be filled as option in the advertise message. An advertise message without the preference option is equivalent to having a preference value of 0. A higher preference represents a higher precedence.

If the command is configured with the **allow-hint** option, the server will delegate the prefix based on prefix hint by client. Otherwise, the prefix hint by client is ignored.

Example

This example shows how to create the DHCP pool "pool1", enable the DHCP IPv6 server service on the interface VLAN 100 using the DHCP pool "pool1" to delegate the prefixes.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 dhcp pool pool1
ZEQUOxxxxRE(config-dhcp)# exit
ZEQUOxxxxRE(config)# interface vlan100
ZEQUOxxxxRE(config-if)# ipv6 dhcp server pool1
ZEQUOxxxxRE(config-if)#
```

11.8.9 ipv6 local pool

This command is used to configure a local IPv6 prefix pool. Use the **no** form of this command to remove the pool.

Syntax

- ipv6 local pool** *POOL-NAME IPV6-PREFIX/PREFIX-LENGTH ASSIGNED-LENGTH*
- no ipv6 local pool** *POOL-NAME*

Parameters

Parameters	description
<i>POOL-NAME</i>	Specifies the name of the local IPv6 prefix pool with a maximum of 12 characters.
<i>IPV6-PREFIX</i>	Specifies the IPv6 prefix address of the local pool.
<i>PREFIX-LENGTH</i>	Specifies the IPv6 prefix length of the local pool.
<i>ASSIGNED-LENGTH</i>	Specifies the prefix length to delegate to the user from the pool. The value of the assigned length cannot be less than the value of the prefix length.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A local IPv6 prefix pool defines a block of prefixes. Define the pool with overlay prefixes with other pools. To modify the prefix for the local pool, remove the local pool first and re-create the pool. All of the prefixes that are already allocated will be freed.

Example

This example shows how to create a local IPv6 prefix pool named "prefix-pool" and use the local pool in the DHCP pool "pool1".

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 local pool prefix-pool 3004:DB8::/48 64
ZEQUOxxxxRE(config)# ipv6 dhcp pool pool1
ZEQUOxxxxRE(config-dhcp)# prefix-delegation pool prefix-pool lifetime 300 200
ZEQUOxxxxRE(config-dhcp)#
  
```

11.8.10prefix-delegation

This command is used to specify a prefix to be delegated to the specified client. Use the **no** form of this command to remove the static binding prefix.

Syntax

- **prefix-delegation** *IPV6-PREFIX/PREFIX-LENGTH CLIENT-DUID* [*iaid IAID*] [*lifetime VALID-LIFETIME PREFERRED-LIFETIME*]
- **no prefix-delegation** *IPV6-PREFIX/PREFIX-LENGTH*

Parameters

Parameters	description
<i>IPV6-PREFIX</i>	Specifies the IPv6 prefix to delegate to the specific client.
<i>PREFIX-LENGTH</i>	Specifies the length of the IPv6 prefix.
<i>CLIENT-DUID</i>	Specifies the DHCP unique identifier (DUID) of the client to get the delegation.
iaid <i>IAID</i>	(Optional) Specifies the identity association identifier (IAID). An IAID uniquely identifies a collection of prefixes assigned to the requesting router.
lifetime <i>VALID-LIFETIME</i>	(Optional) Specifies the valid lifetime of the prefix in seconds. The valid lifetime should be greater than preferred lifetime. This value must be between 60 and 4294967295, or infinite. If the lifetime is not specified, the default valid lifetime is 2592000 seconds (30 days).

Parameters	description
<i>PREFERRED-LIFETIME</i>	(Optional) Specifies the preferred lifetime of the prefix in seconds. This value must be between 60 and 4294967295, or infinite. If the lifetime is not specified, the default preferred lifetime is 604800 seconds (7 days)

Default

None.

Command Mode

DHCPv6 Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure a static binding prefix entry to specify the prefix to be dedicatedly delegated to specific client. Multiple static binding prefix entry can be defined for a client, or an IAPD on a client.

When the server receives a request from a client, the server will check the IPv6 DHCP pool associated with the received interface. If the request message includes the IAPD option and there are free static entries that are configured with IAID and match both the DUID and IAID of the message, then all the match entries will be delegated. If there are no match entries, then if there are free static entries without IAID specified and match the DUID of the message, then the match entries are replied. If the request message has no IAID option, then if there are free static entries without IAID specified and match the DUID of the message, then the match entries are replied.

If there are no match entries, the client will be delegated the prefix from the local IPv6 prefix pool specified in the IPv6 DHCP pool.

Example

This example shows how to configure a static binding prefix entry in a IPv6 DHCP pool named "pool1" and associates the IPv6 DHCP pool with VLAN 100.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 dhcp pool pool1
ZEQUOxxxxRE(config-dhcp)# prefix-delegation 2001:0DB8::/64 000300010506BBCCDDEE
ZEQUOxxxxRE(config-dhcp)# exit
ZEQUOxxxxRE(config)# interface vlan100
ZEQUOxxxxRE(config-if)# ipv6 dhcp server pool1
ZEQUOxxxxRE(config-if)#

```

11.8.11 prefix-delegation pool

This command is used to specify a local IPv6 prefix pool from which prefixes can be delegated. Use the **no** form of this command to remove a local IPv6 prefix pool.

Syntax

- **prefix-delegation pool** *POOL-NAME* [**lifetime** *VALID-LIFETIME* *PREFERRED-LIFETIME*]
- **no prefix-delegation pool** *POOL-NAME*

Parameters

Parameters	description
<i>POOL-NAME</i>	Specifies the name of a local IPv6 prefix pool.
lifetime <i>VALID-LIFETIME</i>	(Optional) Specifies the valid lifetime of the prefix in seconds. The valid lifetime should be greater than preferred lifetime. This value must be between 60 and 4294967295, or infinite. If the lifetime is not specified, the default valid lifetime is 2592000 seconds (30 days).
lifetime <i>PREFERRED-LIFETIME</i>	(Optional) Specifies the preferred lifetime of the prefix in seconds. This value must be between 60 and 4294967295, or infinite. If the lifetime is not specified, the default preferred lifetime is 604800 seconds (7 days)

Default

None.

Command Mode

DHCPv6 Pool Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify a local IPv6 prefix pool in a IPv6 DHCP pool to delegate the prefix for clients serviced by the DHCP pool. Only one local IPv6 prefix pool can be specified in an IPv6 DHCP pool.

When the server receives a request from a client, the server will check the IPv6 DHCP pool associated with the received interface. If static binding prefix entries are defined to delegate the prefix for the request client, the static binding prefix will be delegated. Otherwise, the server will delegate the prefix from the local IPv6 prefix pool specified for the IPv6 DHCP pool.

Example

This example shows how to configure a local IPv6 prefix pool named "prefix-pool", specify the pool in an IPv6 DHCP pool named "pool1" and associate the IPv6 DHCP pool with VLAN 100.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 local pool prefix-pool 3004:DB8::/48 64
ZEQUOxxxxRE(config)# ipv6 dhcp pool pool1
ZEQUOxxxxRE(config-dhcp)# prefix-delegation pool prefix-pool lifetime 300 200
ZEQUOxxxxRE(config-dhcp)# exit
ZEQUOxxxxRE(config)# interface vlan100
ZEQUOxxxxRE(config-if)# ipv6 dhcp server pool1
ZEQUOxxxxRE(config-if)#
```

11.8.12service ipv6 dhcp

This command is used to enable the IPv6 DHCP server and relay service on the Switch. Use the **no** form of this command to disable the IPv6 DHCP server and relay service.

Syntax

- service pv6 dhcp
- no service ipv6 dhcp

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to globally enable the IPv6 DHCP server and relay service on the Switch. The configuration changes of the DHCPv6 server cannot take effect in real-time, disable and enable the DHCPv6 server to make the new configuration take effect.

Example

This example shows how to enable the IPv6 DHCP server and relay service.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# service ipv6 dhcp
ZEQUOxxxxRE(config)#
```

11.8.13show ipv6 dhcp

This command is used to display the DHCPv6 related setting for interfaces.

Syntax

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

Parameters

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

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the device's DHCPv6 DUID or use the **show ipv6 dhcp interface** command to display the DHCPv6 related settings for interfaces. If the interface ID is not specified, all interfaces that are enabled with the DHCPv6 function will be displayed.

Example

This example shows how to display the DHCPv6 information for interface VLAN 1, when VLAN 1 is not in the DHCPv6 mode.

```
ZEQUOxxxxRE# show ipv6 dhcp interface vlan1
```

```
vlan1 is not in DHCPv6 mode
```

```
ZEQUOxxxxRE#
```

This example shows how to display the DHCPv6 client for interface VLAN 1, when VLAN 1 is DHCPv6 server enabled.

```
ZEQUOxxxxRE# show ipv6 dhcp interface vlan1
```

```
vlan1 is in server mode
IPv6 DHCP pool is test
Preference value: 0
Hint from client: ignored
Rapid-Commit is disabled
```

```
ZEQUOxxxxRE#
```

11.8.14show ipv6 dhcp binding

This command is used to display the IPv6 prefix binding entry.

Syntax

- **show ipv6 dhcp binding** [*IPv6-PREFIX*]

Parameters

Parameters	description
<i>IPV6-PREFIX</i>	(Option) Specifies the binding entry to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays all DHCPv6 client prefix bindings from the binding table if the IPV6 prefix parameter is not given. If the IPV6 prefix parameter is given, it only displays the specific client prefix binding for the prefix.

Example

This example shows how to display the IPv6 prefix binding entry.

```
ZEQUOxxxxRE# show ipv6 dhcp binding

Client DUID : 00030001aabbcd000001
              address: 1234::2
                  preferred lifetime 200 ,valid lifetime 300

Client DUID : 00030001aabbcd000000
              address: 1234::3
                  preferred lifetime 200 ,valid lifetime 300

Client DUID : 00030001aabbcd000002
              address: 1234::4
                  preferred lifetime 200 ,valid lifetime 300

Total Entries: 3

ZEQUOxxxxRE#
```

11.8.15 show ipv6 dhcp pool

This command is used to display the DHCPv6 server configuration pool information.

Syntax

- `show ipv6 dhcp pool [POOL-NAME]`

Parameters

Parameters	description
<i>POOL-NAME</i>	(Optional) Specifies the IPv6 DHCP pool to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command displays all DHCPv6 server configuration pool information if the pool name parameter is not specified. Otherwise, it only displays the pool information for the specified pool name.

Example

This example shows how to display the DHCPv6 pool information.

```

ZEQUOxxxxRE# show ipv6 dhcp pool

DHCPv6 pool: pool1
  Static bindings:
    Binding for client 00030001aabbcd000080
      IA PD: IA ID 0x0001
        Prefix: 3000:0:300::/48
          preferred lifetime 604800, valid lifetime 2592000
    Prefix delegation pool: abc
      preferred lifetime 604800, valid lifetime 2592000
    DNS server: 2345::2
    Domain name: pool1.com
    Active clients: 0

DHCPv6 pool: pool2
  DNS server: 6000::2
  DNS server: 6000::9
  Domain name: pool2.com
  Active clients: 0

DHCPv6 pool: test
  Static bindings:
    Binding for client 00030001aabbcd001234
      IA NA: IA ID not specified
        Address: 1234::1234
          preferred lifetime 604800, valid lifetime 2592000
    Address prefix: 1234::/64
      preferred lifetime 200, valid lifetime 300
    DNS server:
    Domain name:
    Active clients: 3

ZEQUOxxxxRE#

```

Display Parameters

Parameters	description
DHCPv6 pool	The name of the pool.
Binding for client 000300010002FCA5C01C	Indicates a static binding for the client with the DUID 000300010002FCA5C01C.
IAPD	The collection of prefixes assigned to a client.
IAID	The identity association identifier for this IAPD.
Prefix	The prefixes to be delegated.
preferred lifetime, valid lifetime	The preferred lifetime and valid lifetime assigned to this prefix for client.
DNS server	The DNS server address list.
Domain name	The configured DNS domain list.
Active clients	The total number of active clients.

11.8.16 show ipv6 excluded-address

This command is used to display the IPv6 excluded address configuration information.

Syntax

- show ipv6 excluded-address

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the excluded address range which cannot be assigned to the client.

Example

This example shows how to display the configured exclude addresses.

```
ZEQUOxxxxRE# show ipv6 excluded-address

IPv6 excluded address:
  1.      3004:DB8::1:1

Total Entries: 1

ZEQUOxxxxRE#
```

11.8.17 show ipv6 local pool

This command is used to display the local IPv6 prefix pool configuration information.

Syntax

- show ipv6 local pool [*POOL-NAME*]

Parameters

Parameters	description
<i>POOL-NAME</i>	(Optional) Specifies the local IPv6 prefix pool to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the settings for a specific local IPv6 prefix pool or the setting for all prefix if the pool name parameter is not specified.

Example

This example shows how to display the local pool information without the pool name specified.

```
ZEQUOxxxxRE#show ipv6 local pool
```

Pool	Prefix	Free	In use
-----	-----	-----	-----
prefix-pool	3004:DB8::/48	65536	0
-----	-----	-----	-----

```
Total Entries: 1
```

```
ZEQUOxxxxRE#
```

This example shows how to display the information for local pool called "PP1".

```
Prefix is 3004:DB8::/48 assign /64 prefix
1 entries in use, 65536 available, 0 rejected
User          Prefix                                Interface
-----
000300010002FCA5C01C 2003::/64                                vlan1

ZEQUOxxxxRE#
```

11.8.18show ipv6 dhcp operation

This command is used to display the operational information for the DHCPv6 server.

Syntax

- show ipv6 dhcp operation

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the operational information for the DHCPv6 server.

Example

This example shows how to the operational information for the DHCPv6 server.

```
ZEQUOxxxxRE# show ipv6 dhcp operation
```

```
DHCPv6 pool: pool1
  Prefix delegation pool: abc, prefix is 3000::/32 48
  Static bindings:
    Binding for client 00030001aabbcd000080
      IA PD: IA ID 0x0001
      Prefix: 3000:0:300::/48
      preferred lifetime 604800, valid lifetime 2592000
    preferred lifetime 604800, valid lifetime 2592000
    DNS server: 2345::2
    Domain name: pool1.com

DHCPv6 pool: test
  Address prefix: 1234::/64
  Static bindings:
    Binding for client 00030001aabbcd001234
      IA NA: IA ID not specified
      Address: 1234::1234
      preferred lifetime 604800, valid lifetime 2592000
    preferred lifetime 200, valid lifetime 300
    DNS server: 2000::2
    Domain name: test.com
```

```
ZEQUOxxxxRE#
```

11.9 DHCPv6 Relay Commands

11.9.1 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.

Syntax

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

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

To enable the DHCPv6 relay function on an interface, use the **ipv6 dhcp relay destination** command to configure the relay destination address on an interface. Use the **no ipv6 dhcp relay destination** command to remove the relay address. If all relay addresses are removed, the relay function is disabled.

The incoming DHCPv6 messages, being relayed can come from a client, may be already relayed by a relay agent. The destination address to be relayed can be a DHCPv6 server or another DHCPv6 relay agent,

The destination address can be a unicast or a multicast address, both can be a link scoped address or a global scoped address. For link scoped addresses, the interface where the destination address is located must be specified. For global scoped addresses, the user can optional specify the output interface. If the output interface is not specified, the output interface is resolved via the routing table.

Multiple relay destination addresses can be specified for an interface. When the DHCPv6 message is relayed to the multicast address, the hop limit field in the IPv6 packet header will be set to 32.

Example

This example shows how to configure the relay destination address on VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# ipv6 dhcp relay destination FE80::250:A2FF:FEBF:A056 vlan1
ZEQUOxxxxRE(config-if)# ipv6 dhcp relay destination FE80::22:33 vlan2
ZEQUOxxxxRE(config-if)#
```

11.9.2 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 setting.

Syntax

- `ipv6 dhcp relay remote-id format { default | cid-with-user-define | user-define }`
- `no ipv6 dhcp relay remote-id format`

Parameters

Parameters	description																																													
default	Specifies to use the Switch's system MAC address as the remote ID. The remote ID is formed in the following format: <table><tr><td colspan="5">-----</td></tr><tr><td>F01</td><td>F02</td><td>F03</td><td>F04</td><td>F05</td></tr><tr><td colspan="5">-----</td></tr><tr><td>Sub Type</td><td>VLAN ID</td><td>Module ID</td><td>Port ID</td><td>MAC</td></tr><tr><td></td><td></td><td></td><td></td><td>Address</td></tr><tr><td colspan="5">-----</td></tr><tr><td>1 byte</td><td>2 bytes</td><td>1 byte</td><td>1 byte</td><td>6 bytes</td></tr><tr><td colspan="5">-----</td></tr></table> F01. Sub Type: The number 1 indicates that this is the remote ID. F02. VLAN ID: The incoming VLAN ID of the DHCP client packet. F03. Module ID: For a standalone switch, the module ID is always 0. For a stacked switch, the module ID is the unit ID. F04. Port ID: The incoming port number of the DHCP client packet. The port number starts from 1. F05. MAC Address: The system MAC address of the Switch.	-----					F01	F02	F03	F04	F05	-----					Sub Type	VLAN ID	Module ID	Port ID	MAC					Address	-----					1 byte	2 bytes	1 byte	1 byte	6 bytes	-----									

F01	F02	F03	F04	F05																																										

Sub Type	VLAN ID	Module ID	Port ID	MAC																																										
				Address																																										

1 byte	2 bytes	1 byte	1 byte	6 bytes																																										

cid-with-user-define	Specifies to use a CID with user-defined string as the remote ID. The remote ID option is formed in the following format: <table><tr><td colspan="5">-----</td></tr><tr><td>F01</td><td>F02</td><td>F03</td><td>F04</td><td>F05</td></tr><tr><td colspan="5">-----</td></tr><tr><td>Sub Type</td><td>VLAN ID</td><td>Module ID</td><td>Port ID</td><td>User</td></tr><tr><td></td><td></td><td></td><td></td><td>Defined</td></tr><tr><td colspan="5">-----</td></tr><tr><td>1 byte</td><td>2 bytes</td><td>1 byte</td><td>1 byte</td><td>Max. 256</td></tr><tr><td></td><td></td><td></td><td></td><td>bytes</td></tr><tr><td colspan="5">-----</td></tr></table> F01. Sub Type: The number 2 indicates that this is the remote ID. F02. VLAN ID: The incoming VLAN ID of the DHCP client packet. F03. Module ID: For a standalone switch, the module ID is always 0. For a stacked switch, the module ID is the unit ID. F04. Port ID: The incoming port number of the DHCP client packet. The port number starts from 1. F05. User Defined: The user-defined string configured in the ipv6 dhcp relay remote-id udf command. By default, the field is empty.	-----					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	-----				

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																																										

Parameters	description														
user-define	Specifies to use a user-defined string as the remote ID. The remote ID option is formed in the following format: <table border="1"> <tr> <td>-----</td><td>-----</td></tr> <tr> <td> F01</td><td> F02</td></tr> <tr> <td>-----</td><td>-----</td></tr> <tr> <td> Sub Type</td><td> User Defined</td></tr> <tr> <td>-----</td><td>-----</td></tr> <tr> <td> 1 byte</td><td> Max. 256 bytes</td></tr> <tr> <td>-----</td><td>-----</td></tr> </table> F01. Sub Type: The number 3 indicates that this is the remote ID. F02. User Defined: The user-defined string configured in the <code>ipv6 dhcp relay remote-id udf</code> command.	-----	-----	F01	F02	-----	-----	Sub Type	User Defined	-----	-----	1 byte	Max. 256 bytes	-----	-----
-----	-----														
F01	F02														
-----	-----														
Sub Type	User Defined														
-----	-----														
1 byte	Max. 256 bytes														
-----	-----														

Default

By default, the format for the DHCPv6 replay remote ID is **default**.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is used to configure the sub-type of the Remote ID option.

Example

This example shows how to configure the sub-type of the remote ID to "cid-with-user-define".

```

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

```

11.9.3 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.

Syntax

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

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is used to enable the insertion of the DHCPv6 relay agent Remote ID option function.

Example

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

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

11.9.4 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.

Syntax

- ipv6 dhcp relay remote-id policy {drop | keep}
- no ipv6 dhcp relay remote-id policy

Parameters

Parameters	description
drop	Specifies to discard the packet that already has the relay agent Remote-ID Option 37.
keep	Specifies that the DHCPv6 request packet that already has the relay agent Remote-ID option is left unchanged and directly relayed to the DHCPv6 server.

Default

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

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the global policy for packets that already have Option 37. If the **drop** policy is selected, relay agent's Remote ID option that has already been presented in the received packet from client, the packet will be dropped. If the **keep** policy is selected, the Switch doesn't check if there is a relay agent Remote-ID option in the received packet.

Example

This example shows how to configure the policy of the DHCPv6 relay agent Remote ID option to dropping the packet if it has a relay agent Remote-ID option.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 dhcp relay remote-id policy drop
ZEQUOxxxxRE(config)#
```

11.9.5 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.

Syntax

- `ipv6 dhcp relay remote-id udf {ascii STRING | hex HEX-STRING}`
- `no ipv6 dhcp relay remote-id udf`

Parameters

Parameters	description
ascii <i>STRING</i>	Specifies the ASCII string (a maximum of 128 characters) for the UDF of the Remote ID.
hex <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.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the UDF for the Remote ID.

Example

This example shows how to configure the UDF to the ASCII string "PARADISE001".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 dhcp relay remote-id udf ascii PARADISE001
ZEQUOxxxxRE(config)#
```

This example shows how to configure the UDF to the hexadecimal string "010c08".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 dhcp relay remote-id udf hex 010c08
ZEQUOxxxxRE(config)#
```

11.9.6 show ipv6 dhcp

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

Syntax

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

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the VLAN interface ID to display.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the device's DHCPv6 DUID or use the **show ipv6 dhcp interface** command to display DHCPv6 related settings and information for the specified VLAN interface. If the interface ID is not specified, all interfaces that are enabled for the DHCPv6 function will be displayed.

Example

This example shows how to display the DHCPv6 settings for VLAN 1, which is in the DHCPv6 relay mode.

```
Switch # show ipv6 dhcp interface vlan1
```

```
vlan1 is in relay mode
Relay destinations:
FE80::20A:BBFF:FECC:102 via vlan2
```

```
Switch #
```

This example shows how to display DHCPv6 information for the interface VLAN 1 when VLAN 1 is not in the DHCPv6 mode.

```
ZEQUOxxxxRE# show ipv6 dhcp interface vlan1
```

```
Vlan1 is not in DHCPv6 mode
```

```
ZEQUOxxxxRE#
```

11.9.7 show ipv6 dhcp relay information option

This command is used to display settings of the DHCPv6 relay information options.

Syntax

- show ipv6 dhcp relay information option

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the settings of the DHCPv6 relay information options.

Example

This example shows how to display the DHCPv6 relay remote ID setting.

```

ZEQUOxxxxRE#show ipv6 dhcp relay information option

IPv6 DHCP relay remote-id
  Insert : disabled
  Policy : keep
  Format : default
  UDF is ascii string

IPv6 DHCP relay interface-id
  Insert : enabled
  Policy : keep
  Format : default

ZEQUOxxxxRE#

```

11.9.8 ipv6 dhcp relay interface-id format

This command is used to configure the sub-type of the interface ID. Use the **no** form of this command to revert to the default setting.

Syntax

- `ipv6 dhcp relay interface-id format { default | cid | vendor1 }`
- `no ipv6 dhcp relay interface-id format`

Parameters

Parameters	description
default	Specifies to use the VLAN ID as the interface ID. The interface ID is formed in the following format: <pre> ----- F01 F02 ----- ----- Sub Type VLAN ID ----- ----- 1 byte 2 bytes ----- </pre> F01. Sub Type: The number 1 indicates that this is the interface ID. F02. VLAN ID: The incoming VLAN ID of the DHCP client packet.

Parameters	description																														
cid	Specifies to use the CID as the interface ID. The interface ID option is formed in the following format:																														
	<table><tr><td colspan="4">-----</td></tr><tr><td>F01</td><td>F02</td><td>F03</td><td>F04</td></tr><tr><td colspan="4">-----</td></tr><tr><td>Sub Type</td><td>VLAN ID</td><td>Module ID</td><td>Port ID</td></tr><tr><td colspan="4">-----</td></tr><tr><td>1 byte</td><td>2 bytes</td><td>1 byte</td><td>1 byte</td></tr><tr><td colspan="4">-----</td></tr></table>	-----				F01	F02	F03	F04	-----				Sub Type	VLAN ID	Module ID	Port ID	-----				1 byte	2 bytes	1 byte	1 byte	-----					

	F01	F02	F03	F04																											

Sub Type	VLAN ID	Module ID	Port ID																												

1 byte	2 bytes	1 byte	1 byte																												

	F01. Sub Type: The number 2 indicates that this is the interface ID.																														
	F02. VLAN ID: The incoming VLAN ID of the DHCP client packet.																														
	F03. Module ID: For a standalone switch, the module ID is always 0. For a stacked switch, the module ID is the unit ID.																														
	F04. Port ID: The incoming port number of the DHCP client packet. The port number starts from 1.																														
vendor1	Specifies to use vendor 1. If configures, the interface ID option is formed in the following format:																														
	<table><tr><td colspan="5">-----</td></tr><tr><td>F01</td><td>F02</td><td>F03</td><td>F04</td><td>F05</td></tr><tr><td colspan="5">-----</td></tr><tr><td>E</td><td>t</td><td>h</td><td>e</td><td>r</td></tr><tr><td>(0x45)</td><td>(0x74)</td><td>(0x68)</td><td>(0x65)</td><td>(0x72)</td></tr><tr><td colspan="5">-----</td></tr></table>	-----					F01	F02	F03	F04	F05	-----					E	t	h	e	r	(0x45)	(0x74)	(0x68)	(0x65)	(0x72)	-----				

F01	F02	F03	F04	F05																											

E	t	h	e	r																											
(0x45)	(0x74)	(0x68)	(0x65)	(0x72)																											

Parameters	description				
	1 byte	1 byte	1 byte	1 byte	1 byte
	-----	-----	-----	-----	-----
	F06	F07	F08	F09	F10
	-----	-----	-----	-----	-----
	n	e	t	Chassis ID	/
	(0x6E)	(0x65)	(0x74)		(0x2F)
	-----	-----	-----	-----	-----
	1 byte	1 byte	1 byte	1~2 byte	1 byte
	-----	-----	-----	-----	-----

	F11	F12	F13	F14	F15
	-----	-----	-----	-----	-----
	0	/	Port	:	cvlan
	(0x30)	(0x2F)	Number	(0x3A)	
	-----	-----	-----	-----	-----
	1 byte	1 byte	1~2 byte	1 byte	1~4 byte
	-----	-----	-----	-----	-----

	F16	F17	F18	F19	F20
	-----	-----	-----	-----	-----
	.	0	Space	System	/
	(0x2E)	(0x30)	(0x20)	Name	(0x2F)
	-----	-----	-----	-----	-----
	1 byte	1 byte	1 byte	1~128 byte	1 byte
	-----	-----	-----	-----	-----

	F21	F22	F23	F24	F25
	-----	-----	-----	-----	-----
	0	/	0	/	Chassis ID
	(0x30)	(0x2F)	(0x30)	(0x2F)	
	-----	-----	-----	-----	-----
	1 byte	1 byte	1 byte	1 byte	1~2 byte
	-----	-----	-----	-----	-----

	F26	F27	F28	F29	
	-----	-----	-----	-----	-----
	/	0	/	Port	
	(0x2F)	(0x30)	(0x2F)	Number	
	-----	-----	-----	-----	-----
	1 byte	1 bytes	1 byte	1~2 byte	
	-----	-----	-----	-----	-----

Parameters	description
	F01. <i>E</i>: The ASCII code is 0x45. F02. <i>t</i>: The ASCII code is 0x74. F03. <i>h</i>: The ASCII code is 0x68. F04. <i>e</i>: The ASCII code is 0x65. F05. <i>r</i>: The ASCII code is 0x72. F06. <i>n</i>: The ASCII code is 0x6E F07. <i>e</i>: The ASCII code is 0x65. F08. <i>t</i>: The ASCII code is 0x74. F09. <i>Chassis ID</i>: The number of the chassis. For a standalone switch, the chassis ID is always 0. For a stacked switch, the chassis ID is the unit ID. F10. <i>Slash (/)</i>: The ASCII code is 0x2F. F11. <i>O</i>: The ASCII code is 0x30. F12. <i>Slash (/)</i>: The ASCII code is 0x2F. F13. <i>Port Number</i>: The incoming port number of the DHCP client packet. F14. <i>Colon (:</i>):The ASCII code is 0x3A. F15. <i>cvlan</i>: The VLAN ID of the client. The value is from 1 to 4094. F16. <i>Dot (.)</i>:The ASCII code is 0x2E. F17. <i>O</i>: The ASCII code is 0x30. F18. <i>Space</i>: The ASCII code is 0x20. F19. <i>System Name</i>: The system name of the Switch. F20. <i>Slash (/)</i>: The ASCII code is 0x2F. F21. <i>O</i>: The ASCII code is 0x30. F22. <i>Slash (/)</i>: The ASCII code is 0x2F. F23. <i>O</i>: The ASCII code is 0x30. F24. <i>Slash (/)</i>: The ASCII code is 0x2F. F25. <i>Chassis ID</i>: The number of the chassis. For a standalone switch, the chassis ID is always 0. For a stacked switch, the chassis ID is the unit ID. F26. <i>Slash (/)</i>: The ASCII code is 0x2F. F27. <i>O</i>: The ASCII code is 0x30. F28. <i>Slash (/)</i>: The ASCII code is 0x2F. F29. <i>Port Number</i>: The incoming port number of the DHCP client packet.

Default

By default, the format for the DHCPv6 replay interface ID is **default**.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is used to configure the sub-type of the interface ID option.

Example

This example shows how to configure the sub-type of the remote ID to "cid".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 dhcp relay interface-id format cid
ZEQUOxxxxRE(config)#
```

11.9.9 ipv6 dhcp relay interface-id option

This command is used to enable the insertion of the relay agent interface ID Option 18 during the relay of DHCP for IPv6 request packets. Use the **no** form of this command to disable the insert function.

Syntax

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

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is used to enable the insertion of the DHCPv6 relay agent interface ID option function.

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 dhcp relay interface-id option
ZEQUOxxxxRE(config)#
```

11.9.10ipv6 dhcp relay interface-id policy

This command is used to configure the Option 18 re-forwarding policy for the DHCPv6 relay agent. Use the **no** form of this command to revert to the default setting.

Syntax

- `ipv6 dhcp relay interface-id policy { drop | keep }`
- `no ipv6 dhcp relay interface-id policy`

Parameters

Parameters	description
drop	Specifies to discard the packet that already has the relay agent Interface-ID Option 18.
keep	Specifies that the DHCPv6 request packet that already has the relay agent Interface-ID option is left unchanged and directly relayed to the DHCPv6 server.

Default

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

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the global policy for packets that already have Option 18. If the **drop** policy is selected, relay agent's Interface ID option that has already been presented in the received packet from client, the packet will be dropped. If the **keep** policy is selected, the Switch doesn't check if there is a relay agent Interface-ID option in the received packet.

Example

This example shows how to configure the policy of the DHCPv6 relay agent Interface ID option to drop the packet if it has a relay agent Interface-ID option.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ipv6 dhcp relay interface-id policy drop
ZEQUOxxxxRE(config)#
```

11.10 DNS (Domain Name System) Commands

11.10.1 clear host

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

Syntax

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

Parameters

Parameters	description
all	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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

11.10.2ip dns server

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

Syntax

- ip dns server
- no ip dns server

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

11.10.3ip dns lookup

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

Syntax

- ip dns lookup [static] [cache]
- no ip dns lookup [static] [cache]

Parameters

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

Default

Enable lookup static and cache.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

11.10.4ip 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.

Syntax

- ip domain lookup
- no ip domain lookup

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use the **ip domain lookup** 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.

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

11.10.5ip 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.

Syntax

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

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

11.10.6ip name-server

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

Syntax

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

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IPv4 address of the domain name server.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the domain name server.
<i>IP-ADDRESS2</i>	Specifies multiple IP addresses, separated by spaces. Up to two servers can be specified.
<i>IPV6-ADDRESS2</i>	Specifies multiple IPv6 addresses, separated by spaces. Up to two servers can be specified.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure a DNS server. When the system cannot obtain an answer from a DNS server, it will attempt the subsequent server until it receives a response. If name servers are already configured, the servers configured later will be added to the server list. The user can configure up to 4 name servers.

Example

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

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

11.10.7ip 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.

Syntax

- ip name-server timeout *SECONDS*
- no ip name-server timeout

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

11.10.8show hosts

This command is used to display the DNS configuration.

Syntax

- show hosts

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display DNS related configuration information.

Example

This example shows how to display DNS related configuration information.

```
ZEQUOxxxxRE#show hosts
```

```
Number of Static Entries:  1
Number of Dynamic Entries: 0
```

```
Host Name:      www.abc.com
IP Address:     192.168.5.243
TTL:           forever
```

```
ZEQUOxxxxRE#
```

11.10.9show ip name-server

This command is used to display the current DNS name servers.

Syntax

- show ip name-server

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the DNS name servers.

Example

This example shows how to display the DNS name servers.

```
ZEQUOxxxxRE#show ip name-server
```

```
Static name server:
```

```
192.168.5.134
```

```
5001:5::2
```

```
Dynamic name server:
```

```
ZEQUOxxxxRE#
```

12 Authentication function

12.1 Authentication, Authorization, and Accounting (AAA) Commands

12.1.1 aaa new-model

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

Syntax

- **aaa new-model**
- **no aaa new-model**

Parameters

None.

Default

By default, this feature is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

The user should use the **aaa new-model** command to enable AAA before the authentication and accounting via the AAA method lists take effect. If AAA is disabled, the login user will be authenticated via the local user account table created by the **username** command. The enable password will be authenticated via the local table which is defined via the **enable password** command.

Example

This example shows how to enable the AAA function.

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

12.1.2 aaa accounting commands

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

Syntax

- **aaa accounting commands** *LEVEL* { **default** | *LIST-NAME* } { **start-stop** *METHOD1* [*METHOD2...*] | **none** }
- **no aaa accounting commands** *LEVEL* { **default** | *LIST-NAME* }

Parameters

Parameters	description
<i>LEVEL</i>	Specifies to do accounting for all configure commands at the specified privilege level. The privilege level is between 1 and 15.
default	Specifies to configure the default method list for accounting.
<i>LIST-NAME</i>	Specifies the name of the method list. This name can be up to 32 characters long.
<i>METHOD1</i> [<i>METHOD2...</i>]	Specifies the list of methods that the accounting algorithm tries in the given sequence. Enter at least one method or enter up to four methods. The following are keywords that can be used to specify a method. group tacacs+ - Specifies to use the servers defined by the tacacs-server host command. group <i>GROUP-NAME</i> - Specifies to use the server groups defined by the aaa group server tacacs+ command.
none	Specifies not to perform accounting.

Default

No AAA accounting method is configured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to configure the method list for accounting of commands.

Example

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

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

12.1.3 aaa accounting exec

This command is used to configure the method list used for EXEC accounting for a specific line. Use the **no** form of this command to delete an Exec accounting method list.

Syntax

- aaa accounting exec {default | *LIST-NAME*} {start-stop *METHOD1* [*METHOD2*...] | none}
- no aaa accounting exec {default | *LIST-NAME*}

Parameters

Parameters	description
default	Specifies to configure the default method list for EXEC accounting.
<i>LIST-NAME</i>	Specifies the name of the method list. This name can be up to 32 characters long.

Parameters	description
METHOD1 [METHOD2...]	Specifies the list of methods that the accounting algorithm tries in the given sequence. Enter at least one method or enter up to four methods. The following are keywords that can be used to specify a method. group radius - Specifies to use the servers defined by the radius-server host command. group tacacs+ - Specifies to use the servers defined by the tacacs-server host command. group GROUP-NAME - Specifies to use the server groups defined by the aaa group server radius and aaa group server tacacs+ commands.
none	Specifies not to perform accounting.

Default

No AAA accounting method is configured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to configure the method list for EXEC accounting.

Example

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

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

12.1.4 aaa accounting network

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

Syntax

- `aaa accounting network default {start-stop METHOD1 [METHOD2...] | none}`
- `no aaa accounting network default`

Parameters

Parameters	description
network	Specifies to perform accounting of network related service requests.
start-stop	Specifies to send accounting messages at both the start time and the end time of access. Users are allowed of access the network regardless of whether the start accounting message enables the accounting successfully.
default	Specifies to configure the default method list for network accounting.
<i>METHOD1</i> [<i>METHOD2...</i>]	Specifies the list of methods that the accounting algorithm tries in the given sequence. Enter at least one method or enter up to four methods. The following are keywords that can be used to specify a method. group radius - Specifies to use the servers defined by the radius-server host command. group tacacs+ - Specifies to use the servers defined by the tacacs-server host command. group <i>GROUP-NAME</i> - Specifies to use the server groups defined by the aaa group server radius and aaa group server tacacs+ commands.
none	Specifies not to perform accounting.

Default

No AAA accounting method is configured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

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

12.1.5 aaa accounting system

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

Syntax

- **aaa accounting system default** {start-stop *METHOD1* [*METHOD2...*] | none}
- **no aaa accounting system default**

Parameters

Parameters	description
system	Specifies to perform accounting for system-level events.
start-stop	Specifies to send accounting messages at both the start time and the end time of access. Users are allowed to access the network regardless of whether the start accounting message enables the accounting successfully.
default	Specifies to configure the default method list for system accounting.

Parameters	description
<i>METHOD1</i> [<i>METHOD2</i> ...]	Specifies the list of methods that the accounting algorithm tries in the given sequence. Enter at least one method or enter up to four methods. The following are keywords that can be used to specify a method. group radius - Specifies to use the servers defined by the radius-server host command. group tacacs+ - Specifies to use the servers defined by the tacacs-server host command. group GROUP-NAME - Specifies to use the server groups defined by the aaa group server radius and aaa group server tacacs+ commands.
none	Specifies not to perform accounting.

Default

No AAA accounting method is configured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to configure the accounting method list for system-events such as reboot, reset events. For the default method list to take effect, enable AAA first by using the **aaa new-model** command. The accounting system is disabled if the default method list is not configured.

Example

This example shows how to enable accounting of the system events using RADIUS and sends the accounting messages while system event occurs:

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

12.1.6 aaa authentication auth-mac

This command is used to configure the authentication local user account for MAC authentication. Use the **no** form of this command to remove the specific user.

Syntax

- `aaa authentication auth-mac MAC-ADDRESS vlan VLAN-ID [filter-id NUMBER] step-auth {no | dot1x | web | any}`
- `no aaa authentication auth-mac MAC-ADDRESS`

Parameters

Parameters	description
auth-mac <i>MAC-ADDRESS</i>	Specifies the MAC address for the MAC-authentication local account.
vlan <i>VLAN-ID</i>	Specifies the target VLAN of the authentication account.
filter-id <i>NUMBER</i>	Specifies the ACL number.
step-auth	Specifies the next authentication method for 2-step authentication. no - Specifies to use no next authentication method. dot1x - Specifies to use 802.1X authentication as the next authentication method. web - Specifies to use web authentication as the next authentication method. any - Specifies to use 802.1X and web authentication as the next authentication method.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command is used to configure the local account and the next authentication method for MAC authentication.

Example

This example shows how to set MAC 00-01-02-03-04-05 for MAC authentication.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)# aaa authentication auth-mac 00-01-02-03-04-05 vlan 100 filter-id
3999 step-auth any
ZEQUOxxxxRE(config)#
```

12.1.7 aaa authentication auth-user

This command is used to configure the local user account for authentication. Use the **no** form of this command to remove the specific user.

Syntax

- **aaa authentication auth-user** *STRING* {**password** *STRING* [**encrypt**] | **encrypt-password** *STRING*} **vlan** *VLAN-ID* [**filter-id** *NUMBER*] **auth-type** {**both** | **web** | **dot1x**} **step-auth** {**enable** | **disable** [**2nd-auth**]}
- **no aaa authentication auth-user** *STRING*

Parameters

Parameters	description
auth-user <i>STRING</i>	Specifies the username of the authentication account. The maximum length is 32 characters.
password <i>STRING</i>	Specifies the password of the authentication account in clear text form. The password can between 1 and 32 clear text characters.
encrypt	(Optional) Specifies to enable the password encryption for the authentication account. The password will be saved in the encrypted format.
encrypt-password <i>STRING</i>	Specifies the password in the encrypted format. The password can between 1 and 56 clear text characters.
vlan <i>VLAN-ID</i>	Specifies the target VLAN of the authentication account.
filter-id <i>NUMBER</i>	Specifies the ACL number.
auth-type	Specifies the authentication method. both - Specifies to use both 802.1X and web authentication. dot1x - Specifies to use 802.1X authentication. web - Specifies to use web authentication.

Parameters	description
step-auth	Specifies the next authentication method for 2-step authentication. enable - Specifies to enable the next authentication method for 2-step authentication. disable - Specifies to remove the next authentication method for 2-step authentication. 2nd-auth - Specifies to configure the second authentication step account for 2-step authentication.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to configure the local user account for authentication. The **step-auth** parameter is used to specify the next authentication method for 802.1X authentication. If the authentication is configured as web authentication, the **step-auth** parameter will be ignored.

Example

This example shows how to configure the local user account for 802.1X authentication.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)# aaa authentication auth-user user password 123 encrypt vlan 10
filter-id 3999 auth-type dot1x step-auth enable
ZEQUOxxxxRE(config)#
```

12.1.8 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.

Syntax

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

Parameters

Parameters	description
<i>METHOD1</i> [<i>METHOD2...</i>]	Specifies the list of methods that the authentication algorithm tries in the given sequence. Enter at least one method or enter up to four methods. The following are keywords that can be used to specify a method. enable - Specifies to use the local enable password for authentication. group radius - Specifies to use the servers defined by the radius-server host command. group tacacs+ - Specifies to use the servers defined by the tacacs-server host command. group GROUP-NAME - Specifies to use the server groups defined by the aaa group server radius and aaa group server tacacs+ commands. none - Normally, the method is listed as the last method. The user will pass the authentication if it is not denied by the previous authentication method.

Default

No AAA authentication method is configured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to configure the default authentication method list for determining access to the privileged EXEC level when the **enable [privilege LEVEL]** command is entered. The authentication with the RADIUS server will be based on the privilege level and take either "enable12" or "enable15" as the user name.

Example

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

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

12.1.9 aaa authentication dot1x

This command is used to configure the primary and secondary database for 802.1X authentication. Use the **no** form of this command to revert to the default setting.

Syntax

- `aaa authentication dot1x {primary radius secondary {local | none} | primary local secondary none}`
- `no aaa authentication dot1x`

Parameters

Parameters	description
primary	Specifies to configure primary account database.
secondary	Specifies to configure secondary account database.
radius	Specifies to use the RADIUS server.
local	Specifies to use the local database.
none	Specifies that the secondary account database is not used.

Default

The primary database uses the RADIUS server.
The secondary database is not used.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to configure the primary and secondary database for 802.1X authentication.

Example

This example shows how to set the primary database to use the RADIUS server and the secondary database to the local database for 802.1X authentication.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)# aaa authentication dot1x primary radius secondary local
ZEQUOxxxxRE(config)#
```

12.1.10aaa 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.

Syntax

- **aaa authentication login** { **default** | *LIST-NAME* } *METHOD1* [*METHOD2...*]
- **no aaa authentication login** { **default** | *LIST-NAME* }

Parameters

Parameters	description
default	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>]	Specifies the list of methods that the authentication algorithm tries in the given sequence. Enter at least one method or enter up to four methods. The following are keywords that can be used to specify a method. local - Specifies to use the local database for authentication. group radius - Specifies to use the servers defined by the radius-server host command. group tacacs+ - Specifies to use the servers defined by the tacacs-server host command. group GROUP-NAME - Specifies to use the server groups defined by the aaa group server radius and aaa group server tacacs+ commands. none - Normally, the method is listed as the last method. The user will pass authentication if it is not denied by the previous authentication method.

Default

No AAA authentication method list is configured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

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

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

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

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

This process continues until there is successful communication with a listed authentication method or all methods defined in the method list are exhausted.

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

Example

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

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

12.1.11aaa authentication mac

This command is used to configure the primary and secondary database, or auth-fail-action for MAC authentication. Use the **no** form of this command to revert to the default setting.

Syntax

- `aaa authentication mac {primary radius secondary {local | none} | primary local secondary {radius | none}}`
- `aaa authentication mac auth-fail-action {secondary-db | stop}`
- `no aaa authentication mac`

Parameters

Parameters	description
<code>primary local</code>	Local database is used first.
<code>primary radius</code>	The RADIUS server is used first.
<code>secondary local</code>	Local database is used as secondary database.
<code>secondary radius</code>	The RADIUS server is used as secondary database.
<code>secondary none</code>	Authentication on the secondary database is treated as approved. The result of the primary database is ignored.
<code>auth-fail-action secondary-db</code>	The secondary database applies if authentication on the primary database fails.
<code>auth-fail-action stop</code>	The secondary database does not apply if authentication on the primary database is denied. However the secondary database applies if it cannot communicate with the RADIUS server which is the primary database.

Default

Primary local secondary none
and
auth-fail-action secondary-db

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to configure the primary and secondary database, or auth-fail-action for MAC authentication.

Example

This example shows how to set the primary database to use the RADIUS server and the secondary database to the local database for MAC authentication.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)# aaa authentication mac primary radius secondary local
ZEQUOxxxxRE(config)#
```

12.1.12aaa authentication web

This command is used to configure the primary and secondary database, or auth-fail-action for web authentication. Use the **no** form of this command to revert to the default setting.

Syntax

- **aaa authentication web {primary radius secondary {local | none} | primary local secondary {radius | none}}**
- **aaa authentication web auth-fail-action {secondary-db | stop}**
- **no aaa authentication web**

Parameters

Parameters	description
primary local	Local database is used first.
primary radius	The RADIUS server is used first.
secondary local	Local database is used as secondary database.
secondary radius	The RADIUS server is used as secondary database.
secondary none	Authentication on the secondary database is treated as approved. The result of the primary database is ignored.
auth-fail-action secondary-db	The secondary database applies if authentication on the primary database fails.
auth-fail-action stop	The secondary database does not apply if authentication on the primary database is denied. However the secondary database applies if it cannot communicate with the RADIUS server which is the primary database.

Default

- Primary local secondary none
and
auth-fail-action secondary-db

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to configure the primary and secondary database, or auth-fail-action for web authentication.

Example

This example shows how to set the primary database to use the RADIUS server and the secondary database to the local database for web authentication.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)# aaa authentication web primary radius secondary local
ZEQUOxxxxRE(config)#
```

12.1.13aaa 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

Syntax

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

Parameters

Parameters	description
<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 that does not allow spaces.

Default

There is no AAA group server.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to define a RADIUS server group. The created server group is used in the definition of method lists used for authentication, or accounting by using the **aaa authentication** and **aaa accounting** commands. 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.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#aaa group server radius group1
ZEQUOxxxxRE(config-sg-radius)# server 172.19.10.100
ZEQUOxxxxRE(config-sg-radius)# server 172.19.10.101
ZEQUOxxxxRE(config-sg-radius)#
```

12.1.14aaa 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

Syntax

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

Parameters

Parameters	description
<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 that does not allow spaces.

Default

There is no AAA group server.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to enter the TACACS+ group server configuration mode. Use the server command to associate the TACACS+ server hosts with the TACACS+ server group. The defined server group can be specified as the method list for authentication, or accounting by using the **aaa authentication** and **aaa accounting** commands.

Example

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

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

12.1.15accounting commands

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

Syntax

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

- no accounting commands *LEVEL*

Parameters

Parameters	description
<i>LEVEL</i>	Specifies to do accounting for all configure commands at the specified privilege level. The privilege level is between 1 and 15.
default	Specifies to do accounting based on the default method list.
<i>METHOD-LIST</i>	Specifies the name of the method list to use.

Default

By default, this option is disabled.

Command Mode

Line Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

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

12.1.16 accounting exec

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

Syntax

- **accounting exec** { **default** | *METHOD-LIST* }
- **no accounting exec**

Parameters

Parameters	description
default	Specifies to use the default method list.
<i>METHOD-LIST</i>	Specifies the name of the method list to use.

Default

By default, this option is disabled.

Command Mode

Line Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

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

12.1.17clear aaa counters servers

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

Syntax

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

Parameters

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

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

This example shows how to clear AAA server counters.

```
ZEQUOxxxxRE# clear aaa counters servers all
ZEQUOxxxxRE#
```

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

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

12.1.18ip 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.

Syntax

- ip http authentication aaa login-authentication { default | *METHOD-LIST* }
- no ip http authentication aaa login-authentication

Parameters

Parameters	description
default	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, the **default** option is used.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

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

12.1.19ip http accounting exec

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

Syntax

- **ip http accounting exec {default | *METHOD-LIST*}**
- **no ip http accounting exec**

Parameters

Parameters	description
default	Specifies to do accounting based on the default method list.
<i>METHOD-LIST</i>	Specifies the name of the method list to use.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

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

12.1.20ip radius source-interface

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

Syntax

- **ip radius source-interface** *INTERFACE-ID*
- **no ip radius source-interface**

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interface whose IP address will be used as the source IP address for sending RADIUS packets.

Default

The IP address of the closest interface will be used.

Command Mode

Global Configuration Mode.
Server Group Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command can be used to specify the interface whose IP address will be used as the source IP address for sending RADIUS packets. If the source interface is specified in both the global configuration mode and group server configuration mode, the source interface specified in group server configuration mode take precedence.

Example

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

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

12.1.21ip tacacs source-interface

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

Syntax

- ip tacacs source-interface** *INTERFACE-ID*

- no ip tacacs source-interface

Parameters

Parameters	description
<i>INTERFACE_ID</i>	Specifies the interface whose IP address will be used as the source IP address for sending TACACS packets.

Default

The IP address of the closest interface will be used.

Command Mode

Global Configuration Mode.
Server Group Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

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

12.1.22ipv6 radius source-interface

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

Syntax

- `ipv6 radius source-interface` *INTERFACE-ID*
- `no ipv6 radius source-interface`

Parameters

Parameters	description
<i>INTERFACE-ID</i>	Specifies the interface whose IPv6 address will be used as the source IPv6 address for sending RADIUS packets.

Default

The IPv6 address of the closest interface will be used.

Command Mode

Global Configuration Mode.
Server Group Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

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

12.1.23 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.

Syntax

- login authentication {default | *METHOD-LIST*}
- no login authentication

Parameters

Parameters	description
default	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, the default method list is used.

Command Mode

Line Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

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

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

Example

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

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

12.1.24radius-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.

Syntax

- radius-server deadtime *MINUTES*
- no radius-server deadtime

Parameters

Parameters	description
<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.

Command Default Level

Level: 15.

Usage Guideline

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

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

Example

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

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

12.1.25radius-server host

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

Syntax

- radius-server host** { *IP-ADDRESS* | *IPV6-ADDRESS* } [**auth-port** *PORT*] [**acct-port** *PORT*] [**timeout** *SECONDS*] [**retransmit** *COUNT*] **key** [0 | 7] *KEY-STRING*
- no radius-server host** { *IP-ADDRESS* | *IPV6-ADDRESS* }

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IP address of the RADIUS server.
<i>IPV6-ADDRESS</i>	Specifies the IPv6 address of the RADIUS server.
auth-port <i>PORT-NUMBER</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.
acct-port <i>PORT-NUMBER</i>	(Optional) Specifies the UDP destination port number for sending accounting packets. The range is 0 to 65535. Set the port number to zero if the server host is not for accounting purposes. The default value is 1813.
timeout <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.

Parameters	description
retransmit <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.
0	(Optional) Specifies the password in clear text form. If not specified, this is the default option.
7	(Optional) Specifies the password in the encrypted form.
key <i>KEY-STRING</i>	Specifies the key used to communicate with the server. The key can be between 1 and 32 clear text characters.

Default

By default, no server is configured.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

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

Example

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

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)# radius-server host 172.19.10.100 auth-port 1500 acct-port 1501
timeout 8 retransmit 3 key ABCDE
ZEQUOxxxxRE(config)# radius-server host 172.19.10.101 auth-port 1600 acct-port 1601
timeout 3 retransmit 1 key ABCDE
ZEQUOxxxxRE(config)#
```

12.1.26server (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.

Syntax

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

Parameters

Parameters	description
<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.

Command Default Level

Level: 15.

Usage Guideline

Use the **aaa group server radius** command to enter the RADIUS group server configuration mode. 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, or accounting via the **aaa authentication** and **aaa accounting** commands. 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 enter the RADIUS group server configuration mode and associate two RADIUS server hosts with the RADIUS server group.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#aaa group server radius group1
ZEQUOxxxxRE(config-sg-radius)# server 172.19.10.100
ZEQUOxxxxRE(config-sg-radius)# server 172.19.10.101
ZEQUOxxxxRE(config-sg-radius)#
```

12.1.27server (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.

Syntax

- **server** *IP-ADDRESS*
- **no server** *IP-ADDRESS*

Parameters

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

Default

By default, no host is in the server group.

Command Mode

TACACS+ Group Server Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use the **aaa group server tacacs+** command to enter the TACACS+ group server configuration mode. Use 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** and **aaa accounting** commands. 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.


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

12.1.28show aaa

This command is used to display the AAA global state.

Syntax

- show aaa

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the AAA global state.

Example

This example shows how to display the AAA global state.

```
ZEQUOxxxxRE# show aaa

AAA is enabled.

ZEQUOxxxxRE#
```

12.1.29 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.

Syntax

- **tacacs-server host** *IP-ADDRESS* [**port** *PORT*] [**timeout** *SECONDS*] **key** [**0** | **7**] *KEY-STRING*
- **no tacacs-server host** *IP-ADDRESS*

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IPv4 address of the TACACS+ server.
port <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.
timeout <i>SECONDS</i>	(Optional) Specifies the time-out value. This value must be between 1 and 255 seconds. The default value is 5 seconds.
0	(Optional) Specifies the password in the clear text form. This is the default option.
7	(Optional) Specifies the password in the encrypted form.
key <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.

Command Default Level

Level: 15.

Usage Guideline

Use the **tacacs-server host** 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.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)# tacacs-server host 172.19.10.100 port 1500 timeout 8 key ABCDE
ZEQUOxxxxRE(config)# tacacs-server host 172.19.122.3 port 1600 timeout 3 key ABCDE
ZEQUOxxxxRE(config)#
```

12.1.30show aaa authentication auth-mac

This command is used to display the local user account for MAC authentication.

Syntax

- show aaa authentication auth-mac

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display the local user account used for MAC authentication.

Example

This example shows how to display the local user account for MAC authentication.

```
ZEQUOxxxxRE#show aaa authentication auth-mac
```

Auth MAC Address	VLAN	Filter-ID	2-Step	Auth
00:01:02:03:04:05	100	3999		Any

```
ZEQUOxxxxRE#
```

12.1.31 show aaa authentication auth-user

This command is used to display the local user account for 802.1X and web authentication.

Syntax

- show aaa authentication auth-user

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display the local user account used for 802.1X and web authentication.

Example

This example shows how to display the local user account for 802.1X and web authentication.

```
ZEQUOxxxxRE#show aaa authentication auth-user
```

User Name	Password	VLAN	Filter-ID	Auth Type	2-Step Auth
test	test	20	3999	WEB	enable
user	[encrypted]	10	3999	802.1X	enable

```
ZEQUOxxxxRE#
```

12.1.32show aaa authentication dot1x

This command is used to display AAA settings for 802.1X authentication.

Syntax

- show aaa authentication dot1x

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display AAA settings for 802.1X authentication.

Example

This example shows how to display AAA settings for 802.1X authentication.

```
ZEQUOxxxxRE#show aaa authentication dot1x
```

Primary Database	: Local	Auth Fail Action	: Stop
Secondary Database	: None		

```
ZEQUOxxxxRE#
```

12.1.33 show aaa authentication mac

This command is used to display AAA settings for MAC authentication.

Syntax

- show aaa authentication mac

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display AAA settings for MAC authentication.

Example

This example shows how to display AAA settings for MAC authentication.

```
ZEQUOxxxxRE#show aaa authentication mac
```

```
Primary Database      : Local      Auth Fail Action      : Secondary DB
Secondary Database    : None       Auth Fail Block Time  : 60      seconds
```

```
ZEQUOxxxxRE#
```

12.1.34 show aaa authentication web

This command is used to display AAA settings for web authentication.

Syntax

- show aaa authentication web
-

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to display AAA settings for web authentication.

Example

This example shows how to display AAA settings for web authentication.

```
ZEQUOxxxxRE#show aaa authentication web
```

Primary Database	: Local	Auth Fail Action	: Secondary DB
Secondary Database	: None	Auth Fail Block Time	: 60 seconds

```
ZEQUOxxxxRE#
```

12.1.35show radius statistics

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

Syntax

- show radius statistics

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display statistics counters related to servers.

Example

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

```
ZEQUOxxxxRE#show radius statistics
RADIUS Server: 172.19.192.80: Auth-Port 1645, Acct-Port 1646
State is UP
```

	Auth.	Acct.
Round Trip Time:	10	10
Access Requests:	4	NA
Access Accepts:	0	NA
Access Rejects:	4	NA
Access Challenges:	0	NA
Acct Request:	NA	3
Acct Response:	NA	3
Retransmissions:	0	0
Malformed Responses:	0	0
Bad Authenticators:	0	0
Pending Requests:	0	0
Timeouts:	0	0
Unknown Types:	0	0
Packets Dropped:	0	0

Display Parameters

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

Parameters	description
Access Challenges	The number of RADIUS Access-Challenge packets (valid or invalid) received from this server.
Acct Request	The number of RADIUS Accounting-Request packets sent. This does not include retransmissions.
Acct Response	The number of RADIUS packets received on the accounting port from this server.
Retransmissions	The number of RADIUS Request packets retransmitted to this RADIUS server. Retransmissions include retries where the Identifier and Acct-Delay have been updated, as well as those in which they remain the same.
Malformed Responses	The number of malformed RADIUS Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators or Signature attributes or unknown types are not included as malformed responses.
Bad Authenticators	The number of RADIUS Response packets containing invalid authenticators or Signature attributes received from this server.
Pending Requests	The number of RADIUS Request packets destined for this server that have not yet timed out or received a response. This variable is incremented when a Request is sent and decremented due to receipt of a Response, a timeout or retransmission.
Timeouts	The number of timeouts to this server. After a timeout the client may retry to the same server, send to a different server, or give up. A retry to the same server is counted as a retransmit as well as a timeout. A send to a different server is counted as a Request as well as a timeout.
Unknown Types	The number of RADIUS packets of unknown type which were received from this server.
Packets Dropped	The number of RADIUS packets of which were received from this server and dropped for some other reason.

12.1.36show tacacs statistics

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

Syntax

- show tacacs statistics

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display statistics counters related to servers.

Example

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

```
ZEQUOxxxxRE# show tacacs statistics
TACACS+ Server: 172.19.192.80/49, State is UP
Socket Opens: 0
Socket Closes: 0
Total Packets Sent: 0
Total Packets Recv: 0
Reference Count: 0
```

Display Parameters

Parameters	description
TACACS+ Server	IP address of the TACACS+ server.
Socket Opens	Number of successful TCP socket connections to the TACACS+ server.
Socket Closes	Number of successfully closed TCP socket attempts.
Total Packets Sent	Number of packets sent to the TACACS+ server.
Total Packets Recv	Number of packets received from the TACACS+ server.
Reference Count	Number of authentication requests from the TACACS+ server.

12.2 802.1X Commands

IEEE 802.1X provides user authentication when clients access the network and blocks connections to the network from unregistered clients. It prevents the access by unauthorized users or devices to protect information assets security.

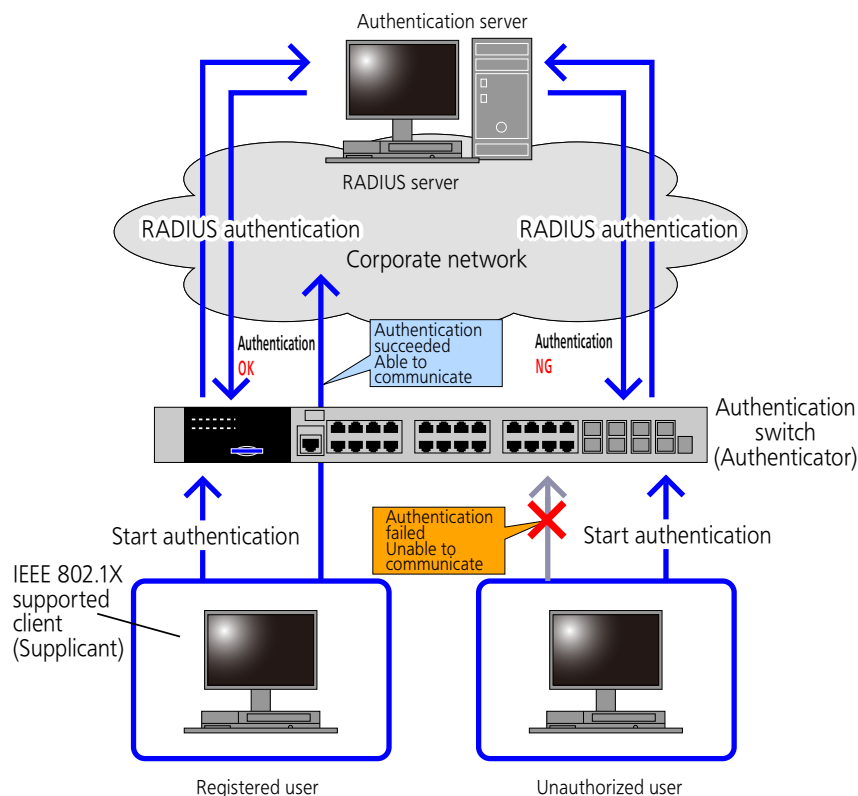


Figure 82-2 IEEE 802.1X overview

To use IEEE 802.1X authentication, there must be a client, authentication switch, and authentication server as shown above.

- The client requires IEEE 802.1X compatible software (An IEEE 802.1X supported client is called Supplicant). The client sends an authentication request when connecting to the network and is able to access when authorized.
- The authentication switch intermediates an authentication process between the client and authentication server. It blocks connections to the network from unauthorized clients (The authentication switch is also called Authenticator). This switch allows you to enable/disable authentication for each port and configure the authentication settings.

- A RADIUS server is usually used for the authentication server. It only approves an authentication request from registered users. Up to three authentication servers can be registered in the authentication switch.

NOTE

You can register users in a local database in the authentication switch and use the database in place of a RADIUS server or as a RADIUS server failover.

Port-based authentication and MAC-based authentication

You need to change the authentication method depending on how you connect the client to the port for the authentication switch. This switch allows you to select port-based or MAC-based authentication.

- **Port-based authentication:** Authorize a port to which the client is connected.
- **MAC-based authentication:** Authorize based on the MAC address of the client connected. It authorizes even in an environment where multiple clients communicate on a single port of the authentication switch (e.g. using an island hub).

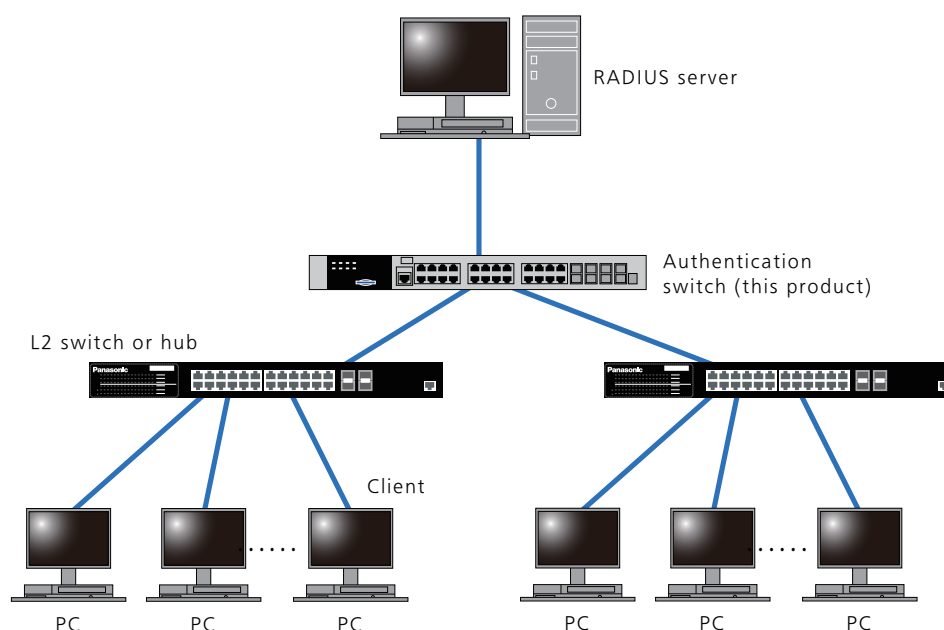


Figure 82-3 Authentication in island hub

NOTE

For authentication in an island hub, a switch acting as an island hub requires the EAP packet forwarding function. An EAP frame is communication data used for an authentication process. If devices are connected via a switch not supporting the EAP packet forwarding function, EAP frames are discarded and authentication is not performed (This switch supports the EAP packet forwarding function).

Guest VLAN

Combining the IEEE 802.1X and guest VLAN functions allows for restricted access, such as authorizing connection to the Internet only instead of completely blocking communications from unauthorized clients.

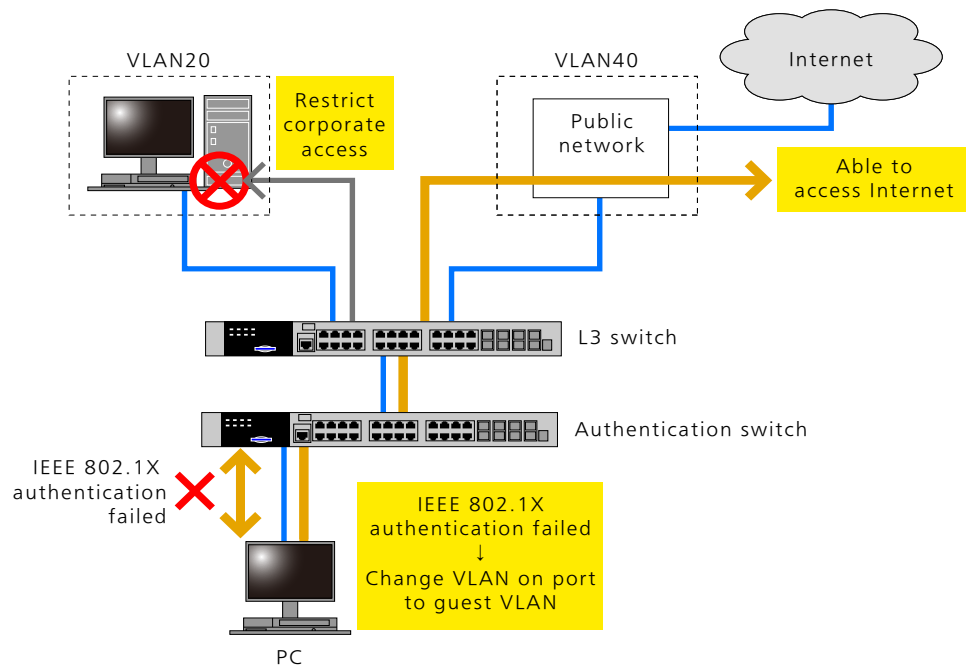


Figure 82-4 Connection through guest VLAN

NOTE Only one VLAN can be assigned to a guest VLAN.

Dynamic VLAN using IEEE 802.1X

In a static VLAN, the destination VLAN is fixed for each port. Meanwhile, in a dynamic VLAN, the destination VLAN is determined based on the client MAC address information regardless of a port to be connected.

There are several ways to configure dynamic VLAN. One of them is to use IEEE 802.1X RADIUS server information. If the client's VLAN information is registered in the RADIUS server, the VLAN information is retrieved during authentication, allowing for accessing the VLAN to which the client belongs from any port.

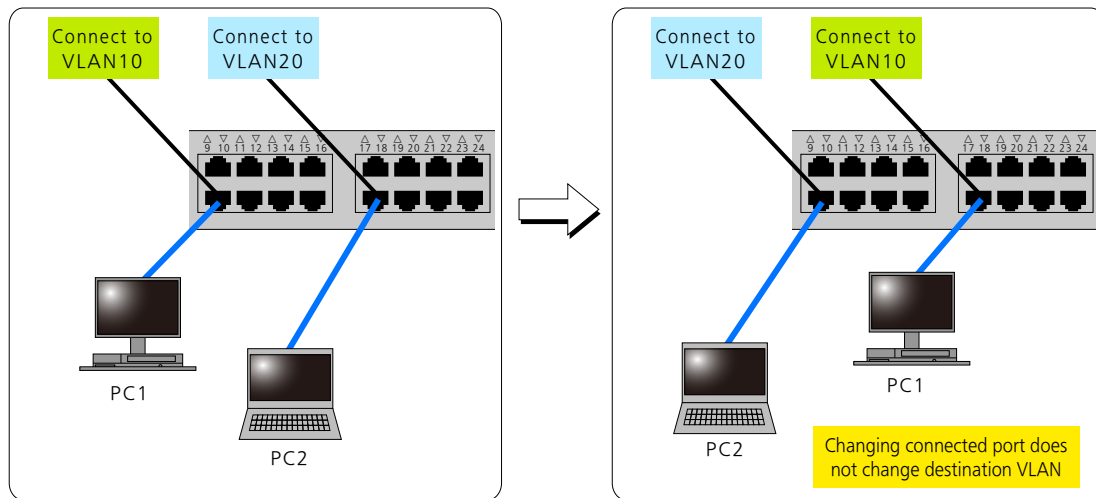


Figure 82-5 Dynamic VLAN

12.2.1 dot1x control-direction

This command is used to configure the direction of the traffic on a controlled port as unidirectional (in) or bidirectional (both).

Syntax

- dot1x control-direction {both | in}

Parameters

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

Default

By default, the bidirectional mode is used.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration. If the port control is set to **force-authorized**, then the port is not controlled in both directions. If the port control is set to **auto**, then the access to the port for the controlled direction needs to be authenticated. If the port control is set to **force-unauthorized**, then the access to the port for the controlled direction is blocked. Suppose that port control is set to **auto**. If the control direction is set to **both**, then the port can receive and transmit EAPOL packets only. All user traffic is blocked before authentication. If the control direction is set to **in**, then in addition to receiving and transmitting EAPOL packets, the port can transmit user traffic but not receive user traffic before authentication.

Example

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

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

12.2.2 dot1x eap-request

This command is used to enable the EAP-Request function. Use the **no** form of this command to revert to the default setting.

Syntax

- dot1x eap-request
- no dot1x eap-request

Parameters

None.

Default

By default, this function is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration. EAP-Request function is used to send unicast EAP continuously to invoke the sending of EAPoL-Start from the unauthorized host. If the host passed 802.1X authentication, its MAC address is deleted from the unauthorized MAC address table, and the Switch stops sending EAP.

Example

This example shows how to enable the EAP-Request function on Gigabit Ethernet 1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# dot1x eap-request
ZEQUOxxxxRE(config-if)#
```

12.2.3 dot1x eap-request interval

This command is used to revert the EAP-Request interval.

Syntax

- dot1x eap-request interval *SECONDS*

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval in seconds for the Switch to send unicast EAP to the unauthorized host. The value is from 1 to 3600.

Default

By default, the interval is 5 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When security module settings can be applied to Link Aggregation port, this command is available for physical port and port channel interface configuration. Otherwise, this command is only available for physical port interface configuration.

This command is used to configure the EAP-Request interval for the switch to send unicast-EAP to the unauthorized host.

Example

This example shows how to configure the EAP-Request interval to 300 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# dot1x eap-request interval 300
ZEQUOxxxxRE(config)#
```

12.2.4 dot1x forceAuthorized mac

This command is used to set force authorized or unauthorized MAC on specific ports. Use the **no** form of this command to remove the specific entry or ports.

Syntax

- dot1x forceAuthorized mac *MAC-ADDRESS* mask-bit *INT* auth-mode { authorized | unauthorized } interface *INTERFACE-ID* [, | -]
- no dot1x forceAuthorized mac *MAC-ADDRESS* interface *INTERFACE-ID* [, | -]

Parameters

Parameters	description
mac-address <i>MAC-ADDRESS</i>	Specifies the MAC address of the supplicant.
mask-bit <i>INT</i>	Specifies the mask bit length of MAC address. The value is from 0 to 48.
authorized	Specifies to force the authorized state.
unauthorized	Specifies to force the unauthorized state.
interface <i>INTERFACE-ID</i>	Specifies the port of the supplicant. 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.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration. This command is used to set a group of MAC addresses to force the authorized or unauthorized state on specific ports.

This command only takes effect on 802.1 X MAC-based ports.

Example

This example shows how to configure MAC group 00-01-02-03-04-XX to force authorized on Gigabit Ethernet 1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# dot1x forceAuthorized mac 00-01-02-03-04-00 mask-bit 40 auth-
mode authorized interface gil/0/1
ZEQUOxxxxRE(config)#
```

This example shows how to change MAC group 00-01-02-03-04-XX from Gigabit Ethernet 1/0/1 to Gigabit Ethernet 1/0/2.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# dot1x forceAuthorized mac 00-01-02-03-04-00 mask-bit 40 auth-
mode authorized interface gil/0/2
ZEQUOxxxxRE(config)# no dot1x forceAuthorized mac 00-01-02-03-04-00 interface gil/0/1
ZEQUOxxxxRE(config)#
```

12.2.5 dot1x init

This command is used to initialize the authenticator state machine on a specific port.

Syntax

- dot1x init

Parameters

None.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to initialize the authenticator state machine of 802.1X port-based port.

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# dot1x init
ZEQUOxxxxRE(config-if)#
```

12.2.6 dot1x mac-based init

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

Syntax

- dot1x mac-based init [*MAC-ADDRESS*]

Parameters

Parameters	description
<i>MAC-ADDRESS</i>	(Optional) Specifies the MAC address to be initialized.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration.

Use the **dot1x mac-based init** command to initialize all authenticator state machines of 802.1X MAC-based ports.

Use the **dot1x mac-based init** *MAC-ADDRESS* command to initialize the specific authenticator state machine of 802.1X MAC-based ports.

Example

This example shows how to initialize all authenticator state machines on Gigabit Ethernet port 1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# dot1x mac-based init
ZEQUOxxxxRE(config-if)#
```

12.2.7 dot1x mac-based re-authenticate

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

Syntax

- dot1x mac-based re-authenticate** [*MAC-ADDRESS*]

Parameters

Parameters	description
<i>MAC-ADDRESS</i>	(Optional) Specifies the MAC address to be used.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration.
Use the **dot1x mac-based re-authenticate** command to re-authenticate all authenticator state machines of 802.1X MAC-based ports.
Use the **dot1x mac-based re-authenticate** *MAC-ADDRESS* command to re-authenticate the specific authenticator state machine of 802.1X MAC-based ports.

Example

This example shows how to re-authenticate MAC 00-01-02-03-04-05 to force authorized on Gigabit Ethernet 1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# dot1x mac-based re-authenticate 00-01-02-03-04-05
ZEQUOxxxxRE(config-if)#
```

12.2.8 dot1x mac-based re-authentication

This command is used to enable periodic re-authentication for a port or MAC address. Use the **no** form of this command to disable periodic re-authentication for a port or remove re-authentication configuration for a MAC address.

Syntax

- **dot1x mac-based re-authentication** [*MAC-ADDRESS*]
- **no dot1x mac-based re-authentication** [*MAC-ADDRESS*]

Parameters

Parameters	description
<i>MAC-ADDRESS</i>	(Optional) Specifies the MAC address to be used.

Default

By default, this option is disabled and no MAC address is configured.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration.

Use the **dot1x mac-based re-authentication** command to enable periodic re-authentication for the specific port.

Use the **dot1x mac-based re-authentication MAC-ADDRESS** command to enable periodic re-authentication for the target MAC Address.

Port Re-Authentication State	MAC Re-Authentication State	Target MAC final Re-Authentication State
Enabled	Enabled	Enabled
Enabled	Not Configured	Enabled
Disabled	Enabled	Enabled
Disabled	Not Configured	Disabled

Use the **dot1x timeout re-authperiod** command to configure the interval in seconds between re-authentication attempts.

Example

This example shows how to enable MAC 00-01-02-03-04-05 periodic re-authentication on Gigabit Ethernet 1/0/1.

```

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# dot1x mac-based re-authentication 00-01-02-03-04-05
ZEQUOxxxxRE(config-if)#

```

12.2.9 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.

Syntax

- **dot1x max-req** *TIMES*

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

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

Example

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

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

12.2.10dot1x nas-id

This command is used to configure the value of the NAS-Identifier (32) RADIUS attribute. Use the **no** form of this command to clear NAS- Identifier value.

Syntax

- **dot1x nas-id** *STRING*

- no dot1x nas-id

Parameters

Parameters	description
<i>STRING</i>	Specifies the string used for the NAS-Identifier (32) RADIUS attribute. The maximum length of the string is 16.

Default

The default string of NAS ID is "nas1".

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the string of the NAS-Identifier attribute. NAS-Identifier is used in Access-Request packets to identify the NAS within the scope of the RADIUS server.

Example

This example shows how to configure the NAS-Identifier as "Sw01".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# dot1x nas-id Sw01
ZEQUOxxxxRE(config)#
```

12.2.11dot1x port-auth-mode

This command is used to specify the 802.1X authentication mode.

Syntax

- dot1x port-auth-mode {port-based | mac-based}

Parameters

Parameters	description
port-based	Specifies the port to operate in the port-based mode. Only a single authentication is performed and only this authorized host is allowed to access the network.
mac-based	Specifies the port to operate in the MAC-based mode. Each host will be authenticated individually.

Default

The default mode is port-based.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration. When the port is operated in the port-based mode and only one of the hosts can be authenticated, this authorized host is 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. When the port is operated in the MAC-based 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. After enabling the 802.1X global status using the **dot1x system-auth-control** command, use the **dot1x port-control auto** and **dot1x port-auth-mode port-based** commands to enable the 802.1X port-based authentication, or use the **dot1x port-auth-mode mac-based** command to enable the 802.1X mac-based authentication.

Example

This example shows how to specify Gigabit Ethernet 1/0/1 to operate in the MAC-based mode.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# dot1x port-auth-mode mac-based
ZEQUOxxxxRE(config-if)#
```

12.2.12dot1x port-control

This command is used to control the authorization state of a port.

Syntax

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

Parameters

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

Default

By default, this option is set as **force-authorized**.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration.

This command takes effect when the 802.1X global status is enabled by using the **dot1x system-auth-control** command.

When the authorization state of the port is **auto**, access to the port needs to be authenticated in the controlled direction.

When the authorization state of the port is **force-authorized**, the port is not controlled in both directions.

When the authorization state of the port is **force-unauthorized**, access to the port is blocked in the controlled direction.

Example

This example shows how to configure the authorization state of Gigabit Ethernet 1/0/1 to force-unauthorized.

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

12.2.13dot1x re-authenticate

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

Syntax

- dot1x re-authenticate

Parameters

None.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to re-authenticate a specific port When the port is configured as the port-based mode.

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# dot1x re-authenticate
ZEQUOxxxxRE(config-if)#
```

12.2.14 dot1x re-authentication

This command is used to enable periodic re-authentication for a port. Use the **no** form of this command to disable periodic re-authentication for a port.

Syntax

- **dot1x re-authentication**
- **no dot1x re-authentication**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration. Use the **dot1x re-authentication** command to enable periodic re-authentication for the specific port. Use the **dot1x timeout re-authperiod** command to configure the interval in seconds between re-authentication attempts.

Example

This example shows how to enable periodic re-authentication on Gigabit Ethernet 1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# dot1x re-authentication
ZEQUOxxxxRE(config-if)#
```

12.2.15dot1x re-auth-timer local

This command is used to enable the local timer to re-authenticate a session. Use the **no** form of this command to revert to the default setting.

Syntax

- dot1x re-auth-timer local
- no dot1x re-auth-timer local

Parameters

None.

Default

By default, the value of the RADIUS Session-Timeout attribute (27) is used for the timer to re-authenticate a session.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration. This command is used to configure the local timer to re-authenticate a session. When the value of the RADIUS Termination-Action attribute (29) is RADIUS-Request (1), 802.1X will re-authenticate the host. When the value of the RADIUS Termination-Action attribute (29) is Default (0), the session terminates.

Example

This example shows how to enable the local timer to re-authenticate a session.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# dot1x re-auth-timer local
ZEQUOxxxxRE(config-if)#
```

12.2.16 dot1x statistics reset

This command is used to clear the 802.1X statistics.

Syntax

- dot1x statistics reset

Parameters

None.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to clear the 802.1X statistics.

Example

This example shows how to clear the 802.1X statistics.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# dot1x statistics reset
ZEQUOxxxxRE(config)#
```

12.2.17 dot1x supplicant-num

This command is used to configure the maximum number of 802.1X authenticated users for a specific port.

Syntax

- dot1x supplicant-num *NUMBER*

Parameters

Parameters	description
<i>NUMBER</i>	Specifies the maximum number of 802.1X authenticated users. The range is from 1 to 512.

Default

By default, there is no limit.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the maximum number of 802.1X authenticated users for a specific port. The users are limited to 802.1X users. If the maximum number of 802.1X authenticated users is less than the current 802.1X authenticated users, this command will be rejected.

Example

This example shows how to configure the maximum number of 802.1X authenticated users on Gigabit Ethernet 1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# dot1x supplicant-num 256
ZEQUOxxxxRE(config-if)#
```

12.2.18dot1x 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.

Syntax

- dot1x system-auth-control
- no dot1x system-auth-control

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

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

Example

This example shows how to enable IEEE 802.1X authentication globally on the Switch.

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

12.2.19dot1x timeout

This command is used to configure IEEE 802.1X timers.

Syntax

- dot1x timeout { quiet-period | re-authperiod | server | supp-timeout | tx-period | force-authorized-mac } *SECONDS*

Parameters

Parameters	description
quiet-period <i>SECONDS</i>	Specifies the number of seconds that the Switch will be in the quiet state in the wake of a failed authentication process. The range is 1 to 65535.
re-authperiod <i>SECONDS</i>	Specifies the number of seconds between re-authentication attempts. The range is 1 to 65535.
server <i>SECONDS</i>	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.
supp-timeout <i>SECONDS</i>	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
tx-period <i>SECONDS</i>	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
force-authorized-mac <i>SECONDS</i>	Specifies the number of seconds that the Switch will wait for the timeout of the force-authorized or force-unauthorized entry. The range is 0 to 65535. 0 represents never timeout.

Default

The **quiet-period** is 60 seconds.
The **re-authperiod** is 3600 seconds.
The **server** is 30 seconds.
The **supp-timeout** is 30 seconds.
The **tx-period** is 30 seconds.
The **force-authorized-mac** is 3600 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration.

Example

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

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

12.2.20dot1x unauthorized age-out time

This command is used to set the age-out time of static unauthorized hosts.

Syntax

- dot1x unauthorized age-out time *SECONDS*

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the age-out time value in seconds. The range is 0 to 65535. 0 represents never timeout.

Default

By default, the time is 300 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When security module settings can be applied to Link Aggregation port, this command is available for physical port and port channel interface configuration. Otherwise, this command is only available for physical port interface configuration.

This command is used to set the age-out time of static unauthorized hosts that are configured by the **dot1x unauthorized mac** command.

Example

This example shows how to set the age-out time of static unauthorized hosts to 1000 seconds.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# dot1x unauthorized age-out time 1000
ZEQUOxxxxRE(config)#
```

12.2.21 dot1x unauthorized mac

This command is used to add an 802.1X static unauthorized entry for the EAP-Request function. Use the **no** form of this command to remove the static unauthorized entry.

Syntax

- **dot1x unauthorized mac** *MAC-ADDRESS* **interface** *INTERFACE-ID*
- **no dot1x unauthorized mac** *MAC-ADDRESS*

Parameters

Parameters	description
<i>MAC-ADDRESS</i>	Specifies the MAC address of the unauthorized host.
interface <i>INTERFACE-ID</i>	Specifies the port that the unauthorized host resides in.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration. This command is used to add or remove an 802.1X static unauthorized entry for the EAP-Request function. The static entry is removed at the next age-out time.

Example

This example shows how to add the unauthorized host, 00-01-02-03-04-05, on Gigabit Ethernet 1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# dot1x unauthorized mac 00-01-02-03-04-05 interface gil/0/1
ZEQUOxxxxRE(config)#
```

12.2.22eap-forward

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

Syntax

- eap-forward
- no eap-forward

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for physical port interface configuration.

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

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# eap-forward
ZEQUOxxxxRE(config-if)#
```

12.2.23show dot1x

This command is used to display the IEEE 802.1X authentication information of the specified interface.

Syntax

- **show dot1x** {port-based interface *INTERFACE-ID* [, | -] | mac-based interface interface *INTERFACE-ID*}

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	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.

Command Default Level

Level: 12.

Usage Guideline

This command is used to display 802.1X port-based or MAC-based authentication information.

Example

This example shows how to display the dot1X port-based information on Gigabit Ethernet 1/0/2.

```
ZEQUOxxxxRE# show dot1x port-based interface gil/0/2

NAS ID: nas1

Port No: Gil/0/2   Authorized MAC Address: 00-19-5B-E9-5C-A7
Port Status       : Authorized                      OperControlDirection : Both
Port Control      : Auto                          AdminControlDirection: Both
Quiet Period      : 60      seconds                Transmission Period  : 30      seconds
Supplicant Timeout: 30      seconds                Server Timeout      : 30      seconds
Maximum Request   : 2                               Re-auth Period      : 3600   seconds
Per Port Re-auth  : Disabled                       Current PVID        : 1
Guest VLAN ID     : ----                          Default VLAN ID     : ----
Re-Auth Timer Mode: RADIUS
```

ZEQUOxxxxRE#

This example shows how to display the dot1X MAC-based information on Gigabit Ethernet 1/0/2.

```
ZEQUOxxxxRE# show dot1x mac-based interface gil/0/2

NAS ID: nas1      Port No: Gil/0/2   Number of Supplicant: 512
OperControlDirection: Both      AdminControlDirection : Both
Transmission Period : 30      seconds  Maximum Request      : 2
Supplicant Timeout  : 30      seconds  Quiet Period         : 60      seconds
Server Timeout      : 30      seconds  Re-authentication Period: 3600   seconds
Force Auth Timeout  : 3600   seconds  Per Port Re-auth     : Disabled
Re-Auth Timer Mode  : RADIUS

Supplicant MAC Addr Type      MAC Control      Auth Status  Re-auth
-----
00-19-5B-E9-5C-A7  Dynamic Auto      Authorized    Disabled
```

ZEQUOxxxxRE#

12.2.24show dot1x eap-request port config

This command is used to display the 802.1X EAP-Request function.

Syntax

- show dot1x eap-request port config

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to display the 802.1X EAP-Request function.

Example

This example shows how to display the 802.1X EAP-Request function.

```
ZEQUOxxxxRE# show dot1x eap-request port config
```

```
EAP-Request Interval: 5 Sec.
```

```
Port      EAP-Request  
-----
```

```
Gi1/0/1   Enabled  
Gi1/0/2   Disabled  
Gi1/0/3   Disabled  
Gi1/0/4   Disabled  
Gi1/0/5   Disabled  
Gi1/0/6   Disabled  
Gi1/0/7   Disabled  
Gi1/0/8   Disabled  
Gi1/0/9   Disabled  
Gi1/0/10  Disabled  
Gi1/0/11  Disabled  
Gi1/0/12  Disabled  
Gi1/0/13  Disabled  
Gi1/0/14  Disabled  
Gi1/0/15  Disabled  
Gi1/0/16  Disabled  
Gi1/0/17  Disabled  
Gi1/0/18  Disabled  
Gi1/0/19  Disabled  
Gi1/0/20  Disabled  
Gi1/0/21  Disabled  
Gi1/0/22  Disabled  
Gi1/0/23  Disabled  
Gi1/0/24  Disabled  
Te1/0/25  Disabled  
Te1/0/26  Disabled  
Te1/0/27  Disabled  
Te1/0/28  Disabled  
Fo1/0/29  Disabled  
Fo1/0/30  Disabled
```

```
ZEQUOxxxxRE#
```

12.2.25show dot1x forceAuthorized-MAC

This command is used to display force authorized or unauthorized entries.

Syntax

- `show dot1x forceAuthorized-MAC {all | single MAC-ADDRESS }`

Parameters

Parameters	description
all	Specifies to display all force authorized or unauthorized entries.

Parameters	description
single <i>MAC-ADDRESS</i>	Specifies to display the specific force authorized or unauthorized entry.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to display force authorized or unauthorized entries.

Example

This example shows how to display force authorized or unauthorized entries.

```
ZEQUOxxxxRE#show dot1x forceAuthorized-MAC all
```

MAC Address	Mask	Auth Status	Port List
00-01-02-03-04-00	40	Authorized	Gi1/0/20-1/0/24

```
ZEQUOxxxxRE#
```

12.2.26show dot1x statistics

This command is used to display IEEE 802.1X statistics.

Syntax

- show dot1x statistics interface *INTERFACE-ID* {since-reset | since-up}

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	Specifies to display the dot1x statistics on the specified interface.

Parameters	description
since-reset	Specifies to display the dot1x statistics since the last system reset.
since-up	Specifies to display the dot1x statistics since the device booted up.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to display IEEE 802.1X statistics since the last system reset or device booted up.

Example

This example shows how to display the dot1x statistics since last device booted up on Gigabit Ethernet 1/0/2.

```
ZEQUOxxxxRE# show dot1x statistics interface gil/0/2 since-up
```

```
Port: Gil/0/2 Elapsed Time Since System Up: 000:04:19:25
<Counter Name>          <Total>
TxReqId                  5
TxReq                    6
TxTotal                  15
RxStart                  1
RxLogoff                 0
RxRespId                 3
RxResp                   6
RxInvalid                0
RxLenError               0
RxTotal                  10
RxVersion                1
LastRxSrcMac             00-19-5B-E9-5C-A7
```

```
ZEQUOxxxxRE#
```

12.2.27 show dot1x unauthorized mac-address-table

This command is used to display the 802.1X unauthorized host table.

Syntax

- show dot1x unauthorized mac-address-table {interface *INTERFACE-ID* [, | -] | mac}

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	Specifies to display the dot1x unauthorized hosts 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.
mac	Specifies to display the dot1x unauthorized hosts sorted by their MAC address.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to display the 802.1X unauthorized host table. The table includes static unauthorized hosts that is manually configured and dynamic unauthorized hosts.

Example

This example shows how to display dot1X unauthorized hosts sorted by their MAC address.

```
ZEQUOxxxxRE# show dot1x unauthorized mac-address-table mac

Age-Out Time:    300 Sec.
MAC Address      Port
-----
00-01-02-03-04-05  Gi1/0/24
00-19-5B-E9-5C-A7  Gi1/0/24

ZEQUOxxxxRE#
```

12.3 MAC Authentication Commands

12.3.1 mac-authentication

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

Syntax

- **mac-authentication**
- **no mac-authentication**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

MAC authentication is a feature designed to authenticate a user by MAC address when the user is trying to access the network via the Switch. The Switch itself can perform the authentication based on a local database or be a RADIUS client and perform the authentication process via the RADIUS protocol with a remote RADIUS server.

Example

This example shows how to enable MAC authentication globally.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# mac-authentication
ZEQUOxxxxRE(config)#
```

12.3.2 mac-authentication auth-fail block-time

This command is used to configure the blocking time after a MAC authentication request is rejected at the specific port.

Syntax

- **mac-authentication auth-fail block-time** *SECONDS*

Parameters

Parameters	description
block-time <i>SECONDS</i>	Specifies the blocking time after a MAC authentication request is rejected at the specific port. The value is from 1 to 65535

Default

By default, the blocking time is 60 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the blocking time after a MAC authentication request is rejected at the specific port

Example

This example shows how to configure the blocking time to 600 seconds.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#mac-authentication auth-fail block-time 600
ZEQUOxxxxRE(config)#
```

12.3.3 mac-authentication 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.

Syntax

- mac-authentication mac-format case { upper | lower } delimiter { hyphen | colon | dot | none } delimited-char-num { 2 | 4 | 6 }

Parameters

Parameters	description
case	upper: Specifies that when using uppercase format, the RADIUS authentication username will be formatted as: AA-BB-CC-DD-EE-FF. lower: Specifies that when using the lowercase format, the RADIUS authentication username will be formatted as: aa-bb-cc-dd-ee-ff.
delimiter	hyphen: Specifies that when using "-" as delimiter, the format is: AA-BB-CC-DD-EE-FF. colon: Specifies that when using ":" as delimiter, the format is: AA:BB:CC:DD:EE:FF. dot: Specifies that when using "." as delimiter, the format is: AA.BB.CC.DD.EE.FF. none: Specifies that when not using any delimiter, the format is: AABCCDDEEFF.
delimiter-char-num	Specifies the delimiter number value. Choose one of the following delimiter options: 2: Single delimiter, the format is: AA-BB-CC-DD-EE-FF. 4: Double delimiters, the format is: AABB-CCDD-EEFF. 6: Multiple delimiters, the format is: AABBCD-DEEFF. If none: is chosen for delimiter, the number does not take effect.

Default

The default authentication MAC address case is upper.
The default authentication MAC address delimiter is hyphen.
The default authentication MAC address delimiter number is 6.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the formatting of usernames used for RADIUS authentication or for IGMP security based on the MAC address.

Example

This example shows how to format the username based on the MAC address.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# mac-authentication mac-format case upper delimiter hyphen
delimited-char-num 4
ZEQUOxxxxRE(config)#
```

12.3.4 mac-authentication password type

This command is used to configure the password type for MAC authentication.

Syntax

- mac-authentication password type { mac | manual }

Parameters

Parameters	description
mac	Specifies to use MAC address as the password.
manual	Specifies to use manual string as the password.

Default

By default, MAC address is used.

Command Mode

Global Configuration Mode,

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the password type for MAC authentication.

Example

This example shows how to configure to use manual string as the password.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#mac-authentication password type manual
ZEQUOxxxxRE(config)#
```

12.3.5 mac-authentication password manual

This command is used to configure the password for MAC authentication when the password type is configured as manual. Use the **no** form of this command to revert to the default setting.

Syntax

- mac-authentication password manual *STRING*
- no mac-authentication password manual

Parameters

Parameters	description
<i>STRING</i>	Specifies to set the password for MAC authentication. The length of the string is between 1 and 32 characters.

Default

By default, the password is blank (empty string).

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the password for MAC authentication when the password type is configured as **manual**.

Example

This example shows how to configure the password to be 123.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#mac-authentication password manual 123
ZEQUOxxxxRE(config)#
```

12.3.6 mac-authentication interface

This command is used to enable MAC authentication on the specified interface. Use the **no** form of this command to disable MAC authentication.

Syntax

- **mac-authentication interface** *INTERFACE-ID* [,| -]
- **no mac-authentication interface**

Parameters

Parameters	description
<i>INTERDACE-ID</i>	Specifies the interfaces to be used.
,	(Optional) Specifies a series of interfaces or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before or after the hyphen.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enable MAC authentication on the specified interface.

Example

This example shows how to enable MAC authentication on Gigabit Ethernet 1/0/1-8.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#mac-authentication interface gi1/0/1-8
ZEQUOxxxxRE(config)#
```

12.3.7 show mac-authentication

This command is used to display settings of MAC authentication.

Syntax

- show mac-authentication

Parameters

None.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to display settings of MAC authentication.

Example

This example shows how to display settings of MAC authentication.

```
ZEQUOxxxxRE#show mac-authentication

MAC Address Format for RADIUS Username
Case                :Upper
Delimiter           :Hyphen
Delimiter Characters :4

RADIUS Password Type :Manual
Manual Password      :123

ZEQUOxxxxRE#
```

12.3.8 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.

Syntax

- 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.

Command Default Level

Level: 12.

Usage Guideline

None.

Example

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

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server enable traps mac-auth
ZEQUOxxxxRE(config)#
```

12.4 Web Authentication Commands

12.4.1 web-authentication interface

This command is used to enable the Web authentication function on the port. Use the **no** form of this command to disable the Web authentication function.

Syntax

- **web-authentication interface** *INTERFACE-ID* [,|-]
- **no web-authentication interface**

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	Specifies the interfaces to be used.
,	(Optional) Specifies a series of interfaces or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command allows hosts connected to the port to do authentication via the Web browser.

Example

This example shows how to enable the Web authentication function on GigabitEthernet1/0/1.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#web-authentication interface gil/0/1
ZEQUOxxxxRE(config)#
```

12.4.2 web-authentication contents

This command is used to customize the Web authentication page elements. Use the **no** form of this command to return to the default setting.

Syntax

- **web-authentication contents** { **description** *STRING* | **message** *STRING* | **password** *STRING* | **title** *STRING* | **username** *STRING* }
- **no web-authentication contents** { **description** | **message** | **password** | **title** | **username** | **logo-data** }

Parameters

Parameters	description
title <i>STRING</i>	Specifies the title of the Web authentication page. The maximum number can be up to 64 characters.
username <i>STRING</i>	Specifies the user name title of Web authentication login window. The maximum number can be up to 32 characters.
password <i>STRING</i>	Specifies the password title of Web authentication login window. The maximum number can be up to 32 characters.
message <i>STRING</i>	Specifies the message field of the Web authentication login window. The maximum number can be up to 256 characters.
description <i>STRING</i>	Specifies the description field of Web authentication login window. The maximum number can be up to 256 characters.
logo-data	Specifies the copyright information by lines in Web authentication pages. The total copyright information can be up to 5 lines and 128 characters for each line.

Default

By default, the description field is not set.
 By default, the message field is not set.
 By default, the password title is "Password".

By default, the title is not set.
By default, the username title is "User Name".
By default, the log file does not exist.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Administrators can customize Web authentication page elements.

Example

This example shows how to configure the title to Panasonic.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#web-authentication contents title Panasonic
ZEQUOxxxxRE(config)#
```

12.4.3 web-authentication redirect

This command is used to configure the default URL the client Web browser will be redirected to after successful authentication. Use the **no** form of this command to remove the specification.

Syntax

- web-authentication redirect *STRING*
- no web-authentication redirect

Parameters

Parameters	description
<i>STRING</i>	Specifies the default URL the client Web browser will be redirected to after successful authentication. If no default redirect URL is specified, the Web authentication logout page will be displayed. The default redirect path can be up to 64 characters.

Default

By default, the Web authentication logout page is displayed.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the Web page to display to the hosts who passes the Web authentication.

Example

This example shows how to configure the default redirect path to be "http://www.website.com" after passing Web authentication.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# web-authentication redirect http://www.website.com
ZEQUOxxxxRE(config)#
```

12.4.4 web-auth system-auth-control

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

Syntax

- web-authentication
- no web-authentication

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Web-based Authentication is used to authenticate users who access the Internet using Web browsers through the Switch. The switch itself can be the authentication server and do the authentication based on a local database, or be a RADIUS client and perform the authentication process via RADIUS protocol with the remote RADIUS server. The authentication process uses HTTP protocol.

Example

This example shows how to enable the Web authentication function globally.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#web-authentication
ZEQUOxxxxRE(config)#
```

12.4.5 web-authentication virtual-ip

This command is used to configure the Web authentication virtual IP address which is used to accept authentication requests from host. Use the **no** form of this command to revert to the default setting.

Syntax

- **web-authentication virtual-ip** { *IP-ADDRESS* }
- **no web-authentication virtual-ip**

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the Web authentication virtual IPv4 address.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The virtual IP of Web authentication is just the characterization of the Web authentication function on the Switch. All Web authentication processes communicate with this IP address, however, the virtual IP does not respond to any ICMP packet or ARP request. So it's not allowed to configure virtual IP in the same subnet as the Switch's IP interface or the same subnet as the host PCs' subnet, otherwise the Web authentication cannot operate correctly.

The defined URL only takes effect when the virtual IP address is configured. The users get the FQDN URL stored on the DNS server to get the virtual IP address. The obtained IP address must match the virtual IP address configured by the command.

If the IPv4 virtual IP is not configured, the IPv4 access cannot start a Web authentication.

Example

This example shows how to configure the Web authentication virtual IP to be "1.1.1.1".

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# web-authentication virtual-ip 1.1.1.1
ZEQUOxxxxRE(config)#
```

12.4.6 web-authentication web-port

This command is used to configure the HTTP port used for web authentication on the Switch. Use the **no** form of this command to revert to the default setting.

Syntax

- **web-authentication web-port http** *TCP-PORT*
- **no web-authentication web-port http**

Parameters

Parameters	description
<i>TCP-PORT</i>	Specifies the TCP port for web authentication. The value is from 1 to 65535.

Default

By default the HTTP port number is 80.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the HTTP port used for web authentication on the Switch. The HTTP packets from the TCP port is trapped to the CPU for authentication, or to access the login page.

Example

This example shows how to configure the TCP port as 8888.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#web-authentication web-port http 8888
ZEQUOxxxxRE(config)#
```

12.4.7 web-authentication auth-fail block-time

This command is used to configure the block time for web authentication.

Syntax

- web-authentication auth-fail block-time *SECONDS*

Parameters

Parameters	authdescription
<i>SECONDS</i>	Specifies the time in seconds to be blocked. The value is from 1 to 65535.

Default

60 seconds.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the block time after the login is failed for 3 times. During the block time, the login is not permitted.

Example

This example shows how to configure the block time to 100 seconds.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#web-authentication auth-fail block-time 100
ZEQUOxxxxRE(config)#
```

12.4.8 show web-authentication

This command is used to display the web authentication settings.

Syntax

- show web-authentication

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the web authentication settings.

Example

This example shows how to display the web authentication settings..

```
ZEQUOxxxxRE#show web-authentication
```

```
Virtual IP Address : 172.10.1.1  
HTTP Port Number  : 8888  
Redirect URL       :
```

```
ZEQUOxxxxRE#
```

12.4.9 show web-authentication contents

This command is used to display the elements of web authentication page.

Syntax

- show web-authentication contents

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the web authentication settings.

Example

This example shows how to display the elements of web authentication page...

```
ZEQUOxxxxRE#show web-authentication contents
```

```
Page title      :  
Logo Data      : None  
User Name String : User Name  
Password String : Password  
Message        :  
Description     :
```

```
ZEQUOxxxxRE#
```

12.4.10copy tftp logo-data

This command is used to upload the logo file for web authentication.

Syntax

- **copy tftp: *//LOCATINO/FILE-NAME* logo-data**

Parameters

Parameters	description
<i>IP-ADDRESS</i>	Specifies the IP address of the TFTP server.
<i>FILE-NAME</i>	Specifies the file name of the logo. The supported file format are JPG, PNG, and GIF. The file size is limited up to 512KB.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to upload the logo file for web authentication.

Example

This example shows how to upload the logo file for web authentication..

```
ZEQUOxxxxRE# copy tftp: //10.90.90.23/wac.jpg logo-data
Address of remote host [10.90.90.23]?
Source filename [wac.jpg]?
Accessing tftp://10.90.90.23/wac.jpg...
Transmission start...
Transmission finished, file length 21909 bytes.
Logo type is JPG.
Please wait, programming flash..... Done
```

```
ZEQUOxxxxRE#
```

12.5 Authentication Commands

12.5.1 authentication aging-time

This command is used to configure the aging timer for MAC and web authentication sessions.

Syntax

- authentication aging-time *MINUTES*

Parameters

Parameters	description
<i>MINUTES</i>	Specifies the timer in minutes. The range is from 0 to 65535.

Default

The default timer is 1440 minutes.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the aging timer for MAC and web authentication sessions. This command is not available for 802.1X.

Example

This example shows how to configure the aging timer to 200.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)# authentication aging-time 200
ZEQUOxxxxRE(config)#
```

12.5.2 authentication default-vlan

This command is used to configure the authentication default VLAN setting. Use the **no** form of this command to remove the authentication default VLAN.

Syntax

- **authentication default-vlan** *VLAN-ID*
- **no authentication default-vlan**

Parameters

Parameters	description
<i>VLAN-ID</i>	Specifies the VLAN as the authentication default VLAN.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The specified VLAN must exist as a static VLAN before configuring it as the authentication default VLAN. This command is available for physical port interface configuration.

After the host passes authentication, it will be assigned to the default VLAN when the dynamic VLAN is disabled or the target VLAN is invalid. However, the host will stay in the original received VLAN if the default VLAN is invalid.

Example

This example shows how to configure VLAN 5 as the authentication default VLAN.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/4
ZEQUOxxxxRE(config-if)#authentication default-vlan 5
ZEQUOxxxxRE(config-if)#
```

12.5.3 authentication dynamic-vlan radius-attribute

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

Syntax

- authentication dynamic-vlan radius-attribute
- no authentication dynamic-vlan radius-attribute

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The command is used to enable or disable the acceptance of the authorized configuration. When enabled, the authorized attributes such as VLAN, 802.1p default priority, bandwidth, and ACL that are assigned by the RADIUS server will be accepted.

Bandwidth and ACL are assigned on port-basis. If authentication on the Switch is in the mac-based mode, VLAN and 802.1p are assigned on host-basis.

Example

This example shows how to disable the authroization status.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#no authentication dynamic-vlan radius-attribute
ZEQUOxxxxRE(config)#
```

12.5.4 authentication guest-vlan

This command is used to configure the authentication guest VLAN setting. Use the **no** form of this command to remove the authentication guest VLAN.

Syntax

- authentication guest-vlan *VLAN-ID*
- no authentication guest-vlan

Parameters

Parameters	description
<i>VLAN-ID</i>	Specifies the VLAN as the authentication guest VLAN.

Default

None

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The specified VLAN must exist as a static VLAN before configuring it as the authentication guest VLAN. This command is available for physical port interface configuration.

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 authentication.

During authentication, if the RADIUS server assigns a VLAN to the user, the user will be authorized to this assigned VLAN.

Guest VLAN and VLAN assignment do not take effect on trunk VLAN ports and VLAN tunnel ports.

Normally, guest VLAN and VLAN assignment are functioning for hosts that send untagged packets. It may cause unexpected behavior if it is functioning on hosts that send tagged packets.

For port-based 802.1X, the port will be added as the guest VLAN member port and PVID of the port will change to guest VLAN. Traffic that comes from guest VLAN can be forwarded regardless of whether it was authenticated. Traffic that comes from other VLANs is dropped until it passes 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.

For MAC-based 802.1X, MAC authentication, and Web authentication; the port will be added as a guest VLAN member port and the PVID of the port will change to the guest VLAN. Hosts that are allowed to access the guest VLAN, are forbidden to access other VLANs until they pass authentication.

When one host passes authentication, the port will stay in the guest VLAN and the PVID of the port will not be changed.

If the guest VLAN is disabled, the port will leave the guest VLAN, return to the native VLAN, and the PVID will change to the native VLAN.

Example

This example shows how to configure VLAN 5 as the authentication guest VLAN.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/1
ZEQUOxxxxRE(config-if)#authentication guest-vlan 5
ZEQUOxxxxRE(config-if)#
```

12.5.5 authentication step-auth

This command is used to configure the 2-step authentication mode for the specific interface. Use the **no** form of this command clear the 2-step authentication mode for the specific interface.

Syntax

- **authentication step-auth** { mac-web | mac-dot1x | dot1x-web } interface *INTERFACE-ID* [, | -]
- **no authentication step-auth** { mac-web | mac-dot1x | dot1x-web } interface *INTERFACE-ID* [, | -]

Parameters

Parameters	description
mac-web	Specifies to first use MAC authentication and then web authentication in the 2-step authentication mode.
mac-dot1x	Specifies to first use MAC authentication and then 802.1X authentication in the 2-step authentication mode.
dot1x-web	Specifies to first use 802.1X authentication and then web authentication in the 2-step authentication mode.
<i>INTERFACE-ID</i>	Specifies the interfaces to be used.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the 2-step authentication mode for the specified interface. The **mac-web**, **mac-dot1x**, and **dot1x-web** options can be configured on the same interface at the same time. 2-step authentication will allow access to clients where two authentication methods succeeded.

If **MAC authentication** is used as the first step, the **MAC authentication account** is required to include the following attribute to specify the second authentication method:

- **RADIUS: Filter-ID = "AUTH-WEB"** - This is required for Web authentication as the second step.
- **RADIUS: Filter-ID = "AUTH-802.1X"** - This is required for 802.1X authentication as the second step.
- **RADIUS: Filter-ID = "AUTH-ANY"** - This is required for Web or 802.1X authentication as the second step.

When no Filter-ID exists, the DUT will treat the configuration as single MAC authentication.

In the local database, the "2-step authentication Status" field will be:

- **802.1X** - When 802.1X authentication is required as the second step.
- **WEB** - When Web authentication is required as the second step.
- **Any** - When Web or 802.1X authentication is required as the second step.
- **No** - When the second step for authentication is not defined (single MAC authentication).

The following command can be used to specify the "2-step authentication Status" for local MAC authentication:

- **aaa authentication auth-mac** *MAC-ADDRESS* **vlan** *VLAN-ID* **filter-id** *NUMBER* **step-auth** { **no** | **dot1x** | **web** | **any** }

If **802.1X authentication** is used as the first step, the **802.1X authentication account** is required to include the following attribute to specify the second authentication method:

- **RADIUS: Filter-ID = "AUTH-WEB"** - This is required for Web authentication as the second step.

When no Filter-ID exists, the DUT will treat the configuration as single 802.1X authentication.

In the local database, the "2-step authentication Status" field will be:

- **Enabled** - When Web authentication is required as the second step.
- **Disabled** - When the second step for authentication is not defined (single MAC authentication).

The following command can be used to specify the "2-step authentication Status" for local 802.1X authentication:

- **aaa authentication auth-user** *STRING* { **password** *STRING* [**encrypt**] | **encrypt-password** *STRING* } **vlan** *VLAN-ID* **filter-id** *NUMBER* **auth-type** { **both** | **web** | **dot1x** } **step-auth** { **enable** | **disable** }

If the second step for authentication (configured using the abovementioned command) and the second step for authentication in the port settings (MAC-WEB Auth Ports, MAC-802.1X Auth Ports, and 802.1X-WEB Auth Ports) are different, then authentication will be rejected.

Example

This example shows how to configure to use MAC and web authentication as the 2-step authentication mode on Gigabit Ethernet 1/0/1.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#authentication step-auth mac-web interface g11/0/1
ZEQUOxxxxRE(config)#
```


12.5.6 authentication step-auth second-step-timeout

This command is used to configure the timeout value for the first authentication success module.

Syntax

- `authentication step-auth second-step-timeout SECONDS`

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the timeout value in seconds for the first authentication success module. The value is from 0-65535.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the timeout value for the first authentication success module. If the first authentication succeeded but not the second authentication, the first authentication will be rejected after the timeout.

Example

This example shows how to configure the timeout value of 2-step authorization.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#authentication step-auth second-step-timeout 200
ZEQUOxxxxRE(config)#
```

12.5.7 no authentication mac

This command is used to remove authentication sessions.

Syntax

- no authentication mac *MAC-ADDRESS*

Parameters

Parameters	description
<i>MAC-ADDRESS</i>	Specifies MAC address to clear authentication sessions.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to remove authentication sessions.

Example

This example shows how to remove authentication sessions.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#no authentication mac 00-40-10-28-19-78
ZEQUOxxxxRE(config)#
```

12.5.8 show authentication

This command is used to display the authentication settings.

Syntax

- show authentication

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to display the authentication settings.

Example

This example shows how to display the authentication settings.

```
ZEQUOxxxxRE#show authentication

Global MAC Auth Status : Disabled      Global WEB Auth Status : Disabled

802.1X Port-based Auth Ports :1/0/1-1/0/30
802.1X MAC-based Auth Ports  :
MAC Auth Ports               :
WEB Auth Ports               :
Syslog Transmission          :Enabled

ZEQUOxxxxRE#
```

12.5.9 show authentication dynamic-vlan

This command is used to display the dynamic VLAN information of authentication.

Syntax

- show authentication dynamic-vlan

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to display the dynamic VLAN information of authentication.

Example

This example shows how to display the dynamic VLAN information of authentication.

```
ZEQUOxxxxRE#show authentication dynamic-vlan
```

```
Accept RADIUS Attribute: Enabled
```

Port	Current PVID	Auth Status	Guest	Default
Gi1/0/1	1	Authorized	----	----
Gi1/0/2	1	Authorized	----	----
Gi1/0/3	1	Authorized	----	----
Gi1/0/4	1	Authorized	----	----
Gi1/0/5	1	Authorized	----	----
Gi1/0/6	1	Authorized	----	----
Gi1/0/7	1	Authorized	----	----
Gi1/0/8	1	Authorized	----	----
Gi1/0/9	1	Authorized	----	----
Gi1/0/10	1	Authorized	----	----
Gi1/0/11	1	Authorized	----	----
Gi1/0/12	1	Authorized	----	----
Gi1/0/13	1	Authorized	----	----
Gi1/0/14	1	Authorized	----	----
Gi1/0/15	1	Authorized	----	----
Gi1/0/16	1	Authorized	----	----
Gi1/0/17	1	Authorized	----	----
Gi1/0/18	1	Authorized	----	----
Gi1/0/19	1	Authorized	----	----

```
--More--
```

12.5.10show authentication sort

This command is used to display authentication information.

Syntax

- show authentication sort { mac | interface *INTERFACE-ID* [, | -] }

Parameters

Parameters	description
mac	Specifies to display all authentication information.
<i>INTERFACE-ID</i>	Specifies the interfaces to be displayed.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of interfaces. No space is allowed before and after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to display authentication information.

Example

This example shows how to display authentication information.

```
ZEQUOxxxxRE#show authentication sort mac
```

```
Total Hosts      :17
Authorized Hosts  :2
Auth Aging Time   :1440 minutes
```

MAC Address	Port	Auth Type	Auth Status	Remaining Aging Time
-----	-----	-----	-----	-----
00-01-01-01-01-01	Gi1/0/21	MAC	Authorized	1440
00-05-5D-A5-41-BF	Gi1/0/21	802.1X/MAC	Unauthorized	---
00-19-5B-E9-5C-A7	Gi1/0/24	802.1X	Authorized	---
00-1A-4D-2A-09-20	Gi1/0/21	802.1X/MAC	Unauthorized	---
00-1B-21-44-C6-21	Gi1/0/21	802.1X/MAC	Unauthorized	---
00-1C-F0-C3-D4-F9	Gi1/0/21	802.1X/MAC	Unauthorized	---
00-1D-7D-44-96-0E	Gi1/0/21	802.1X/MAC	Unauthorized	---
00-21-91-A9-3D-01	Gi1/0/21	802.1X/MAC	Unauthorized	---
00-21-91-A9-F3-01	Gi1/0/21	802.1X/MAC	Unauthorized	---
00-24-1D-36-E8-1B	Gi1/0/21	802.1X/MAC	Unauthorized	---
00-24-1D-EC-84-DD	Gi1/0/21	802.1X/MAC	Unauthorized	---
00-50-BA-19-59-81	Gi1/0/21	802.1X/MAC	Unauthorized	---
00-A0-C9-E5-34-60	Gi1/0/21	802.1X/MAC	Unauthorized	---
50-46-5D-A2-02-31	Gi1/0/21	802.1X/MAC	Unauthorized	---
6C-F0-49-62-CA-44	Gi1/0/21	802.1X/MAC	Unauthorized	---
6C-F0-49-C6-52-C0	Gi1/0/21	802.1X/MAC	Unauthorized	---
74-27-EA-F1-52-9A	Gi1/0/21	802.1X/MAC	Unauthorized	---

```
ZEQUOxxxxRE#
```

12.6 Secure Sockets Layer (SSL)

12.6.1 no certificate

This command is used to delete the imported certificate.

Syntax

- no certificate *NAME*

Parameters

Parameters	description
<i>NAME</i>	Specifies the name of the certificate to be deleted.

Default

None.

Command Mode

Certificate Chain Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use the **show crypto pki trustpoints** command to get a name list of imported certificates. Then use this command to delete the imported certificates of a trust point. If the specified certificate is a local certificate the corresponding private key will be deleted at the same time.

Example

This example shows how to delete an imported certificate named *tongken.ca* of the trust point *gaa*.

```

ZEQUOxxxxRE# show crypto pki trustpoints

Trustpoint Name      : gaa (primary)
  Imported certificates:
    CA                : tongken.ca
    local certificate  : webserver.crt
    local private key  : webserver.prv

ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# crypto pki certificate chain gaa
ZEQUOxxxxRE(config-cert-chain)# no certificate tongken.ca
ZEQUOxxxxRE(config-cert-chain)#

```

12.6.2 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.

Syntax

- **crypto pki import** *TRUSTPOINT* **pem** *FILE-SYSTEM:/[DIRECTORY/]FILE-NAME* [**password** *PASSWORD-PHRASE*] { **ca** | **local** | **both** }
- **crypto pki import** *TRUSTPOINT* **pem** *tftp://IP-ADDRESS/[DIRECTORY/]FILE-NAME* [**password** *PASSWORD-PHRASE*] { **ca** | **local** | **both** }

Parameters

Parameters	description
<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.
<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.
password <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.
tftp	Specifies the source URL for a TFTP network server.
<i>IP-ADDRESS</i>	Specifies the IP address of the TFTP server.

Parameters	description
ca	Specifies to import the CA certificate only.
local	Specifies to import local certificate and key pairs only.
both	Specifies to import the CA certificate, local certificate and key pairs.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 15.

Usage Guideline

This command allows administrators to import certificates and key pairs in the PEM-formatted files.

Proper certificates and key pairs need to be imported to the Switch according to the desired key exchange algorithm. RSA and DSA certificates/key pairs should be imported for RSA and DHS-DSS respectively. RSA and DSA certificates and keys are incompatible. An SSL client that has only an RSA certificate and key cannot establish a connection with an SSL server that has only a DSA certificate and key.

The imported certificate(s) may form a certificate chain which establishes a sequence of trusted certificates from a peer certificate to the root CA certificate. The trust point CA is the certificate authority configured on the Switch as the trusted CA. Any obtained peer certificate will be accepted if it is signed by a locally trusted CA or its subordinates.

If the specified trust point doesn't exist, an error message will be prompted.

Example

This example shows how to import certificates (CA and local) and key pair files to trust-point "TP1" via TFTP.

```

ZEUQUOxxxxRE# 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 Gi1/0/5):!
[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 Gi1/0/5):!
[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 Gi1/0/5):!
[OK - 1289 bytes]
% PEM files import succeeded.

ZEUQUOxxxxRE(config)#

```

12.6.3 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.

Syntax

- **crypto pki trustpoint** *NAME*
- **no crypto pki trustpoint** *NAME*

Parameters

Parameters	description
<i>NAME</i>	Specifies to create a name for the trust-point.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to declare a trust-point, which can be a self-signed root certificate authority (CA) or a subordinate CA. Issuing this command will enter the CA-Trust-Point Configuration Mode.

Example

This example shows how to declare a trust-point "TP1" and specify it is a primary trust-point.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# crypto pki trustpoint TP1
ZEQUOxxxxRE(ca-trustpoint)# primary
ZEQUOxxxxRE(ca-trustpoint)#
```

12.6.4 crypto pki certificate chain

This command is used to enter into the certificate chain configuration mode.

Syntax

- `crypto pki certificate chain` *NAME*

Parameters

Parameters	description
<i>NAME</i>	Specifies the name for the trust-point.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use this command to enter into certificate chain configuration mode. If the specified trust-point name doesn't exist, an error message will be displayed.

Example

This example shows how to enter into certificate chain configuration mode.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# crypto pki certificate chain TP1
ZEQUOxxxxRE(trustpoint)#
```

12.6.5 primary

This command is used to assign a specified trust-point as the primary trust-point of the Switch. Use the **no** form of this command to disable the option.

Syntax

- primary
- no primary

Parameters

None.

Default

By default, this option is disabled.

Command Mode

CA-Trust-Point Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

Use the primary command to specify a given trust-point as primary. This trust-point can be used as default trust-point when the application doesn't explicitly specify which certificate authority (CA) trust-point should be used. Only one trust-point can be specified as the primary. The last trust-point specified as the primary will overwrite the previous one.

Example

This example shows how to configure the trust-point "TP1" as the primary trust-point.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# crypto pki trustpoint TP1
ZEQUOxxxxRE(ca-trustpoint)# primary
ZEQUOxxxxRE(ca-trustpoint)#
```

12.6.6 show crypto pki trustpoints

This command is used to display the trust-points that are configured in the Switch.

Syntax

- show crypto pki trustpoints [*TRUSTPOINT*]

Parameters

Parameters	description
<i>TRUSTPOINT</i>	(Optional) Specifies the name of the trust-point to be displayed.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

If no parameter is specified, all trust-points will be displayed.

Example

This example shows how to display all trust-points.

```
ZEQUOxxxxRE# 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
```

```
ZEQUOxxxxRE#
```

12.6.7 show ssl-service-policy

This command is used to display the SSL service policy.

Syntax

- `show ssl-service-policy [POLICY-NAME]`

Parameters

Parameters	description
<i>POLICY-NAME</i>	(Optional) Specifies the name of the SSL service policy.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

When the name of the SSL service policy is not specified, all SSL service policies will be displayed.

Example

This example shows how to display all SSL service policies.

```
ZEQUOxxxxRE# show ssl-service-policy

SSL Policy Name      : ssl-server
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_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    : TP1
ZEQUOxxxxRE#
```

12.6.8 ssl-service-policy

This command is used to configure the SSL service policy.

Syntax

- `ssl-service-policy POLICY-NAME [version [tls1.0] [tls1.1] [tls1.2]] |[ciphersuite [dhe-dss-3des-ede-cbc-sha] [rsa-3des-ede-cbc-sha] [rsa-rc4-128-sha] [rsa-rc4-128-md5] [rsa-export-rc4-40-md5] [rsa-aes-128-cbc-sha] [rsa-aes-256-cbc-sha] [rsa-aes-128-cbc-sha256] [rsa-aes-256-cbc-sha256] [dhe-dss-aes-256-cbc-sha] [dhe-rsa-aes-256-cbc-sha]]| secure-trustpoint TRUSTPOINT | session-cache-timeout TIME-OUT]`
- `no ssl-service-policy POLICY-NAME [version [tls1.0] [tls1.1] [tls1.2]] |[ciphersuite [dhe-dss-3des-ede-cbc-sha] [rsa-3des-ede-cbc-sha] [rsa-rc4-128-sha] [rsa-rc4-128-md5] [rsa-export-rc4-40-md5] [rsa-aes-128-cbc-sha] [rsa-aes-256-cbc-sha] [rsa-aes-128-cbc-sha256] [rsa-aes-256-cbc-sha256] [dhe-dss-aes-256-cbc-sha] [dhe-rsa-aes-256-cbc-sha]]| secure-trustpoint | session-cache-timeout]`

Parameters

Parameters	description
<i>POLICY-NAME</i>	Specifies the name of the SSL service policy.
version	(Optional) Specifies the TLS version. tls1.0 - Indicate the appliance accepts TLS version 1.0. tls1.1 - Indicate the appliance accepts TLS version 1.1. tls1.2 - Indicate the appliance accepts TLS version 1.2.

Parameters	description
ciphersuite	(Optional) Specifies the cipher suites that should be used by the secure service when negotiating a connection with a remote peer. dhe-dss-3des-ede-cbc-sha - Use DH key exchange with 3DES-EDE-CBC encryption and SHA for message digest. rsa-3des-ede-cbc-sha - Use RSA key exchange with 3DES and DES-EDE3-CBC for message encryption and the Secure Hash Algorithm (SHA) for message digest. rsa-rc4-128-sha - Use RSA key exchange with RC4 128-bit encryption for message encryption and SHA for message digest. rsa-rc4-128-md5 - Use RSA key exchange with RC4 128-bit encryption for message encryption and Message Digest 5 (MD5) for message digest. rsa-export-rc4-40-md5 - Use RSA EXPORT key exchange with RC4 40 bits for message encryption and MD5 for message digest. rsa-aes-128-cbc-sha - Use RSA key exchange with AES 128-bit encryption for message encryption and SHA for message digest. rsa-aes-256-cbc-sha - Use RSA key exchange with AES 256-bit encryption for message encryption and SHA for message digest. rsa-aes-128-cbc-sha256 - Use RSA key exchange with AES 128-bit encryption for message encryption and SHA 256 bits for message digest. rsa-aes-256-cbc-sha256 - Use RSA key exchange with AES 256-bit encryption for message encryption and SHA 256 bits for message digest. dhe-dss-aes-256-cbc-sha - Use DH key exchange with AES 256-bit encryption for message encryption and SHA for message digest. dhe-rsa-aes-256-cbc-sha - Use DH key exchange with AES 256-bit encryption for message encryption and SHA for message digest. When the cipher suite is not configured, the SSL client and server will negotiate the best cipher suite that they both support from the list of available cipher suites. Multiple cipher suites can be specified to be used. Use the no form of this command to disable the selected cipher suites.
secure-trustpoint <i>TRUSTPOINT</i>	(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. Use the no form of this command to cancel the specified trust-point and use the built-in certificate/key pairs.

Parameters	description
session-cache-timeout <i>TIME-OUT</i>	(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 Use the no form of this command to revert the SSL session cache timeout to the default setting.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 15.

Usage Guideline

This command is used to configure the SSL service policy.

Example

This example shows how to configure the SSL service policy "ssl-server" which associates the "TP1" trust-point.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# ssl-service-policy ssl-server secure-trustpoint TP1
ZEQUOxxxxRE(config)#
```

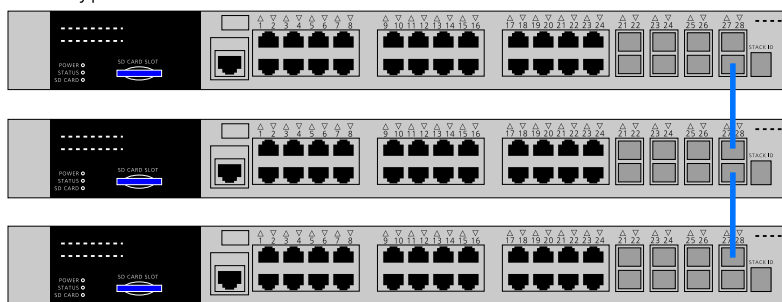
13 Stacking

13.1 Stacking Commands

Stacking is a function to manage multiple switches as one virtual switch. It is used to multiplex switches for disaster planning. This switch supports a stack of up to three units.

Stacked switches are interconnected through SFP+ ports. Chain or ring type connection is available.

Chain type



Link type

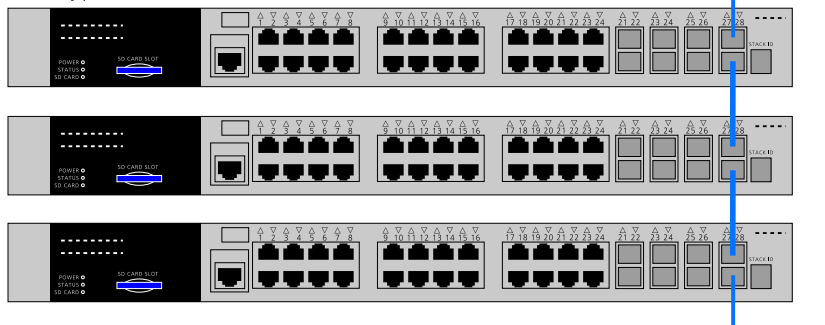


Figure 87-1 Chain or ring type stacking

Switches in a stack are divided into three roles: a master switch which actually operates, a backup switch which operates in place of a failed master, and a slave switch which prepares even for a backup switch failure. They are allocated based on the priority of each switch specified in the stacking settings.

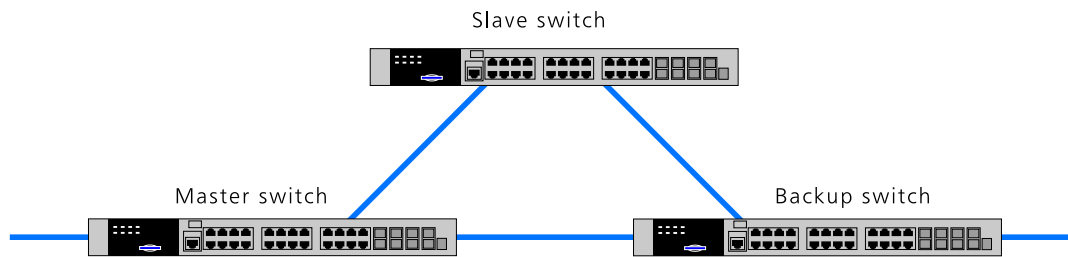


Figure 87-2 Stacking configuration

13.1.1 stack

This command is used to enable the daisy-chain stacking function. Use the **no** form of this command to disable the daisy-chain stacking function.

Syntax

- **stack**
- **no stack**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The ports on a stackable switch unit, used to chain with other switch units, can either work as stacking ports or work as ordinary Ethernet ports based on the setting of the stack command. The stack command setting of a switch unit must be enabled before the switch unit can be chained with other switch units. The setting will be saved in the individual switch unit if the user saves the configuration.

When stacking is enabled, the last 2 or 4 SFP+ ports are dedicated stacking ports and cannot be used for any other purpose. These ports are only able to perform stacking when stacking is enabled.

Example

This example shows how to enable stacking mode.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#stack
```

```
WARNING: The command does not take effect until the next reboot.
ZEQUOxxxxRE(config)#
```

13.1.2 stack renumber

This command is used to manually assign a unit ID to a switch unit. Use the **no** form of this command to set the unit ID of the switch to auto-assigned.

Syntax

- **stack** *CURRENT-UNIT-ID* **renumber** *NEW-UNIT-ID*
- **no stack** *CURRENT-UNIT-ID* **renumber**

Parameters

Parameters	description
<i>CURRENT-UNIT-ID</i>	Specifies the switch unit being configured.
<i>NEW-UNIT-ID</i>	Specifies the new unit ID assigned to the switch.

Default

The unit ID is assigned automatically.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Initially, a switch unit has no unit ID assigned. When this switch unit is initialized or is added to a stack, it will get a unit ID auto-assigned by the master unit. After a unit ID was assigned, the unit ID can be kept in configuration file by issuing the **copy running-config startup-config** command and will be used after the next reboot.

The user can use this command to re-assign a unit ID to the specified switch unit. The assigned unit ID will be used after the next reboot. The switch unit cannot be added to a switch stack if its unit ID is conflicting with an existing switch unit in the stack.

The master unit automatically assigns unit IDs to switch units based on the following rules:

- If the unit ID of the master unit is auto-assigned, it will get 1 as its unit ID.
- If a switch unit to be added to the stack has a unit ID conflicting with a unit ID of a switch unit already added, then this switch unit ID cannot be successfully added.

Example

This example shows how to configure the renumbered unit ID of a switch unit 2 to 3.

```
ZEQUOxxxxRE# stack 2 renumber 3
```

```
WARNING: The command does not take effect until the next reboot.  
ZEQUOxxxxRE#
```

13.1.3 stack priority

This command is used to configure the priority of the switch stacking unit. Use the **no** form of this command to revert to the default setting.

Syntax

- **stack** *CURRENT-UNIT-ID* **priority** *NEW-PRIORITY-NUMBER*
- **no stack** *CURRENT-UNIT-ID* **priority**

Parameters

Parameters	description
<i>CURRENT-UNIT-ID</i>	Specifies the switch stacking unit being configured.
<i>NEW-PRIORITY-NUMBER</i>	Specifies the priority assigned to the switch stacking unit. The lower number means a higher priority. The range is between 1 and 63.

Default

By default, this value is 32.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the priority for the specified switch unit. When switch units are daisy-chained together as a stack, the unit with the best priority will be elected as the master. The unit with the next best priority will be elected as the backup master. A lower value means the higher priority. When two switch units have the same priority, the unit with the smaller MAC address will get the higher priority. The new priority setting will be saved in individual switch units when the user saves the configuration.

Example

This example shows how to configure the priority of the switch unit 2 to 10.

```
ZEQUOxxxxRE# stack 2 priority 10
ZEQUOxxxxRE#
```

13.1.4 stack self-unit-id

This command is used to manually assign a unit ID to the local switch. Use the **no** form of this command to set the unit ID of the switch to auto-assigned.

Syntax

- `stack self-unit-id NEW-UNIT-ID`
- `no stack self-unit-id`

Parameters

Parameters	description
<i>NEW-UNIT-ID</i>	Specifies the new unit ID assigned to the local switch. <1-4>

Default

The unit ID is assigned automatically.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the unit ID for the local switch. The re-assigned unit ID takes effect when the setting is saved and the switch is rebooted.

This command can be used no matter the stacking function is enabled or not, but the setting only takes effect when the stack mode is enabled.

The setting is put in the configuration file for saving the unit ID for the local device. The configuration file can be applied to a new switch which will get the same stack unit ID configuration.

The configuration file should be applied to individual switches before joining to the stack system. Make sure the unit ID is identical before joining to the stack system.

Example

This example shows how to configure the unit ID of the local switch to 3.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#stack self-unit-id 3
```

```
WARNING: The command does not take effect until the next reboot.
ZEQUOxxxxRE(config)#
```


13.1.5 stack self-unit-priority

This command is used to configure the priority of the local switch. Use the **no** form of this command to revert to the default setting.

Syntax

- **stack self-unit-priority** *NEW-PRIORITY-NUMBER*
- **no stack self-unit-priority**

Parameters

Parameters	description
<i>NEW-PRIORITY-NUMBER</i>	Specifies the priority assigned to the local switch. The lower number means a higher priority. The range is between 1 and 63.

Default

By default, this value is 32.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the priority for the local switch. The priority takes effect when the setting is saved and the switch is rebooted.

This command can be used no matter the stacking function is enabled or not, but the setting only takes effect when the stack mode is enabled.

The setting is put in the configuration file for saving the priority for the local device. The configuration file can be applied to a new switch which will get the same priority configuration.

The configuration file should be applied to individual switches before joining to the stack system.

Example

This example shows how to configure the priority of the local switch to 10.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#stack self-unit-priority 10
ZEQUOxxxxRE(config)#
```

13.1.6 stack preempt

This command is used to enable preemption of the master role to come into play when a unit with a better priority is added to the switch later. Use the **no** form of this command to disable preemption.

Syntax

- stack preempt
- no stack preempt

Parameters

None.

Default

By default, this option is enabled.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

When this command is disabled, the unit that assumes the master role will not change when units with a better priority are added to the stack. If this command is enabled, then the unit that assumes the master role will change as units with a better priority are added to the stack.

Example

This example shows how to enable preemption.

```
ZEQUOxxxxRE# stack preepmt
ZEQUOxxxxRE#
```

13.1.7 snmp-server enable traps stack

This command is used to enable the sending of stacking related trap. Use the **no** form of this command to disable the sending of stacking related trap.

Syntax

- snmp-server enable traps stack
- no snmp-server enable traps stack

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable or disable the sending of stacking related SNMP notifications.

Example

This example shows how to enable the sending of stacking related trap.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#snmp-server enable traps stack

ZEQUOxxxxRE(config)#
```

13.1.8 show stack

This command is used to display the stacking information.

Syntax

- show stack

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

This command is used to display the stacking information.

Example

This example shows how to display stacking information.

```
ZEQUOxxxxRE#show stack
```

```
Stacking Mode      : Enabled
Stack Preempt      : Enabled
Trap State         : Disabled
```

```
Topology           : Duplex_Chain
My Box ID          : 1
Master ID          : 1
Box Count          : 1
```

Box	User	Module	Prio-	Prom	Runtime	H/W
ID	Set	Name	Exist rity	MAC	Version	Version
1	Auto	ZEQUOxxxxRE	Exist 32	00-50-40-3C-77-81	V1.0.0.01	V1.0.0.03 A1
2	-	ZEQUOxxxxRE	No			
3	-	ZEQUOxxxxRE	No			
4	-	ZEQUOxxxxRE	No			

```
ZEQUOxxxxRE#
```

14 Redundancy function

14.1 STP (Spanning Tree Protocol) Commands

STP

STP (Spanning Tree Protocol) is a function to provide path redundancy while preventing loops in a network established by connecting multiple bridges. Even if one end of a communication route is down, the function can continue communications by detouring the route.

In general, if a cable is connected in a loop form, a phenomenon called broadcast storm, where frames keep looping permanently, occurs and causes the network to go down.

The STP function interchanges control frames called BPDU frames between switches to calculate the shortest route. Automatic port blocking to prevent frames from looping allows you to establish a network which logically never has loops.

If a failure occurs on a route, the communication route can be recovered within 50 seconds or less.

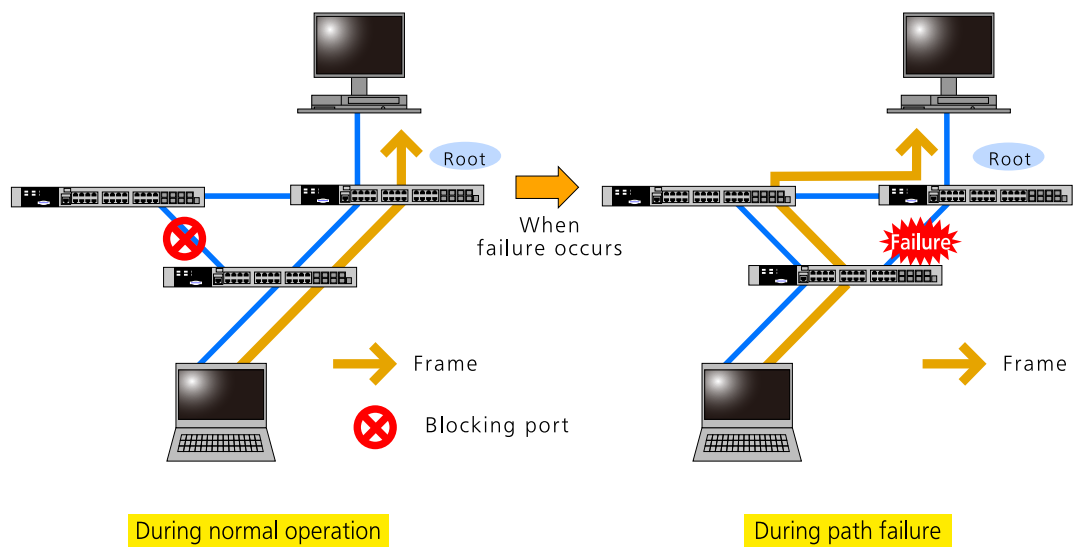


Figure 88-1 STP overview

RSTP

RSTP (Rapid Spanning Tree Protocol) is a modified STP protocol to reduce recovery time to several seconds during a route failure.

When changing a route, the RSTP function determines port roles and changes the route immediately through information exchanges (proposal/agreement) between switches instead of timers used in STP.

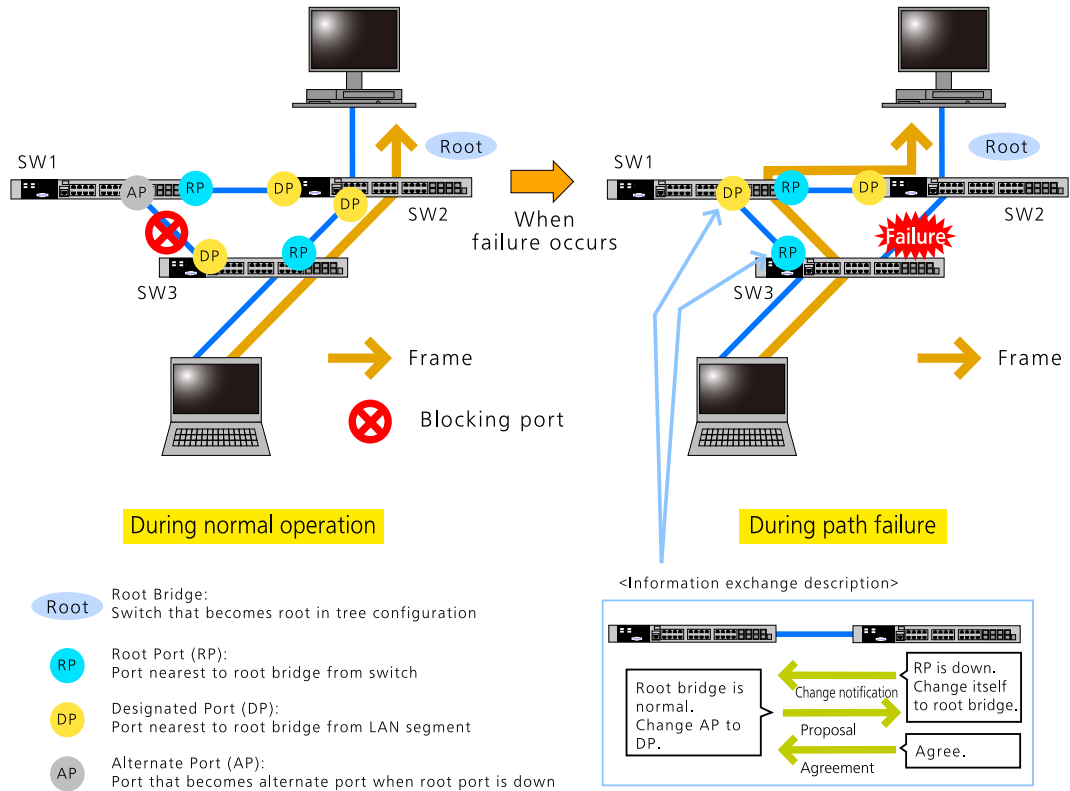


Figure 88-2 RSTP overview

MSTP

MSTP (Multiple Spanning Tree Protocol) is also a modified STP protocol to communicate data for each VLAN using different routes. This allows for effective use of bandwidth.

Consolidating multiple VLANs into a group called instance can reduce more CPU loads compared to when designing a spanning tree instance for each VLAN. The MSTP function allows for supporting a large-size network.

<Physical configuration>

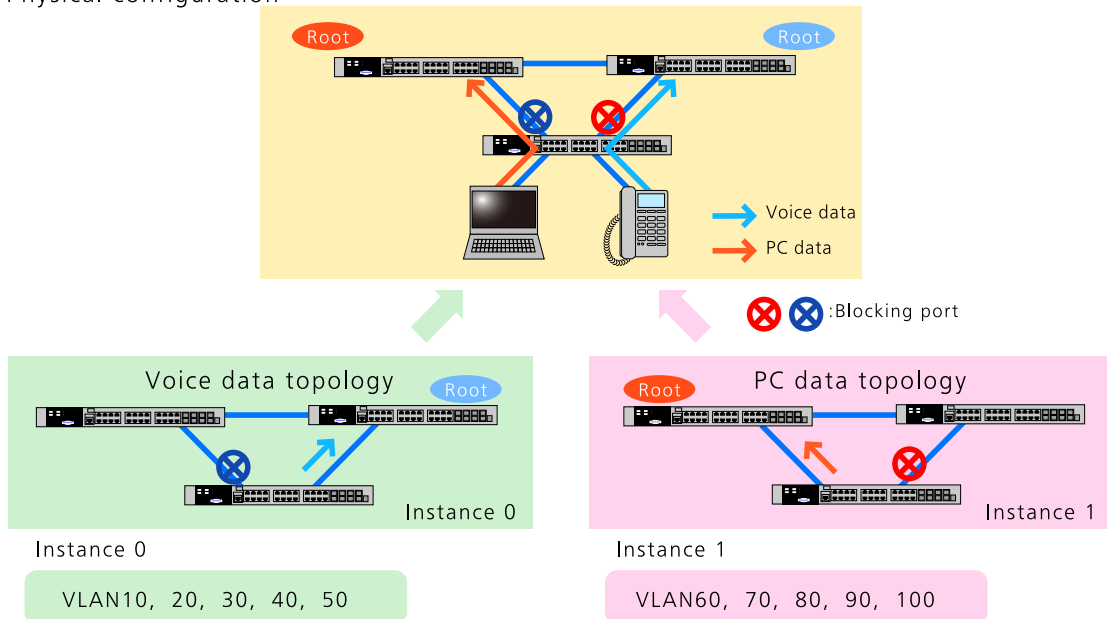


Figure 88-3 MSTP overview

14.1.1 clear spanning-tree detected-protocols

This command is used to restart the protocol migration.

Syntax

- clear spanning-tree detected-protocols {all | interface *INTERFACE-ID*}

Parameters

Parameters	description
all	Specifies to trigger the detection action for all ports.
interface <i>INTERFACE-ID</i>	Specifies the port interface that will be triggered the detecting action.

Default

None.

Command Mode

Privileged EXEC Mode.

Command Default Level

Level: 12.

Usage Guideline

Using this command the port protocol migrating state machine will be forced to the *SEND_RSTP* state. This action can be used to test whether all legacy bridges on a given LAN have been removed. If there is no STP Bridge on the LAN, the port will be operated in the configured mode, either in the RSTP or MSTP mode. Otherwise, the port will be operated in the STP mode.

Example

This example shows how to trigger the protocol migration event for all ports.

```
ZEQUOxxxxRE# clear spanning-tree detected-protocols all
```

```
Clear spanning-tree detected-protocols? (y/n) [n] y
```

```
ZEQUOxxxxRE#
```

14.1.2 show spanning-tree

This command is used to display the information of spanning tree protocol operation. This command is only for STP and RSTP.

Syntax

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

Parameters

Parameters	description
interface <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.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the Spanning Tree configuration for the single spanning tree when in the RSTP or STP-compatible mode.

Example

This example shows how to display the spanning tree information when STP is enabled.

```
ZEQUOxxxxRE#show spanning-tree
```

```
Spanning Tree: Enabled
Protocol Mode: RSTP
Tx-hold-count: 6
NNI BPDU Address: dot1d(01-80-C2-00-00-00)
Root ID Priority: 32768
    Address: F0-7D-68-34-0A-00
    Hello Time: 2 sec, Max Age: 20 sec, Forward Delay: 15 sec
Bridge ID Priority: 32768 (priority 32768 sys-id-ext 0)
    Address: F0-7D-68-34-0A-00
    Hello Time: 2 sec, Max Age: 20 sec, Forward Delay: 15 sec,
Topology Changes Count: 0
```

Interface	Role	State	Cost	Priority	Link	Edge
-----	----	-----	----	-----	-----	-----
Gi1/0/1	designated	forwarding	200000	128.1	p2p	edge

```
ZEQUOxxxxRE#
```

14.1.3 show spanning-tree mst

This command is used to display the information of Multiple Spanning Tree (MST) and instances.

Syntax

- show spanning-tree mst** { configuration | instance *INSTANCE-ID* [interface *INTERFACE-ID*]

Parameters

Parameters	description
configuration	Specifies the MST configuration of the equipment.
instance <i>INSTANCE-ID</i>	Specifies the instance number.
interface <i>INTERFACE-ID</i>	Specifies the interface ID to be displayed.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display MST information.

Example

This example shows how to display spanning tree configuration information for GigabitEthernet1/0/1.

```
ZEQUOxxxxRE#show spanning-tree mst configuration
```

```
Name       : F0:7D:68:34:00:10
Revision   : 0,Instances configured: 1
Instance   Vlans
-----
0          1-4094
```

```
ZEQUOxxxxRE#
```

14.1.4 show spanning-tree configuration interface

This command is used to display the information about STP interface related configuration.

Syntax

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

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface ID to be displayed.
,	(Optional) Specifies a series of interfaces, or separate a range of interfaces from a previous range. No space before and after the comma.
-	(Optional) Specifies a range of interfaces. No space before and after the hyphen.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display Spanning Tree interface level configuration. The command can be used for all STP versions.

Example

This example shows how to display spanning tree configuration information for GigabitEthernet1/0/1.

```
ZEQUOxxxxRE#show spanning-tree configuration interface gil/0/1
```

```
Gil/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
```

```
ZEQUOxxxxRE#
```

14.1.5 spanning-tree global state

This command is used to enable or disable the STP's global state. Use the **no** form of this command to disable the STP's global state.

Syntax

- spanning-tree global state {enable | disable}
- no spanning-tree global state

Parameters

Parameters	description
enable	Specifies to enable the STP's global state.
disable	Specifies to disable the STP's global state.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command in the global configuration mode to enable the global spanning-tree function.

Example

This example shows how to enable the spanning-tree function.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# spanning-tree global state enable
ZEQUOxxxxRE(config)#
```

14.1.6 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.

Syntax

- **spanning-tree** { **hello-time** *SECONDS* | **forward-time** *SECONDS* | **max-age** *SECONDS* }
- **no spanning-tree** { **hello-time** | **forward-time** | **max-age** }

Parameters

Parameters	description
hello-time <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.
forward-time <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.
max-age <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.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the Spanning Tree timer value.

Example

This example shows how to configure the STP timers.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# spanning-tree hello-time 1
ZEQUOxxxxRE(config)# spanning-tree forward-time 16
ZEQUOxxxxRE(config)# spanning-tree max-age 21
ZEQUOxxxxRE(config)#
```

14.1.7 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.

Syntax

- spanning-tree state {enable | disable}
- no spanning-tree state

Parameters

Parameters	description
enable	Specifies to enable STP for the configured interface.
disable	Specifies to disable STP for the configured interface.

Default

By default, this option is enabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

When a port is spanning tree enabled, the spanning tree protocol engine will either send or process the spanning tree BPDU received by the port. The command should be used with caution to prevent bridging loops. The command does not take effect if the Layer 2 protocol tunnel is enabled for STP.

Example

This example shows how to enable Spanning Tree on GigabitEthernet1/0/1.


```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# spanning-tree state enable
ZEQUOxxxxRE(config-if)#
```

14.1.8 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 the auto-computed path cost.

Syntax

- spanning-tree cost *COST*
- no spanning-tree cost

Parameters

Parameters	description
<i>COST</i>	Specifies the path cost for the port. The range is from 1 to 2000000000.

Default

The default path cost is computed from the interface's bandwidth setting.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

In the RSTP or STP-compatible mode, the administrative path cost is used by the single spanning-tree to accumulate the path cost to reach the Root. In the MSTP mode, the administrative path cost is used by the CIST regional root to accumulate the path cost to reach the CIST root.

Example

This example shows how to configure the port cost to 20000 for GigabitEthernet1/0/7.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/7
ZEQUOxxxxRE(config-if)# spanning-tree cost 20000
ZEQUOxxxxRE(config-if)#
```

14.1.9 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.

Syntax

- spanning-tree guard root
- no spanning-tree guard root

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

BPDU guard prevents a port from becoming a root port. This feature is useful for the service provider to prevent external bridges to a core region of the network influencing the spanning tree active topology, possibly because those bridges are not under the full control of the administrator.

When a port is guarded from becoming a root port, the port will only play the role as a designated port. If the port receives the configuration BPDU with a higher priority, the port will change to the alternate port, which is in the blocking state. The received superior factor will not participate in the STP computation. The port will listen for BPDUs on the link. If the port times out the received superior BPDU, it will change to the designated port role. When a port changes to the alternate port state, due to the root guard, a system message will be generated. This configuration will take effect for all the spanning-tree versions.

Example

This example shows how to configure to prevent interface GigabitEthernet1/0/1 from being a root port.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# spanning-tree guard root
ZEQUOxxxxRE(config-if)#
```

14.1.10spanning-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.

Syntax

- spanning-tree link-type { point-to-point | shared }
- no spanning-tree link-type

Parameters

Parameters	description
point-to-point	Specifies that the port's link type is point-to-point.
shared	Specifies that the port's link type is a shared media connection.

Default

The link type is automatically derived from the duplex setting unless explicitly configuring the link type.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A full-duplex port is considered to have a point-to-point connection; on the opposite, a half-duplex port is considered to have a shared connection. The port can't transit into forwarding state rapidly by setting link type to shared-media. Hence, auto-determined of link-type by the STP module is recommended. This configuration will take effect for all the spanning-tree modes.

Example

This example shows how to configure the link type to point-to-point for port GigabitEthernet1/0/7.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/7
ZEQUOxxxxRE(config-if)# spanning-tree link-type point-to-point
ZEQUOxxxxRE(config-if)#
```

14.1.11spanning-tree mode

This command is used to configure the STP mode. Use the **no** form of this command to revert to the default setting.

Syntax

- spanning-tree mode {mstp | rstp | stp}
- no spanning-tree mode

Parameters

Parameters	description
mstp	Specifies the Multiple Spanning Tree Protocol (MSTP).
rstp	Specifies the Rapid Spanning Tree Protocol (RSTP).
stp	Specifies the Spanning Tree Protocol (IEEE 802.1D Compatible)

Default

By default, this mode is RSTP.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If the mode is configured as STP or RSTP, all currently running MSTP instances will be cancelled automatically. If the newly configured mode is changed from the previous one, the spanning-tree state machine will restart again, therefore all of the stable spanning-tree port states will transit into discarding states.

Example

This example shows how to configure the running version of the STP module to RSTP.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# spanning-tree mode rstp
ZEQUOxxxxRE(config)#
```

14.1.12spanning-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.

Syntax

- spanning-tree portfast {disable | edge | network}
- no spanning-tree portfast

Parameters

Parameters	description
disable	Specifies to set the port to the port fast disabled mode.
edge	Specifies to set the port to the port fast edge mode.
network	Specifies to set the port to the port fast network mode.

Default

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

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

A port can be in one of the following three port fast modes:

- **Edge mode** - The port will directly change to the spanning-tree forwarding state when a link-up occurs without waiting for the forward-time delay. If the interface receives a BPDU later, its operation state changes to the non-port-fast state.
- **Disable mode** - The port will always be in the non-port-fast state. It will always wait for the forward-time delay to change to forwarding state.
- **Network mode** - The port will remain in the non-port-fast state for three seconds. The port will change to the port-fast state if no BPDU is received and changes to the forwarding state. If the port received the BPDU later, it will change to the non-port-fast state

This command should be used with caution. Otherwise, an accidental topology loop and data-packet loop may be generated and disrupt the network operation.

Example

This example shows how to configure port GigabitEthernet1/0/7 to the port-fast edge mode.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/7
ZEQUOxxxxRE(config-if)# spanning-tree portfast edge
ZEQUOxxxxRE(config-if)#
```

14.1.13spanning-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.

Syntax

- spanning-tree port-priority *PRIORITY*
- no spanning-tree port-priority

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

The port priority and the port number together form the Port Identifier. It will be used in the computation of the role of the port. This parameter is used only in the RSTP and STP-compatible mode. A smaller number represents a better priority.

Example

This example shows how to configure the port priority to 0 for port GigabitEthernet1/0/7.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/7
ZEQUOxxxxRE(config-if)# spanning-tree port-priority 0
ZEQUOxxxxRE(config-if)#
```

14.1.14spanning-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 revert to the default setting.

Syntax

- spanning-tree priority *PRIORITY*
- no spanning-tree priority

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

The bridge priority value is one of the two parameters used to select the Root Bridge. The other parameter is system's MAC address. The bridge's priority value must be divisible by 4096 and a smaller number represents a better priority. This configuration will take effect on STP version and RSTP mode. In the MSTP mode, use the command **spanning-tree mst priority** to configure the priority for an MSTP instance.

Example

This example shows how to configure the STP bridge priority value to 4096.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# spanning-tree priority 4096
ZEQUOxxxxRE(config)#
```


14.1.15 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.

Syntax

- **spanning-tree tcnfilter**
- **no spanning-tree tcnfilter**

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Enabling TC filtering on a port is useful for an ISP to prevent the external bridge to a core region of the network, causing address flushing in that region, possibly because those bridges are not under the full control of the administrator.

When a port is set to the TCN filter mode, the TC event received by the port will be ignored. This configuration will take effect for all the spanning-tree modes.

Example

This example shows how to configure TCN filtering on port GigabitEthernet1/0/7.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/7
ZEQUOxxxxRE(config-if)# spanning-tree tcnfilter
ZEQUOxxxxRE(config-if)#
```

14.1.16 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.

Syntax

- spanning-tree tx-hold-count *VALUE*
- no spanning-tree tx-hold-count

Parameters

Parameters	description
<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.

Command Default Level

Level: 12.

Usage Guideline

This command specifies the number of hold BPDUs to transmit. The transmission of BPDUs on a port is controlled by a counter. The counter is incremented on every BPDU transmission and decremented once a second. The transmissions are paused for one second if the counter reaches the transmit hold count.

Example

This example shows how to configure the transmit hold count value to 5.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# spanning-tree tx-hold-count 5
ZEQUOxxxxRE(config)#
```

14.1.17 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.

Syntax

- spanning-tree forward-bpdu
- no spanning-tree forward-bpdu

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

If enabled, the received STP BPDU will be forwarded to all VLAN member ports in the untagged form. The command does not take effect if the Layer 2 protocol tunnel is enabled for STP.

Example

This example shows how to enable the forwarding of STP BPDUs.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/2
ZEQUOxxxxRE(config-if)# spanning-tree forward-bpdu
ZEQUOxxxxRE(config-if)#
```

14.2 MSTP (Multiple Spanning Tree Protocol) Commands

14.2.1 spanning-tree mst configuration

This command is used to enter the MST configuration mode and configure the MSTP region. Use the **no** form of this command to revert all settings in the MST configuration mode to the default settings.

Syntax

- spanning-tree mst configuration
- no spanning-tree mst configuration

Parameters

None.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enter the MST configuration mode.

Example

This example shows how to enter the MST configuration mode.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#spanning-tree mst configuration
ZEQUOxxxxRE(config-mst)#
```

14.2.2 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).

Syntax

- **instance** *INSTANCE-ID* **vlan** *VLAN-ID* [, | -]
- **no instance** *INSTANCE-ID* [**vlan** *VLAN-ID* [, | -]]

Parameters

Parameters	description
<i>INSTANCE-ID</i>	Specifies the MSTP instance identifier that is mapped with the specified VLANs. The value is from 1 to 64.
<i>VLAN-ID</i>	Specifies the VLAN ID to be configured.
,	(Optional) Specifies a series of VLANs, or separate a range of VLANs from a previous range. No space is allowed before and after the comma.
-	(Optional) Specifies a range of VLANs. No space is allowed before and after the hyphen.

Default

By default, all VLANs are mapped with the CIST (instance 0).

Command Mode

MST Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to map VLANs to an MST instance. When mapping VLANs to a MST instance, the instance will be created automatically if the instance does not exist.

Example

This example shows how to map VLANs to an MST instance.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#spanning-tree mst configuration
ZEQUOxxxxRE(config-mst)#instance 2 vlans 1-100
ZEQUOxxxxRE(config-mst)#
```

14.2.3 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.

Syntax

- name *NAME*
- no name

Parameters

Parameters	description
<i>NAME</i>	Specifies the name for the MST region. The maximum length is 32 characters.

Default

By default, the name is the bridge MAC address.

Command Mode

MST Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the name of an MST region. When more than one switch with the same VLAN mapping and configuration version number, but with different region names, they are considered to be in different MST regions.

Example

This example shows how to configure the name of the MST region as "MSTP".

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#spanning-tree mst configuration
ZEQUOxxxxRE(config-mst)#name MSTP
ZEQUOxxxxRE(config-mst)#
```

14.2.4 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.

Syntax

- **revision** *REVISION*
- **no revision**

Parameters

Parameters	description
<i>REVISION</i>	Specifies the different revision level when the name is the same. The value is from 0 to 65535.

Default

By default, the value is 0.

Command Mode

MST Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the revision number for the MST configuration. When more than one switch with the same configuration but different revision numbers, they are considered to be in different MST regions.

Example

This example shows how to configure the revision number for the MST configuration to "2".

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#spanning-tree mst configuration
ZEQUOxxxxRE(config-mst)#revision 2
ZEQUOxxxxRE(config-mst)#
```

14.2.5 spanning-tree mst

This command is used to configure the path cost and port priority for the MST instance. Use the **no** form of this command to revert to the default settings.

Syntax

- **spanning-tree mst** *INSTANCE-ID* {**cost** *COST* | **port-priority** *PRIORITY*}
- **no spanning-tree mst** *INSTANCE-ID* {**cost** | **port-priority**}

Parameters

Parameters	description
<i>INSTANCE-ID</i>	Specifies the MSTP instance identifier. The value is from 0 to 64. The value 0 represents the default instance, CIST.
cost <i>COST</i>	Specifies the path cost of the instance. The value is from 0 to 200000000.
port-priority <i>PRIORITY</i>	Specifies the port priority of the instance. The value is from 0 to 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.

Command Default Level

Level: 12.

Usage Guideline

This command is only available for the physical ports.

Example

This example shows how to configure the interface path cost.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/3
ZEQUOxxxxRE(config-if)#spanning-tree mst 0 cost 17031970
ZEQUOxxxxRE(config-if)#
```

This example shows how to configure the port priority.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface gil/0/3
ZEQUOxxxxRE(config-if)#spanning-tree mst 0 port-priority 64
ZEQUOxxxxRE(config-if)#
```

14.2.6 spanning-tree mst max-hops

This command is used to configure the MSTP maximum hop count. Use the **no** form of this command to revert to the default setting.

Syntax

- spanning-tree mst max-hops *HOP-COUNT*
- no spanning-tree mst max-hops

Parameters

Parameters	description
<i>HOP-COUNT</i>	Specifies the MSTP maximum hop count. The value is from 1 to 40.

Default

By default the MSTP maximum hop count is 20.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the MSTP maximum hop count.

Example

This example shows how to configure the MSTP maximum hop count.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#spanning-tree mst max-hops 19
ZEQUOxxxxRE(config)#
```

14.2.7 spanning-tree mst hello-time

This command is used to configure the hello time used in MSTP version for each port. Use the **no** form of this command to revert to the default setting.

Syntax

- spanning-tree mst hello-time *SECONDS*
- no spanning-tree mst hello-time

Parameters

Parameters	description
<i>SECONDS</i>	Specifies the interval of sending one BPDU at the designated port. The range is from 1 to 2 seconds.

Default

By default, the hello-time is 2 seconds.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to configure the hello time used in MSTP version for each port. This only takes effects in the MSTP mode.

Example

This example shows how to configure the hello time used in MSTP version for gi1/0/1.

```
ZEQUOxxxxRE(config)#interface gi1/0/1
ZEQUOxxxxRE(config-if)#spanning-tree mst hello-time 1
ZEQUOxxxxRE(config-if)#
```

14.2.8 spanning-tree mst priority

This command is used to configure the bridge priority for the specified MSTP. Use the **no** form of this command to revert to the default setting.

Syntax

- **spanning-tree mst** *INSTANCE-ID* **priority** *PRIORITY*
- **no spanning-tree mst** *INSTANCE-ID* **priority**

Parameters

Parameters	description
<i>INSTANCE-ID</i>	Specifies the MSTP instance identifier. The value is from 0 to 8. The value 0 represents the default instance, CIST.
<i>PRIORITY</i>	Specifies that the bridge priority. The range is from 0 to 61440.

Default

By default, this value is 32768.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The bridge priority value must be divisible by 4096.

Example

This example shows how to configure the bridge priority value for MSTP instance 2.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#spanning-tree mst 2 priority 0
ZEQUOxxxxRE(config)#
```

14.3 BPDU Guard Commands

14.3.1 spanning-tree bpdu-guard (global)

This command is used to enable the BPDU guard function globally. Use the **no** form of this command to revert to the default setting.

Syntax

- spanning-tree bpdu-guard
- no spanning-tree bpdu-guard

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

In a network, customers do not want all ports of devices to receive STP packets, because some ports that receive STP BPDU packets will cause system resources to be wasted.

If ports are not expected to receive BPDU packets, the BPDU guard function will prevent those ports from receiving BPDU packets. The port where the BPDU guard function is enabled will enter a protection state (drop/block/shutdown) when it receives a STP BPDU packet.

There are 3 mode behaviors when the Switch detects BPDU attacks:

- **Drop** - The Switch drops received STP BPDU packets only, and the port is placed in the normal state.

- **Block** - The Switch drops all received BPDU packets and blocks all data, and the port is placed in the normal state.
- **Shutdown** - The Switch shuts down the port, and the port is placed the error-disabled state.

Example

This example shows how to enable the BPDU guard function globally.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# spanning-tree bpdu-guard
ZEQUOxxxxRE(config)#
```

14.3.2 spanning-tree bpdu-guard (Interface)

This command is used to enable the BPDU guard function on a port. Use the **no** form of this command to disable the BPDU guard function on the port.

Syntax

- spanning-tree bpdu-guard { drop | block | shutdown }
- no spanning-tree bpdu-guard

Parameters

Parameters	description
drop	Specifies to drop all received BPDU packets when the interface enters the attacked state.
block	Specifies to drop all packets (include BPDU and normal packets) when the interface enters the attacked state.
shutdown	Specifies to shut down the interface when the interface enters the attacked state.

Default

By default, this option is disabled.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable and configure the BPDU guard operational mode. This command is available for the port and port channel interface configuration.

Example

This example shows how to enable the BPDU Protection function with block mode on GigabitEthernet1/0/1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface gil/0/1
ZEQUOxxxxRE(config-if)# spanning-tree bpdu-guard block
ZEQUOxxxxRE(config-if)#
```

14.3.3 show spanning-tree bpdu-guard

This command is used to display BPDU guard information.

Syntax

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

Parameters

Parameters	description
interface <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.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display BPDU guard information. If no interface ID is specified, information of all interfaces will be displayed.

Example

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

```
ZEQUOxxxxRE#show spanning-tree bpdu-guard
```

```
Global State:      Enabled

Interface          State      Mode      Status
-----
Gil/0/1            Enabled   Block     Normal
Gil/0/2            Disabled  Shutdown  Normal
Gil/0/3            Disabled  Shutdown  Normal
Gil/0/4            Disabled  Shutdown  Normal
Gil/0/5            Disabled  Shutdown  Normal
Gil/0/6            Disabled  Shutdown  Normal
Gil/0/7            Disabled  Shutdown  Normal
Gil/0/8            Disabled  Shutdown  Normal
Gil/0/9            Disabled  Shutdown  Normal
Gil/0/10           Disabled  Shutdown  Normal
Gil/0/11           Disabled  Shutdown  Normal
Gil/0/12           Disabled  Shutdown  Normal
Gil/0/13           Disabled  Shutdown  Normal
Gil/0/14           Disabled  Shutdown  Normal
Gil/0/15           Disabled  Shutdown  -
Gil/0/16           Disabled  Shutdown  -
Gil/0/17           Disabled  Shutdown  -
Gil/0/18           Disabled  Shutdown  -
Gil/0/19           Disabled  Shutdown  Normal
--More--
```

This example shows how to display the BPDU guard status of GigabitEthernet1/0/1.

```
ZEQUOxxxxRE#show spanning-tree bpdu-guard interface gil/0/1
```

```
Interface          State      Mode      Status
-----
Gil/0/1            Enabled   Block     Normal

ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Interface	Indicates a port channel or a physical port which is not a member of the port channel.
State	Indicates the interface's configuration state.
Mode	Indicates the operation mode of the interface.

Parameters	description
Status	Under attack: BPDU guard is enabled and STP BPDU is detected. Normal: BPDU guard is enabled and STP BPDU is not detected.

14.3.4 snmp-server enable traps stp-bpdu-guard

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

Syntax

- snmp-server enable traps stp-bpdu-guard
- no snmp-server enable traps stp-bpdu-guard

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable or disable the sending of SNMP notifications for BPDU guard.

Example

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

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#snmp-server enable traps stp-bpdu-guard
ZEQUOxxxxRE(config)#
```

14.4 RRP (Ring Redundant Protocol) Commands

14.4.1 rrp enable

This command is used to enable the RRP global state. Use the **no** form of this command to revert to the default the function

Syntax

- rrp enable
- no rrp enable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command enable the RRP global state. Both the RRP global state and RRP domain must be enabled to have RRP working.

Example

This example shows how to enable the RRP global state.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# rrp enable
ZEQUOxxxxRE(config)#
```

14.4.2 timer

This command is used to configure the timer for the RRP domain. Use the **no** form of this command to revert to the default settings.

Syntax

- timer { polling-interval *SECONDS* | fail-period *SECONDS* }
- no timer { polling-interval | fail-period }

Parameters

Parameters	description
polling-interval <i>SECONDS</i>	Specifies the hello time of the RRP domain.
fail-period <i>SECONDS</i>	Specifies the fail time of the RRP domain.

Default

The default hello time is 1 second.
The default fail time is 2 seconds.

Command Mode

RRP Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the timer for the RRP domain. The fail time should be longer than the hello time. If no optional parameter is specified in the no form of this command, both timers will be revert to the default settings.

Example

This example shows how to configure the hello time to 2 seconds and the fail time to 5 seconds.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#rrp domain dom1
ZEQUOxxxxRE(config-rrp)#timer polling-interval 2
ZEQUOxxxxRE(config-rrp)#timer fail-period 5
ZEQUOxxxxRE(config-rrp)#
```

14.4.3 rrp domain

This command is used to create or configure an RRP domain, and enter the RRP configuration mode. Use the **no** form of this command to delete the specified RRP domain.

Syntax

- **rrp domain** *DOMAIN_NAME*
- **no rrp domain** *DOMAIN_NAME*

Parameters

Parameters	description
<i>DOMAIN_NAME</i>	Specifies the name of the RRP domain with a maximum of 25 characters.

Default

None.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to create, modify or delete an RRP domain, and enter the RRP configuration mode. One domain name represents a physical ring. The Switch supports 8 RRP domains.

Example

This example shows how to create a RRP domain called "dom1".

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#rrp domain dom1
ZEQUOxxxxRE(config-rrp)#
```

14.4.4 control-vlan-id

This command is used to specify the VLAN to be used as control VLAN of the RRP domain. Use the **no** form of this command to remove the configuration.

Syntax

- control-vlan-id *VLAN-ID*
- no control-vlan-id

Parameters

Parameters	description
<i>VLAN-ID</i>	Specifies the VLAN ID to be used. The range is from 2 to 4094.

Default

None.

Command Mode

RRP Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

All nodes of one domain have one control VLAN, and different domains have different control VLANs. The control frame will be sent by using control VLAN. Control VLAN must be newly created, not be displayed or not be operated.

Example

This example shows how to configure control VLAN for the domain called "dom1"

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#rrp domain dom1
ZEQUOxxxxRE(config-rrp)#control-vlan-id 3
ZEQUOxxxxRE(config-rrp)#
```

14.4.5 data-vlan-id

This command is used to configure VLANs protected by the RRP mechanism. Use the **no** form of this command to delete VLANs

Syntax

- **data-vlan-ids** *VLAN-ID* [, | -]
- **no data-vlan-ids** *VLAN-ID* [, | -]

Parameters

Parameters	description
<i>VLAN-ID</i>	Specifies the VLAN ID to be configured. The 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 and after the hyphen

Default

None.

Command Mode

RRP Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure or delete VLANs protected by the RRP mechanism.

Example

This example shows how to configure VLANs protected by the RRP mechanism.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#rrp domain dom1
ZEQUOxxxxRE(config-rrp)#data-vlan-ids 100-200
ZEQUOxxxxRE(config-rrp)#
```

14.4.6 type

This command is used to configure the node type.

Syntax

- type {master |transit}

Parameters

Parameters	description
master	Specifies the node as the domain master node. Each RRP domain has one single master node. The master node is responsible for ring polling and ring restoration.
transit	Specifies the node as the domain transit node. Each RRP domain can have multiple transit nodes. The transit node is responsible for link-down alert.

Default

None.

Command Mode

RRP Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the node type.

Example

This example shows how to configure the node type to master for the domain called "dom1".

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#rrp domain dom1
ZEQUOxxxxRE(config-rrp)#type master
ZEQUOxxxxRE(config-rrp)#
```

14.4.7 primary-port

This command is used to configure the first ring port of the RRP domain. Use the **no** form of this command to remove the first ring port.

Syntax

- primary-port interface *INTERFACE-ID*
- no primary-port

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	Specifies the interface to be used. The interface can be physical port or port-channel interface.

Default

None.

Command Mode

RRP Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the first ring port of the RRP domain.

Example

This example shows how to configure the GigabitEthernet1/0/4 as the first ring port.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#rrp domain dom1
ZEQUOxxxxRE(config-rrp)#primary-port interface gil/0/4
ZEQUOxxxxRE(config-rrp)#
```

14.4.8 secondary-port

This command is used to configure the second ring port of the RRP domain. Use the **no** form of this command to remove the second ring port.

Syntax

- secondary-port interface *INTERFACE-ID*
- no secondary-port

Parameters

Parameters	description
interface <i>INTERFACE-ID</i>	Specifies the interface to be used. The interface can be physical port or port-channel interface.

Default

None.

Command Mode

RRP Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to configure the second ring port of the RRP domain.

Example

This example shows how to configure the GigabitEthernet1/0/2 as the second ring port.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#rrp domain dom1
ZEQUOxxxxRE(config-rrp)#secondary-port interface gil/0/2
ZEQUOxxxxRE(config-rrp)#
```

14.4.9 ring-guard-port

This command is used to specify the ring guard enabled port. Use the **no** form of this command to disable the function.

Syntax

- ring-guard-port {primary |secondary |both}
- no ring-guard-port

Parameters

Parameters	description
primary	Specifies the primary port as the ring guard enabled port.
secondary	Specifies the secondary port as the ring guard enabled port.
both	Specifies both the primary and secondary ports as the ring guard enabled ports.

Default

By default, this option is disabled.

Command Mode

RRP Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to specify the ring guard enabled port. When the link of the ring guard enabled port is down, other ports become Blocking.

Example

This example shows how to specify the primary port as the ring guard enabled port.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#rrp domain dom1
ZEQUOxxxxRE(config-rrp)#ring-guard-port primary
ZEQUOxxxxRE(config-rrp)#
```

14.4.10domain

This command is used to enable or disable the RRP domain.

Syntax

- domain enable
- domain disable

Parameters

None.

Default

By default, this option is disabled.

Command Mode

RRP Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Ring ports, control VLAN, data VLAN, and the node type must be configured before the RRP domain is enabled.

Example

This example shows how to enable the RRP domain, dom1.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#rrp domain dom1
ZEQUOxxxxRE(config-rrp)#domain enable
ZEQUOxxxxRE(config-rrp)#
```

14.4.11show rrp

This command is used to display the RRP information.

Syntax

- **show rrp** [*DOMAIN_NAME*]

Parameters

Parameters	description
<i>DOMAIN_NAME</i>	(Optional) Specifies the name of the RRP domain.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the RRP information.

Example

This example shows how to display the RRP information.

```
ZEQUOxxxxRE#show rrp

RRP Status : Enabled
Total Domain Number(s) : 1

Domain Name  Ctrl VLAN  Data VLAN(s)                Ring Status
-----
dom1         3          100-200                     Complete

ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
Domain Name	The RRP domain name.
Ctrl VLAN	All nodes of the domain have this VLAN. The control frame MUST be sent by using control VLAN. Each RRP Domain can only have one control VLAN. The 802.1Q priority of the control frame sent on this VLAN is 7 (highest).
Data VLAN(s)	All nodes of the domain have this type of VLAN. The non-control frame MUST be sent by using data VLAN. One domain can have multiple data VLANs. VLAN IDs may be overlapped in each RRP Domain.
Ring Status	The ring status of the master node can have the following status. IDLE: When the RRP function is disabled, the status is IDLE. Complete When the node decides "Ring Topology", the status is Complete. Failed: When the node decides "non-Ring topology", the status is Failed. The ring status of the transit node can have the following status. IDLE: When the RRP function is disabled, the status is IDLE. Link-Up When the link of both Primary and Secondary Ports is Up, the status is Link-Up. Link-Down When the link of either Primary Port or Secondary Port is down, the status is Link-Down. Pre-Fowarding: When the link-down port is restored, the status is Pre-Forwarding while "Ring topology" is restored.

Example

This example shows how to display the RRP information of dom1.

```
ZEQUOxxxxRE#show rrp dom1
```

```
RRP Domain Name      : dom1
RRP Domain Status    : Enabled
RRP Node Type        : Master
RRP Ring Status      : Complete
```

```
Primary Port         : Gi1/0/1
Primary Port Status  : Down
Primary Port Role     : None
```

```
Secondary Port       : Gi1/0/2
Secondary Port Status : Down
Secondary Port Role   : None
```

```
Polling Interval     : 2
Fail Period           : 5
```

```
Ring Guard Port      : Primary
```

```
Control VLAN         : 3
Data VLAN(s)         : 100-200
```

```
ZEQUOxxxxRE#
```

Display Parameters

Parameters	description
RRP Domain Name	The RRP domain name.
RRP Domain Status	Displays that the RRP domain status is enabled or disabled.
RRP Node Type	Displays that the RRP node type is master or transit.

Parameters	description
RRP Ring Status	The ring status of the master node can have the following status. IDLE: When the RRP function is disabled, the status is IDLE. Complete When the node decides "Ring Topology", the status is Complete. Failed: When the node decides "non-Ring topology", the status is Failed. The ring status of the transit node can have the following status. IDLE: When the RRP function is disabled, the status is IDLE. Link-Up When the link of both Primary and Secondary Ports is Up, the status is Link-Up. Link-Down When the link of either Primary Port or Secondary Port is down, the status is Link-Down. Pre-Forwarding: When the link-down port is restored, the status is Pre-Forwarding while "Ring topology" is restored.
Primary Port	The first ring port of the domain node. The primary port is forwarding in normal operation.
Secondary Port	The secondary ring port of the domain node. If the master node detects a ring fault, it unblocks its secondary port and allows Ethernet data frames to pass through that port.
Primary/Secondary Port Status	unknown: RRP Domain is not set. Blocking: The control frame is received but the non-control frame is not received. Down: This port is link-down. Forwarding: This port receives all frames and forwards.
Primary/Secondary Port Role	Upstream: This port is shortest to the port status of Forwarding in the master node and receives the control frame of Health Check. Downstream: This port is the furthest to the port status of Forwarding in the master node and sends the control frame of Health Check.
Polling Interval	The interval that the master node sends the control frame of Health Check.
Fail Period	When the master node does not receive the control frame of Health Check by this time, the master node judges non-Ring topology.
Control VLAN	All nodes of the domain have this VLAN. The control frame MUST be sent by using control VLAN. Each RRP Domain can only have one control VLAN. The 802.1Q priority of the control frame sent on this VLAN is 7 (highest).
Data VLAN(s)	All nodes of the domain have this type of VLAN. The non-control frame MUST be sent by using data VLAN. One domain can have multiple data VLANs. VLAN IDs may be overlapped in each RRP Domain.

14.5 VRRP (Virtual Router Redundancy Protocol) Commands

VRRP is a function to group multiple routers (VRRP group) and manage routers in a group as one virtual router. It is used to multiplex routers for disaster planning. A virtual IP address and a virtual MAC address are assigned to a VRRP group, and other devices on the network communicate with the virtual router through the virtual address.

Routers in a VRRP are divided into one master router which actually performs routing, and other backup routers. They are automatically allocated based on the priority settings through information exchanges between VRRP enabled routers. If the master router fails, one of the backup routers automatically becomes the master router.

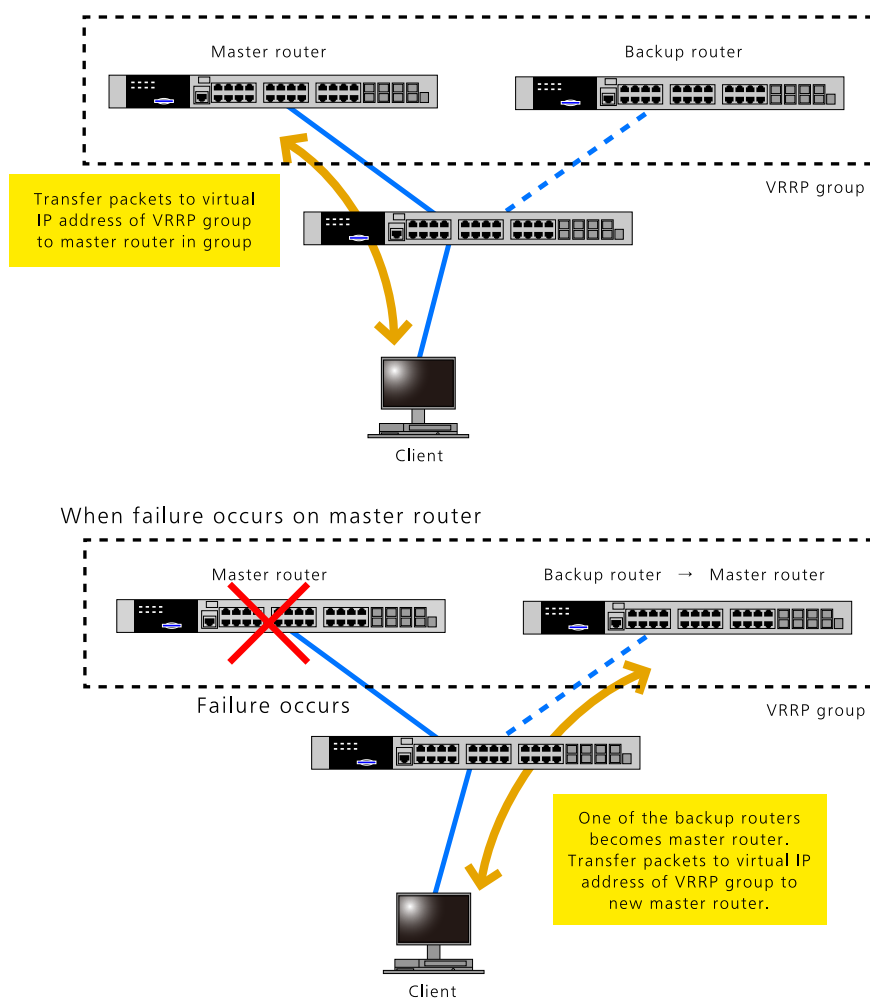


Figure 92-1 VRRP overview

14.5.1 snmp-server enable traps vrrp

This command is used to enable the VRRP trap function in SNMP. Use the **no** form of this command to disable this function.

Syntax

- `snmp-server enable traps vrrp [new-master] [auth-fail]`
- `no snmp-server enable traps vrrp [new-master] [auth-fail]`

Parameters

Parameters	description
new-master	(Optional) Specifies the new master trap status that will be configured. If the trap status is enabled, once the device has transitioned to the master state, a trap will be sent out.
auth-fail	(Optional) Specifies the authentication failure trap status that will be configured. If the trap status is enabled, if a packet has been received from a router whose authentication key or authentication type conflicts with this router's authentication key or authentication type, then a trap will be sent out.

Default

By default, this feature is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Use this command to enable the VRRP trap state. If no option is specified, then both trap types are enabled or disabled at the same time.

Example

This example shows how to enable the VRRP new master trap state.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# snmp-server enable traps vrrp new-master
ZEQUOxxxxRE(config)#
```

14.5.2 vrrp authentication

This command is used to enable VRRP authentication and set the password on an interface. Use the **no** form of this command to remove the authentication.

Syntax

- **vrrp authentication** *STRING*

- no vrrp authentication

Parameters

Parameters	description
<i>STRING</i>	Specifies the plain text authentication password. This string can be up to 8 characters long.

Default

By default, no authentication is used.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to enable VRRP authentication on an interface. The authentication is applied to all virtual routers on this interface. The devices in the same VRRP group must have the same authentication password.

Example

This example shows how to configure one interface's VRRP authentication:

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan 1
ZEQUOxxxxRE(config-if)# vrrp authentication test
ZEQUOxxxxRE(config-if)#
```

14.5.3 vrrp ip

This command is used to create a VRRP group on an interface. Use the **no** form of this command to remove a VRRP group.

Syntax

- vrrp *VRID* ip *IP-ADDRESS*
- no vrrp *VRID*

Parameters

Parameters	description
<i>VRID</i>	Specifies the virtual router identifier that identifies the VRRP group. The valid range is from 1 to 255.
<i>IP-ADDRESS</i>	Specifies the IP address for the created virtual router group.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command creates a virtual router and specifies the IP address for the virtual router. All routers in the same VRRP group must be configured with the same virtual router ID and IP address.

A virtual router group is represented by a virtual router ID. The IP address of the virtual router is the default router configured on hosts. The virtual router's IP address can be a real address configured on the routers, or an unused IP address. If the virtual router address is a real IP address, the router that has this IP address is the IP address owner.

A master will be elected in a group of routers that supports the same virtual routers. Others are the backup routers. The master is responsible for forwarding the packets that are sent to the virtual router.

Example

This example shows how to create a VRRP group on interface VLAN 1. The virtual router identifier is 7, and 10.1.1.1 is the IP address of the virtual router.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# vrrp 7 ip 10.1.1.1
ZEQUOxxxxRE(config-if)#
```

14.5.4 vrrp priority

This command is used to configure the priority of the virtual router. Use the **no** form of this command to revert to the default setting.

Syntax

- **vrrp** *VRID* **priority** *PRIORITY*
- **no vrrp** *VRID* **priority**

Parameters

Parameters	description
<i>VRID</i>	Specifies the virtual router identifier. The range of value is from 1 to 255.
<i>PRIORITY</i>	Specifies the priority of the virtual router. The range of value is from 1 to 254.

Default

By default, the priority value is 100.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The master of a VRRP group is elected based on the priority. The virtual router with the highest priority becomes the master and others with lower priorities act as the backup for the VRRP group. If there are multiple routers with the same highest priority value, the router with the larger IP address will become the master.

The router that is the IP address owner of the VRRP group is always the master of the VRRP group, and has the highest priority 255.

Example

This example shows how to configure the priority of the virtual router to 200.

```
ZEQUOxxxxRE#configure terminal
ZEQUOxxxxRE(config)#interface vlan 1
ZEQUOxxxxRE(config-if)#vrrp 1 priority 200
ZEQUOxxxxRE(config-if)#
```

14.5.5 vrrp non-owner-ping

This command is used to enable the virtual router in the master state to respond to ICMP echo requests for an IP address not owned but associated with this virtual router. Use the **no** form of this command to disable the response.

Syntax

- vrrp non-owner-ping
- no vrrp non-owner-ping

Parameters

None.

Default

By default, this option is disabled.

Command Mode

Global Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

In some conditions, the virtual router in the master state needs to response ICMP echo requests for an IP address that is not owned by this virtual router.

Example

This example shows how to enable all virtual routers to respond to ICMP echo requests.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# vrrp non-owner-ping
ZEQUOxxxxRE(config)#
```

14.5.6 vrrp timers advertise

This command is used to configure the interval between successive VRRP advertisements by the master router. Use the **no** form of this command to revert to the default setting.

Syntax

- **vrrp** *VRID* **timers advertise** *INTERVAL*
- **no vrrp** *VRID* **timers advertise**

Parameters

Parameters	description
<i>VRID</i>	Specifies the virtual router identifier that identifies the VRRP group. The valid range is from 1 to 255.
<i>INTERVAL</i>	Specifies the time interval between successive advertisements by the master router. The unit of the interval is in seconds. The valid value is from 1 to 255.

Default

By default, this value is 1 second.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

The maser will constantly send VRRP advertisements to communicate the related information of the current master virtual router. This command configures the interval between advertisement packets and the time before other routers declare the master router as down. All routers in a VRRP group must use the same timer values.

Example

This example shows how to configure the router to send advertisements for VRRP 7 every 10 seconds on interface VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# vrrp 7 timers advertise 10
ZEQUOxxxxRE(config-if)#
```

14.5.7 vrrp preempt

This command is used to allow a router to take over the master role if it has a better priority than the current master. Use the **no** form of this command to change back to non-preempt mode.

Syntax

- **vrrp** *VRID* **preempt**
- **no vrrp** *VRID* **preempt**

Parameters

Parameters	description
<i>VRID</i>	Specifies the virtual router identifier that identifies the VRRP group. The valid range is from 1 to 255.

Default

By default, the preempt mode is used.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

In preempt mode, a router will take over the master role if it has a better priority than the current master.

In non-preempt mode, the master will not be preempted unless the incoming router is the IP address owner of the virtual router.

Example

This example shows how to configure the router for VRRP group 7 to preempt the current master router when its priority is higher than that of the current master router.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan1
ZEQUOxxxxRE(config-if)# vrrp 7 preempt
ZEQUOxxxxRE(config-if)#
```

14.5.8 vrrp shutdown

This command is used to disable a virtual router on an interface. Use the **no** form of this command to revert to the default setting.

Syntax

- vrrp *VRID* shutdown
- no vrrp *VRID* shutdown

Parameters

Parameters	description
<i>VRID</i>	Specifies the virtual router identifier that identifies the VRRP group. The valid range is from 1 to 255.

Default

By default, a virtual router is enabled after being created.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

Avoid the common mistake of shutting down the IP address owner router before shutting down other non-owner routers.

Example

This example shows how to disable one VRRP VRID 1 on interface VLAN 1 while retaining the VRRP VRID 2.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan 1
ZEQUOxxxxRE(config-if)# vrrp 1 shutdown
ZEQUOxxxxRE(config-if)# no vrrp 2 shutdown
ZEQUOxxxxRE(config-if)#
```

14.5.9 vrrp track critical-ip

This command is used to configure the critical IP address of a virtual router. Use the **no** form of this command to remove the critical IP address.

Syntax

- **vrrp** *VRID* **track critical-ip** *IP-ADDRESS*
- **no vrrp** *VRID* **track critical-ip**

Parameters

Parameters	description
<i>VRID</i>	Specifies the virtual router identifier that identifies the VRRP group. The valid range is from 1 to 255.
<i>IP-ADDRESS</i>	Specifies the critical IP address.

Default

None.

Command Mode

Interface Configuration Mode.

Command Default Level

Level: 12.

Usage Guideline

This command is used to set the critical IP address for one virtual router. If the critical IP is configured on one virtual router, the virtual router cannot be activated when the critical IP address is unreachable. One VRRP group can only track one critical IP.

Example

This example shows how to configure the critical IP address of virtual router 1 on VLAN 1.

```
ZEQUOxxxxRE# configure terminal
ZEQUOxxxxRE(config)# interface vlan 1
ZEQUOxxxxRE(config-if)# vrrp 1 track critical-ip 192.168.100.1
ZEQUOxxxxRE(config-if)#
```

14.5.10show vrrp

This command is used to display the VRRP settings and status.

Syntax

- show vrrp [interface *INTERFACE-ID* [*VRID*]]

Parameters

Parameters	description
<i>INTERFACE-ID</i>	(Optional) Specifies the interface ID.
<i>VRID</i>	(Optional) Specifies the virtual router identifier that identifies the VRRP group. The valid range is from 1 to 255.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display the VRRP related setting and status.

Example

This example shows how to display the VRRP status for all interfaces.

```
ZEQUOxxxxRE#show vrrp

vlan1 - Group 7
  State is Init
  Virtual IP Address is 10.1.1.1
  Virtual MAC Address is 00-00-5E-00-01-07
  Advertisement interval is 10 seconds
  Preemption is enabled
  Priority is 100
  Authentication is enabled
  Authentication Text is test
  No critical IP address
  Master Router is 192.168.70.124

Total Entries: 1
ZEQUOxxxxRE#
```

14.5.11show vrrp brief

This command is used to display the VRRP brief information.

Syntax

- show vrrp brief

Parameters

None.

Default

None.

Command Mode

User/Privileged EXEC Mode.

Command Default Level

Level: 1.

Usage Guideline

Use this command to display VRRP brief status.

Example

This example shows how to display the brief VRRP information.

```
ZEQUOxxxxRE#show vrrp brief
```

Interface	VRID	Pri	Owner	Pre	State	Master IP	VRouter IP
-----	-----	---	-----	---	-----	-----	-----
vlan1	7	100		Y	Init	192.168.70.124	10.1.1.1

Total Entries: 1

```
ZEQUOxxxxRE#
```

15 Appendix - System Log

15.1 Appendix - System Log Entries

15.1.1 802.1X

ID	Log Description	Severity
1.	Event Description: 802.1X Authentication successful. Log Message: [802.1X](<method>) Authorized user <username> (<macaddr>) on Port <portNum> to VLAN <vid> Parameters Description: method: Indicates local or RADIUS. username: The user that is being authenticated. macaddr: The MAC address of the authenticated device. portNum: The switch port number. vid: The authorized VLAN ID.	Informational
2.	Event Description: 802.1X Authentication failure. Log Message: [802.1X](<method>)Rejected user <username> (<macaddr>) on Port <portNum> Parameters Description: method: local or RADIUS. username: TIndicateshe user that is being authenticated. macaddr: The MAC address of the authenticated device. portNum: The switch port number.	Notice
3.	Event Description: The 802.1X authentication table full, cannot authenticate new address. Log Message: [802.1X]Rejected <macaddr> on Port <portNum> (auth table was full) Parameters Description: macaddr: The MAC address of the authenticated device. portNum: The switch port number.	Notice

15.1.2 AAA

ID	Log Description	Severity
1.	Event Description: Successful login. Log Message: Successful login through <Console Telnet SSH>(Username: <username>, IP: <ipaddr ipv6address>) Parameters Description: ipaddr: The IP address. username: The user name. ipv6address: The IPv6 address.	Informational
2.	Event Description: Login failed. Log Message: Login failed through <Console Telnet SSH> (Username: <username>, IP: <ipaddr ipv6address>) Parameters Description: ipaddr: The IP address. username: The user name. ipv6address: The IPv6 address.	Warning
3.	Event Description: Logout. Log Message: Logout through <Console Telnet SSH> (Username: <username>, IP: <ipaddr ipv6address>) Parameters Description: ipaddr: The IP address. username: The user name. ipv6address: The IPv6 address.	Informational
4.	Event Description: Session timed out. Log Message: <Console Telnet > session timed out (Username: <username>, IP: <ipaddr ipv6address>) Parameters Description: ipaddr: The IP address. username: The user name. ipv6address: The IPv6 address.	Informational
5.	Event Description: SSH server is enabled. Log Message: SSH server is enabled	Informational
6.	Event Description: SSH server is disabled. Log Message: SSH server is disabled	Informational
7.	Event Description: Authentication Policy is enabled. Log Message: Authentication Policy is enabled (Module: AAA)	Informational
8.	Event Description: Authentication Policy is disabled. Log Message: Authentication Policy is disabled (Module: AAA)	Informational
9.	Event Description: Login failed due to AAA server timeout or improper configuration. Log Message: Login failed through <Console Telnet SSH> from <ipaddr ipv6address> due to AAA server <ipaddr ipv6address> timeout or improper configuration (Username: <username>) Parameters Description: ipaddr: The IP address. ipv6address: The IPv6 address. username: The user name.	Warning

ID	Log Description	Severity
10.	Event Description: Successful Enable Admin authenticated by AAA local or none or server. Log Message: Successful Enable Admin through <Console Telnet SSH> from <ipaddr ipv6address> authenticated by AAA <local none server <ipaddr ipv6address>> (Username: <username>) Parameters Description: local: Enable admin by AAA local method. none: Enable admin by AAA none method. server: Enable admin by AAA server method. ipaddr: The IP address. ipv6address: The IPv6 address. username: The user name.	Informational
11.	Event Description: Enable Admin failed due to AAA server timeout or improper configuration. Log Message: Enable Admin failed through <Console Telnet SSH> from <ipaddr ipv6address> due to AAA server <ipaddr ipv6address> timeout or improper configuration (Username: <username>) Parameters Description: ipaddr: The IP address. ipv6address: The IPv6 address. username: The user name.	Warning
12.	Event Description: Enable Admin failed authenticated by AAA local or server. Log Message: Enable Admin failed through <Console Telnet SSH> from <ipaddr ipv6address> authenticated by AAA <local server <ipaddr ipv6address>> (Username: <username>) Parameters Description: local: Enable admin by AAA local method. server: Enable admin by AAA server method. ipaddr: The IP address. ipv6address: The IPv6 address. username: The user name.	Warning
13.	Event Description: Successful login authenticated by AAA local or none or server. Log Message: Successful login through <Console Telnet SSH> from <ipaddr ipv6address> authenticated by AAA <local none server <ipaddr ipv6address>> (Username: <username>) Parameters Description: local: Specify AAA local method. none: Specify none method. server: Specify AAA server method. ipaddr: The IP address. ipv6address: The IPv6 address. username: The user name.	Informational
14.	Event Description: Login failed authenticated by AAA local or server. Log Message: Login failed through <Console Telnet SSH> from <ipaddr ipv6address> authenticated by AAA <local server <ipaddr ipv6address>> (Username: <username>) Parameters Description: local: Specify AAA local method. server: Specify AAA server method. ipaddr: The IP address. ipv6address: The IPv6 address. username: The user name.	Warning

15.1.3 ARP

ID	Log Description	Severity
1.	Event Description: Gratuitous ARP detected duplicate IP. Log Message: Conflict IP was detected with this device (IP: <ipaddr>, MAC: <macaddr>, Port <[unitID:]portNum>, Interface: <ipif_name>) Parameters Description: ipaddr: The IP address which is duplicated with our device. macaddr: The MAC address of the device that has duplicated IP address as our device. unitID: 1.Interger value; 2.Represent the id of the device in the stacking system. portNum: 1.Interger value; 2.Represent the logic port number of the device. ipif_name: The name of the interface of the switch which has the conflict IP address.	Warning

15.1.4 Authentication (2-step)

ID	Log Description	Severity
1.	Event Description: 2-step Authentication successful. Log Message: [<step-mode>] (<method>) Authorized user <username> (<macaddr>) on Port <portNum> to VLAN <vid> Parameters Description: step-mode: Indicates 2-step authentication mode. method: Indicates local or RADIUS. username: The user that is being authenticated. macaddr: The MAC address of the authenticated device. portNum: The switch port number. vid: The authorized VLAN ID.	Informational
2.	Event Description: MAC-WEB Authentication failures. Log Message: [MAC-WEB] (<method>) Rejected at MAC auth <macaddr> on Port <portNum> Parameters Description: method: Indicates local or RADIUS. macaddr: The MAC address of the authenticated device. portNum: The switch port number.	Notice
3.	Event Description: MAC-WEB Authentication failures. Log Message: [MAC-WEB] (<method>) Rejected at WEB auth user <username> (<macaddr>) on Port <portNum> Parameters Description: method: Indicates local or RADIUS. username: The user that is being rejected. macaddr: The MAC address of the authenticated device. portNum: The switch port number.	Notice
4.	Event Description: MAC-802.1X Authentication failures. Log Message: [MAC-802.1X] (<method>) Rejected at MAC auth <macaddr> on Port <portNum> Parameters Description: method: Indicates local or RADIUS. macaddr: The MAC address of the authenticated device. portNum: The switch port number.	Notice
5.	Event Description: MAC-802.1X Authentication failures. Log Message: [MAC-802.1X] (<method>) Rejected at 802.1X auth user <username> (<macaddr>) on Port <portNum> Parameters Description: method: Indicates local or RADIUS. username: The user that is being rejected. macaddr: The MAC address of the authenticated device. portNum: The switch port number.	Notice
6.	Event Description: 802.1X-WEB Authentication failures. Log Message: [802.1X-WEB] (<method>) Rejected at 802.1X auth user <username> (<macaddr>) on Port <portNum> Parameters Description: method: Indicates local or RADIUS. username: The user that is being rejected. macaddr: The MAC address of the authenticated device. portNum: The switch port number.	Notice

ID	Log Description	Severity
7.	Event Description: 802.1 X-WEB Authentication failures. Log Message: [802.1X-WEB] (<method>) Rejected at WEB auth user <username> (<macaddr>) on Port <portNum> Parameters Description: method: Indicates local or RADIUS. username: The user that is being rejected. macaddr: The MAC address of the authenticated device. portNum: The switch port number.	Notice

15.1.5 BPDU Guard

ID	Log Description	Severity
1.	Event Description: BPDU attack happened. Log Message: Port<portNum> enter BPDU under attacking state (mode: drop / block / shutdown) Parameters Description: portNum: The port number. mode: The BPDU current state.	Informational
2.	Event Description: BPDU attack automatically recover. Log Message: Port <portNum> recover from BPDU under attacking state automatically Parameters Description: portNum: The port number.	Informational
3.	Event Description: BPDU attack manually recover. Log Message: Port<portNum> recover from BPDU under attacking state manually Parameters Description: portNum: The port number.	Informational

15.1.6 Command

ID	Log Description	Severity
1.	Event Description: Command Logging Log Message: "<command-str>" executed by <username> from <line>[, IP: <ip-address>] Parameters Description: username: The account name which executed this command. command-str: The command string which was executed successfully and cause a change in switch configuration. line: This parameter indicates the line mode which this command is executed from. (e.g. console, telnet, SSH) ip-address: (Optional) If the command is inputted from remote terminal (e.g. telnet, SSH), this parameter is needed.	Informational

15.1.7 Configuration/Firmware

ID	Log Description	Severity
1.	Event description: Firmware upgraded successfully. Log Message: [Unit <unitID>,]Firmware upgraded by <session> successfully (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Informational
2.	Event description: Firmware upgraded unsuccessfully. Log Message: [Unit <unitID>,]Firmware upgraded by <session> unsuccessfully (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Warning
3.	Event description: Firmware uploaded successfully. Log Message: [Unit <unitID>,]Firmware uploaded by <session> successfully (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Informational
4.	Event description: Firmware uploaded unsuccessfully. Log Message: [Unit <unitID>,]Firmware uploaded by <session> unsuccessfully (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Warning

ID	Log Description	Severity
5.	Event description: Configuration downloaded successfully. Log Message: [Unit <unitID>,]Configuration downloaded by <session> successfully. (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Informational
6.	Event description: Configuration downloaded unsuccessfully. Log Message: [Unit <unitID>,]Configuration downloaded by <session> unsuccessfully. (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Warning
7.	Event description: Configuration uploaded successfully. Log Message: [Unit <unitID>,]Configuration uploaded by <session> successfully. (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Informational
8.	Event description: Configuration uploaded unsuccessfully. Log Message: [Unit <unitID>,]Configuration uploaded by <session> unsuccessfully. (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Warning

ID	Log Description	Severity
9.	Event description: Unknown type files downloaded unsuccessfully. Log Message: [Unit <unitID>,]Downloaded by <session> unsuccessfully. (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>], Server IP: <serverIP>, File Name: <pathFile>) Parameters description: unitID: The unit ID. session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address. serverIP: Server IP address. pathFile: Path and file name on server.	Warning
10.	Event description: Log message uploaded successfully. Log Message: Log message uploaded by <session> successfully. (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>]) Parameters description: session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address.	Informational
11.	Event description: Log message uploaded unsuccessfully. Log Message: Log message uploaded by <session> unsuccessfully. (Username: <username>[, IP: <ipaddr>, MAC: <macaddr>]) Parameters description: session: The user's session. username: Represent current login user. ipaddr: Represent client IP address. macaddr : Represent client MAC address.	Informational

15.1.8 DAD

ID	Log Description	Severity
1.	Event description: When DUT receives Neighbor Solicitation (NS) message with reduplicated address in the DAD duration, DUT will add a log. Log Message: Duplicate address <ipv6address> on <interface-id> via receiving Neighbor Solicitation Messages Parameters description: ipv6address : ipv6 address in Neighbor Solicitation Messages. interface-id : port interface ID.	Warning
2.	Event description: When DUT receives Neighbor Advertisement (NA) message with reduplicated address in the DAD duration, DUT will add a log. Log Message: Duplicate address <ipv6address> on <interface-id> via receiving Neighbor Advertisement Messages Parameters description: ipv6address : ipv6 address in Neighbor Advertisement Messages. interface-id : port interface ID.	Warning

15.1.9 DDM

ID	Log Description	Severity
1.	Event description: when the any of SFP parameters exceeds from the warning threshold. Log Message: Optical transceiver <interface-id> <component> <high-low> warning threshold exceeded Parameters description: interface-id: port interface ID. component: DDM threshold type. It can be one of the following types: temperature supply voltage bias current TX power RX power high-low: High or low threshold.	Warning
2.	Event description: when the any of SFP parameters exceeds from the alarm threshold. Log Message: Optical transceiver <interface-id> <component> <high-low> alarm threshold exceeded Parameters description: interface-id: port interface ID. component: DDM threshold type. It can be one of the following types: temperature supply voltage bias current TX power RX power high-low: High or low threshold.	Critical
3.	Event description: when the any of SFP parameters recovers from the warning threshold. Log Message: Optical transceiver <interface-id> <component> back to normal Parameters description: interface-id: port interface ID. component: DDM threshold type. It can be one of the following types: temperature supply voltage bias current TX power RX power	Warning

15.1.10 Debug Error

ID	Log Description	Severity
1.	Event description: system fatal error lead to reboot system. Log Message: [Uint <unitID>] System re-start reason: system fatal error Parameters description: unitID: The unit ID.	Emergencies
2.	Event description: CPU exception lead to reboot system. Log Message: [Uint <unitID>] System re-start reason: CPU exception Parameters description: unitID: The unit ID.	Emergencies

15.1.11DHCPv6 Client

ID	Log Description	Severity
1.	Event description: DHCPv6 client interface administrator state changed. Log Message: DHCPv6 client on interface <ipif-name> changed state to [enabled disabled] Parameters description: <ipif-name>: Name of the DHCPv6 client interface.	Informational
2.	Event description: DHCPv6 client obtains an ipv6 address from a DHCPv6 server. Log Message: DHCPv6 client obtains an ipv6 address < ipv6address > on interface <ipif-name> Parameters description: ipv6address: ipv6 address obtained from a DHCPv6 server. ipif-name: Name of the DHCPv6 client interface.	Informational
3.	Event description: The ipv6 address obtained from a DHCPv6 server starts renewing. Log Message: The IPv6 address < ipv6address > on interface <ipif-name> starts renewing Parameters description: ipv6address: ipv6 address obtained from a DHCPv6 server. ipif-name: Name of the DHCPv6 client interface.	Informational
4.	Event description: The ipv6 address obtained from a DHCPv6 server renews success. Log Message: The IPv6 address < ipv6address > on interface <ipif-name> renews success Parameters description: ipv6address: ipv6 address obtained from a DHCPv6 server. ipif-name: Name of the DHCPv6 client interface.	Informational
5.	Event description: The ipv6 address obtained from a DHCPv6 server starts rebinding. Log Message: The IPv6 address < ipv6address > on interface <ipif-name> starts rebinding Parameters description: ipv6address: ipv6 address obtained from a DHCPv6 server. ipif-name: Name of the DHCPv6 client interface.	Informational
6.	Event description: The ipv6 address obtained from a DHCPv6 server rebinds success. Log Message: The IPv6 address < ipv6address > on interface <ipif-name> rebinds success Parameters description: ipv6address: ipv6 address obtained from a DHCPv6 server. ipif-name: Name of the DHCPv6 client interface.	Informational
7.	Event description: The ipv6 address from a DHCPv6 server was deleted. Log Message: The IPv6 address < ipv6address > on interface <ipif-name> was deleted Parameters description: ipv6address: ipv6 address obtained from a DHCPv6 server. ipif-name: Name of the DHCPv6 client interface.	Informational

ID	Log Description	Severity
8.	Event description: DHCPv6 client PD interface administrator state changed. Log Message: DHCPv6 client PD on interface <intf-name> changed state to <enabled disabled> Parameters description: intf-name: Name of the DHCPv6 client PD interface.	Informational
9.	Event description: DHCPv6 client PD obtains an IPv6 prefix from a delegation router. Log Message: DHCPv6 client PD obtains an ipv6 prefix < ipv6networkaddr> on interface <intf-name> Parameters description: ipv6networkaddr: ipv6 prefix obtained from a delegation router. intf-name: Name of the DHCPv6 client PD interface.	Informational
10.	Event description: The IPv6 prefix obtained from a delegation router starts renewing. Log Message: The IPv6 prefix < ipv6networkaddr > on interface <intf-name> starts renewing Parameters description: ipv6networkaddr: IPv6 prefix obtained from a delegation router. intf-name: Name of the DHCPv6 client PD interface.	Informational
11.	Event description: The IPv6 prefix obtained from a delegation router renews success. Log Message: The IPv6 prefix < ipv6networkaddr > on interface <intf-name> renews success Parameters description: ipv6networkaddr: IPv6 prefix obtained from a delegation router. intf-name: Name of the DHCPv6 client PD interface.	Informational
12.	Event description: The IPv6 prefix obtained from a delegation router starts rebinding. Log Message: The IPv6 prefix < ipv6networkaddr > on interface <intf-name> starts rebinding Parameters description: ipv6address: IPv6 prefix obtained from a delegation router. intf-name: Name of the DHCPv6 client PD interface.	Informational
13.	Event description: The IPv6 prefix obtained from a delegation router rebinds success. Log Message: The IPv6 prefix < ipv6networkaddr > on interface <intf-name> rebinds success Parameters description: ipv6address: IPv6 prefix obtained from a delegation router. intf-name: Name of the DHCPv6 client PD interface.	Informational
14.	Event description: The IPv6 prefix from a delegation router was deleted. Log Message: The IPv6 prefix < ipv6networkaddr > on interface <intf-name> was deleted Parameters description: ipv6address: IPv6 prefix obtained from a delegation router. intf-name: Name of the DHCPv6 client PD interface.	Informational

15.1.12DHCPv6 Relay

ID	Log Description	Severity
1.	Event description: DHCPv6 relay on a specify interface's administrator state changed. Log Message: DHCPv6 relay on interface <ipif-name> changed state to [enabled disabled] Parameters description: <ipif-name>: Name of the DHCPv6 relay agent interface.	Informational

15.1.13DHCPv6 Server

ID	Log Description	Severity
1.	Event description: The address of the DHCPv6 Server pool is used up. Log Message: The address of the DHCPv6 Server pool <pool-name> is used up Parameters description: <pool-name>: Name of the DHCPv6 Server pool.	Informational
2.	Event description: The number of allocated ipv6 addresses is equal to MAX-NUM (4096). Log Message: The number of allocated ipv6 addresses of the DHCPv6 Server pool is equal to MAX-NUM	Informational

15.1.14DNS Resolver

ID	Log Description	Severity
1.	Event description: Duplicate Domain name cache added, leads a dynamic domain name cache be deleted Log Message: DUPLICATEDDOMAIN: Duplicate Domain name case name: <domain name>, static IP: <static- ip>, dynamic IP:<dynamic-ip > Parameters description: domain name: the domain name string. ipaddr: IP address.	Informational

15.1.15 Dynamic ARP

ID	Log Description	Severity
1.	Event description: This log will be generated when DAI detect invalid ARP packet. Log Message: Illegal ARP <type> packets (IP: <ip-address>, MAC: <mac-address>, VLAN <vlan-id>, on <interface-id>) Parameters description: type: The type of ARP packet, it indicates that ARP packet is request or ARP response. ip-address: IP address. mac-address: MAC address. vlan-id: The unit ID. interface-id : The interface number.	Warning
2.	Event description: This log will be generated when DAI detect valid ARP packet. Log Message: Legal ARP <type> packets (IP: <ip-address>, MAC: <mac-address>, VLAN <vlan-id>, on <interface-id>) Parameters description: type: The type of ARP packet, it indicates that ARP packet is request or ARP response. ip-address: IP address. mac-address: MAC address. vlan-id: The unit ID. interface-id : The interface number.	Informational

15.1.16Fan

ID	Log Description	Severity
1.	Event description: Back Fan failed. Log Message: Unit <unitID>, Back Fan <value> failed Parameters description: unitID: The unit ID. value : Fans ID.	Critical
2.	Event description: Back Fan recovered. Log Message: Unit <unitID>, Back Fan <value> back to normal Parameters description: unitID: The unit ID. value : Fans ID.	Critical

15.1.17Interface

ID	Log Description	Severity
1.	Event description: Port link up. Log Message: Port <port> link up, <nway> Parameters description: port: Represents the logical port number. nway: Represents the speed and duplex of link.	Informational
2.	Event description: Port link down. Log Message: Port <port> link down Parameters description: port: Represents the logical port number.	Informational

15.1.18IP-Directed Broadcast

ID	Log Description	Severity
1.	Event description: IP Directed-broadcast rate exceed 50 packets per second on a certain subnet. Log Message: IP Directed Broadcast packet rate is high on subnet. [(IP: %s)] Parameters description: IP: The broadcast IP destination address.	Informational
2.	Event description: IP Directed-broadcast rate exceed 100 packets per second. Log Message: IP Directed Broadcast rate is high	Informational

15.1.19IP Source Guard Verify

ID	Log Description	Severity
1.	Event description: This message indicates that no hardware rule resource to set DHCP Snooping entry into IPSG table. Log Message: Failed to set IPSG entry due to no hardware rule resource. (IP: <IPADDR>, MAC: <MACADDR>, VID: <VLANID>, Interface <INTERFACE-ID>) Parameters description: IPADDR: IP address MACADDR: MAC address VLANID: The VLAN VID INTERFACE-ID : The interface number	Warning

15.1.20LACP

ID	Log Description	Severity
1.	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 up aggregation group.	Informational
2.	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
3.	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
4.	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

15.1.21LLDP-MED

ID	Log Description	Severity
1.	Event description: LLDP-MED topology change detected. Log Message: LLDP-MED topology change detected (on port <portNum>. chassis id: <chassisType>, <chassisID>, port id: <portType>, <portID>, device class: <deviceClass>) Parameters description: portNum: The port number. chassisType: chassis ID subtype. Value list: 1. chassisComponent(1) 2. interfaceAlias(2) 3. portComponent(3) 4. macAddress(4) 5. networkAddress(5) 6. interfaceName(6) 7. local(7) chassisID: chassis ID. portType: port ID subtype. Value list: 1. interfaceAlias(1) 2. portComponent(2) 3. macAddress(3) 4. networkAddress(4) 5. interfaceName(5) 6. agentCircuitId(6) 7. local(7) portID: port ID. deviceClass: LLDP-MED device type.	Notice

ID	Log Description	Severity
2.	Event description: Conflict LLDP-MED device type detected. Log Message: Conflict LLDP-MED device type detected (on port < portNum >, chassis id: < chassisType>, <chassisID>, port id: < portType>, <portID>, device class: <deviceClass>) Parameters description: portNum: The port number. chassisType: chassis ID subtype. Value list: 1. chassisComponent(1) 2. interfaceAlias(2) 3. portComponent(3) 4. macAddress(4) 5. networkAddress(5) 6. interfaceName(6) 7. local(7) chassisID: chassis ID. portType: port ID subtype. Value list: 1. interfaceAlias(1) 2. portComponent(2) 3. macAddress(3) 4. networkAddress(4) 5. interfaceName(5) 6. agentCircuitId(6) 7. local(7) portID: port ID. deviceClass: LLDP-MED device type.	Notice
3.	Event description: Incompatible LLDP-MED TLV set detected. Log Message: Incompatible LLDP-MED TLV set detected (on port < portNum >, chassis id: < chassisType>, <chassisID>, port id: < portType>, <portID>, device class: <deviceClass>) Parameters description: portNum: The port number. chassisType: chassis ID subtype. Value list: 1. chassisComponent(1) 2. interfaceAlias(2) 3. portComponent(3) 4. macAddress(4) 5. networkAddress(5) 6. interfaceName(6) 7. local(7) chassisID: chassis ID. portType: port ID subtype. Value list: 1. interfaceAlias(1) 2. portComponent(2) 3. macAddress(3) 4. networkAddress(4) 5. interfaceName(5) 6. agentCircuitId(6) 7. local(7) portID: port ID. deviceClass: LLDP-MED device type.	Notice

15.1.22 Loop Detection

ID	Log Description	Severity
1.	Event description: The loop detected between 2 ports or 2 LACP interfaces. Log Message: The loop detected between port/port-channel <portNum> and <portNum> Parameters description: portNum: The port number or LACP interface id.	Warning
2.	Event description: The loop detected on 1 port or 1 LACP interface. Log Message: The loop detected on port/port-channel <portNum> Parameters description: portNum: The port number or LACP interface id.	Warning
3.	Event description: The loop detected between 1 port and 1 LACP interface. Log Message: The loop detected between port/port-channel <portNum> and port/port-channel <portNum> Parameters description: portNum: The port number or port-channel number.	Warning
4.	Event description: Looped port or LACP interface auto recovery. Log Message: Port/Port-channel <portNum> auto recovery Parameters description: portNum: The port number or LACP interface id.	Informational

15.1.23 MAC-based Access Control

ID	Log Description	Severity
1.	Event description: MAC authentication successful. Log Message: [MAC](<method>)Authorized <macaddr> on Port <portNum> to VLAN <vid> Parameters description: method: Indicates local or RADIUS. macaddr: The MAC address of the authenticated device. portNum: The switch port number. vid: The authorized VLAN ID.	Informational
2.	Event description: MAC authentication failure. Log Message: [MAC](<method>)Rejected <macaddr> on Port <portNum> Parameters description: method: Indicates local or RADIUS. macaddr: The MAC address of the authenticated device. portNum: The switch port number.	Notice
3.	Event description: The MAC authentication table full, cannot authenticate new address. Log Message: [MAC]Rejected <macaddr> on Port <portNum> (auth table was full) Parameters description: macaddr: The MAC address of the authenticated device. portNum: The switch port number.	Notice

15.1.24MSTP Debug Enhancement

ID	Log Description	Severity
1.	Event description: Topology changed. Log Message: Topology changed (Instance : <Instance-id>,<interface-id>, MAC:<macaddr>) Parameters description: Instance-id: Instance ID. interface-id: Port ID. macaddr: MAC address.	Notice
2.	Event description: Spanning Tree new Root Bridge. Log Message: [CIST CIST Regional MSTI Regional] New Root bridge selected ([Instance: <Instance-id>] MAC: <macaddr> Priority :< priority>) Parameters description: Instance-id : Instance ID. macaddr: MAC address. priority: Priority value.	Notice
3.	Event description: Spanning Tree Protocol is enabled. Log Message: Spanning Tree Protocol is enabled	Informational
4.	Event description: Spanning Tree Protocol is disabled. Log Message: Spanning Tree Protocol is disabled	Informational
5.	Event description: New root port. Log Message: New root port selected (Instance:<instance-id>, <interface-id >) Parameters description: instance-id: Instance ID. interface-id: Port ID.	Notice
6.	Event description: Spanning Tree port status changed. Log Message: Spanning Tree port status change (Instance :< instance-id>, <interface-id>) <old-status> -> <new-status> Parameters description: instance-id: Instance ID. interface-id: Port ID. old_status: Old status. new_status: New status.	Notice
7.	Event description: Spanning Tree port role changed. Log Message: Spanning Tree port role change (Instance :< instance-id>, <interface-id>) <old-role> -> <new-role> Parameters description: instance-id: Instance ID. interface-id: Port ID. old_role: Old role. new_status: New role.	Informational
8.	Event description: Spanning Tree instance created. Log Message: Spanning Tree instance created. (Instance :< instance-id>) Parameters description: instance-id: Instance ID.	Informational
9.	Event description: Spanning Tree instance deleted. Log Message: Spanning Tree instance deleted. (Instance :< instance-id >) Parameters description: instance-id: Instance ID.	Informational

ID	Log Description	Severity
10.	Event description: Spanning Tree Version changed. Log Message: Spanning Tree version change (new version :< new-version>) Parameters description: new_version: New STP version.	Informational
11.	Event description: Spanning Tree MST configuration ID name and revision level changed. Log Message: Spanning Tree MST configuration ID name and revision level change (name :< name>, revision level <revision-level>) Parameters description: name : New name. revision_level: New revision level.	Informational
12.	Event description: Spanning Tree MST configuration ID VLAN mapping table deleted. Log Message: Spanning Tree MST configuration ID VLAN mapping table change (instance: < instance-id > delete vlan <startvlanid> [- <endvlanid>]) Parameters description: instance-id: Instance ID. startvlanid-endvlanid: VLAN list.	Informational
13.	Event description: Spanning Tree MST configuration ID VLAN mapping table added. Log Message: Spanning Tree MST configuration ID VLAN mapping table change (instance: < instance-id > add vlan <startvlanid> [- <endvlanid>]) Parameters description: instance-id: Instance ID. startvlanid-endvlanid: VLAN list.	Informational
14.	Event description: Spanning Tree role changed due to the guard root function. Log Message: Spanning Tree port role change (Instance : < instance-id >, <interface-id>) to alternate port due to the guard root Parameters description: instance-id: Instance ID. interface-id: Port ID.	Informational

15.1.25OSPF[ZEQUO6700RE/6600RE]

ID	Log Description	Severity
1.	Event description: OSPF interface link state changed. Log Message: OSPF-6-INTFSTATECHANGE: OSPF interface <intf-name> changed state to <status> Parameters description: intf-name: Name of OSPF interface. Status: Up or down.	Informational
2.	Event description: OSPF interface administrator state changed. Log Message: OSPF-6-INTFADMINCHANGE: OSPF protocol on interface <intf-name> changed state to <status> Parameters description: intf-name: Name of OSPF interface. Status: Enabled or disabled.	Informational
3.	Event description: One OSPF interface changed from one area to another. Log Message: OSPF-6-INTFAREACHANGE: OSPF interface <intf-name> changed from area <area-id> to area <area-id> Parameters description: intf-name: Name of OSPF interface. area-id: OSPF area ID.	Informational
4.	Event description: One OSPF neighbor state changed from Loading to Full. Log Message: OSPF-5-NBRLOADINGTOFULL: OSPF nbr <nbr-id> on interface <intf-name> changed state from Loading to Full Parameters description: intf-name: Name of OSPF interface. nbr-id: Neighbor's router ID.	Notice
5.	Event description: One OSPF neighbor state changed from Full to Down. Log Message: OSPF-5-NBRFULLTODOWN: OSPF nbr <nbr-id> on interface <intf-name> changed state from Full to Down Parameters description: intf-name: Name of OSPF interface. nbr-id: Neighbor's router ID.	Notice
6.	Event description: One OSPF neighbor state's dead timer expired. Log Message: OSPF-5-DTIMEXPIRED: OSPF nbr <nbr-id> on interface <intf-name> dead timer expired Parameters description: intf-name: Name of OSPF interface. nbr-id: Neighbor's router ID.	Notice
7.	Event description: One OSPF virtual neighbor state changed from Loading to Full. Log Message: OSPF-5-VNBRLOADINGTOFULL: OSPF nbr <nbr-id> on virtual link changed state from Loading to Full Parameters description: nbr-id: Neighbor's router ID.	Notice
8.	Event description: One OSPF virtual neighbor state changed from Full to Down. Log Message: OSPF-5-VNBRFULLTODOWN: OSPF nbr <nbr-id> on virtual link changed state from Full to Down Parameters description: nbr-id: Neighbor's router ID.	Notice

ID	Log Description	Severity
9.	Event description: OSPF router ID was changed. Log Message: OSPF-6-RIDCHANGE: OSPF router ID changed to <router-id> Parameters description: router-id: OSPF router ID.	Informational
10.	Event description: OSPF state change. Log Message: OSPF-6-STATECHANGE: OSPF state changed to <state> Parameters description: state: Enabled or disabled.	Informational

15.1.26Port Security

ID	Log Description	Severity
1.	Event description: Address full on a port Log Message: MAC address <mac-address> causes port security violation on <interface-id> Parameters description: macaddr: The violation MAC address. interface-id: The interface on which the violation occur.	Warning
2.	Event description: Address full on system. Log Message : Limit on system entry number has been exceeded	Warning

15.1.27RADIUS

ID	Log Description	Severity
1.	Event description: This log will be generated when RADIUS assigned a valid VLAN ID attributes. Log Message: RADIUS server <server-ip> assigned VID: <vid> to port <interface-id> (Username: <username>) Parameters description: server-ip: It indicates the RADIUS server IP address. vid: The assign VLAN ID that authorized by from RADIUS server. interface-id: It indicates the port number of the client authenticated. username: It indicates the username for authentication.	Informational
2.	Event description: This log will be generated when RADIUS assigned a valid bandwidth attributes. Log Message: RADIUS server <server-ip> assigned <direction> bandwidth: <threshold> to port < interface-id> (Username: <username>) Parameters description: server-ip: It indicates the RADIUS server IP address. direction: It indicates the direction for bandwidth control, e.g.: ingress or egress. threshold: The assign threshold of bandwidth that authorized by from RADIUS server. interface-id: It indicates the port number of the client authenticated. username: It indicates the username for authentication.	Informational
3.	Event description: This log will be generated when RADIUS assigned a valid priority attributes. Log Message: RADIUS server <server-ip> assigned 802.1p default priority: <priority> to port < interface-id> (Username: <username>) Parameters description: server-ip: It indicates the RADIUS server IP address. priority: The assign priority that authorized by from RADIUS server. interface-id: It indicates the port number of the client authenticated. username: It indicates the username for authentication.	Informational
4.	Event description: This log will be generated when RADIUS assigned ACL script but fails to apply to the system due to insufficient resource. Log Message: RADIUS server <server-ip> assigns <username> ACL failure at port < interface-id> (<acl-script>) Parameters description: server-ip: It indicates the RADIUS server IP address. username: It indicates the username for authentication. interface-id: It indicates the port number of the client authenticated. acl-script: The assign ACL script that authorized by from RADIUS server.	Warning
5.	Event description: This log will be generated when fail to assign access-list number. Log Message: Local assigns [USERNAME] filter-id ID failure at port INTERFACE-ID Parameters description: username: It indicates the username for authentication. filter-id: It indicates access-list number. interface-id: It indicates the port number of the client authenticated.	Warning

15.1.28RRP

ID	Log Description	Severity
1.	Event description: The status in "Master Node" changes from "Failed" to "Complete." Log Message: Ring topology was recovered to complete	Notice
2.	Event description: The status in "Master Node" changes from "Complete" to "Failed." Log Message: Ring topology was failed	Warning
3.	Event description: Master or Transit node flush its Forwarding Database based on RRP packets or state machine. Log Message: FDB was flushed	Informational
4.	Event description: The RRP status in "Transit Node" changes to "Link-Up." Log Message: RRP ring status was changed to Link-Up	Warning
5.	Event description: The RRP status in "Transit Node" changes to "Link-Down." Log Message: RRP ring status was changed to Link-Down	Notice
6.	Event description: The RRP status in "Transit Node" changes to "Pre-Forwarding". Log Message: RRP ring status was changed to Pre-Forwarding	Informational
7.	Event description: Worked ring guard function at the specific domain and port. Log Message: Ring Guard was activated on "<domain-name>" domain at port <port> Parameters description: <domain name>: target domain name. <port num>: target port number worked ring guard function.	Informational

15.1.29SNMP

ID	Log Description	Severity
1.	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

15.1.30 Stacking

ID	Log Description	Severity
1.	Event description: Hot insertion. Log Message: Unit: <unitID>, MAC: <macaddr> Hot insertion Parameters description: unitID: Box ID. Macaddr: MAC address.	Informational
2.	Event description: Hot removal. Log Message: Unit: <unitID>, MAC: <macaddr> Hot removal Parameters description: unitID: Box ID. Macaddr: MAC address.	Informational
3.	Event description: Stacking topology change. Log Message: Stacking topology is <Stack_TP_TYPE>. Master(Unit <unitID>, MAC:<macaddr>) Parameters description: Stack_TP_TYPE: The stacking topology type is one of the following: 1. Ring, 2. Chain. unitID: Box ID. Macaddr: MAC address.	Informational
4.	Event description: Backup master changed to master. Log Message: Backup master changed to master. Master (Unit: <unitID>) Parameters description: unitID: Box ID.	Informational
5.	Event description: Slave changed to master. Log Message: Slave changed to master. Master (Unit: <unitID>) Parameters description: unitID: Box ID.	Informational
6.	Event description: Box ID conflict. Log Message: Hot insert failed, box ID conflict: Unit <unitID> conflict (MAC: <macaddr> and MAC: <macaddr>) Parameters description: unitID: Box ID. macaddr: The MAC addresses of the conflicting boxes.	Critical

15.1.31 System

ID	Log Description	Severity
1.	Event description: System start up. Log Message: [Unit <unitID>,) System started up Parameters description: unitID: The unit ID.	Critical
2.	Event description: Save current configuration to flash. Log Message: [Unit <unitID>,) Configuration saved to flash by console (Username: <username>) Parameters description: unitID: The unit ID. username: The user name.	Informational
3.	Event description: Power fail. Log Message: Unit <unitID> Power <powerID> failed Parameters description: unitID: The unit ID. powerID: The power ID.	Critical
4.	Event description: Power is recovered. Log Message: Unit <unitID> Power <powerID> back to normal Parameters description: unitID: The unit ID. powerID: The power ID.	Critical
5.	Event description: Save system configuration from remote. Log Message: [Unit <unitID>,) Configuration saved to flash (Username: <username>, IP: <ipaddr>) Parameters description: unitID: The unit ID. username: The user name. ipaddr: The ip address.	Informational
6.	Event description: System power up and start up. Log Message: [Unit <unitID>,) System cold start Parameters description: unitID: The unit ID.	Critical
7.	Event description: System reboot and start up. Log Message: [Unit <unitID>,) System warm start Parameters description: unitID: The unit ID.	Critical

15.1.32Telnet

ID	Log Description	Severity
1.	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 user name that used to login telnet server.	Informational
2.	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 user name that used to login telnet server.	Warning
3.	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 user name that used to login telnet server.	Informational
4.	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 user name that used to login telnet server.	Informational

15.1.33Temperature

ID	Log Description	Severity
1.	Event description: Temperature sensor enters alarm state. Log Message: Uint <unitID> Sensor:<sensorID> detects abnormal temperature <temperature> Parameters description: unitID: The unit ID. sensorID: The sensor ID. temperature: The current temperature of the sensor.	Critical
2.	Event description: Temperature recovers to normal. Log Message: Uint <unitID> Sensor:<sensorID> temperature back to normal Parameters description: unitID: The unit ID. sensorID: The sensor ID. temperature: The temperature.	Critical

15.1.34 Traffic Control

ID	Log Description	Severity
1.	Event description: Broadcast, Multicast or Unicast storm occurrence. Log Message: Broadcast Multicast Unicast> storm is occurring on <interface-id> Parameters description: interface-id: The interface ID on which a storm is occurring.	Warning
2.	Event description: Broadcast, Multicast or Unicast storm cleared. Log Message: <Broadcast Multicast Unicast> storm is cleared on <interface-id> Parameters description: interface-id: The interface ID on which a storm is cleared.	Informational
3.	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

15.1.35UDLD

ID	Log Description	Severity
1.	Event description: A unidirectional link is detected on this port. Log Message: Unidirectional link detection on <INTERFACE-ID> Parameters description: INTERFACE-ID: The interface name.	Warning

15.1.36 Voice VLAN

ID	Log Description	Severity
1.	Event description: When a new voice device is detected on an interface. Log Message: New voice device detected (<interface-id>, MAC: < mac-address >) Parameters description: interface-id: Interface name. mac-address: Voice device MAC address	Informational
2.	Event description: When an interface which is in auto voice VLAN mode joins the voice VLAN. Log Message: < interface-id > add into voice VLAN <vid > Parameters description: interface-id: Interface name.s vid: VLAN ID.	Informational
3.	Event description: When an interface leaves the Voice VLAN and at the same time, no voice device is detected in the aging interval for that interface, the log message will be sent. Log Message: < interface-id > remove from voice VLAN <vid > Parameters description: interface-id: Interface name. vid: LAN ID.	Informational

15.1.37VRRP

ID	Log Description	Severity
1.	Event description: One virtual router state becomes Master. Log Message: VRRP-6-STATEMASTER: VR <vr-id> at interface <intf-name> switch to Master role Parameters description: vr-id: VRRP virtual router ID. intf-name: Interface name on which virtual router is based.	Informational
2.	Event description: One virtual router state becomes Backup. Log Message: VRRP-6-STATEBACKUP: VR <vr-id> at interface <intf-name> switch to Backup state Parameters description: vr-id: VRRP virtual router ID. intf-name: Interface name on which virtual router is based.	Informational
3.	Event description: One virtual router state becomes Init. Log Message: VRRP-6-STATEINIT: VR <vr-id> at interface <intf-name> switch to Init state Parameters description: vr-id: VRRP virtual router ID. intf-name: Interface name on which virtual router is based.	Informational
4.	Event description: Authentication type mismatch of one received VRRP advertisement message. Log Message: VRRP-4-AUTHYPEMIS: Authentication type mismatch on VR <vr-id> at interface <intf-name> Parameters description: vr-id: VRRP virtual router ID. intf-name: Interface name on which virtual router is based.	Warning
5.	Event description: Authentication checking fail of one received VRRP advertisement message. Log Message: VRRP-4-AUTHFAIL: Authentication fail on VR <vr-id> at interface <intf-name>. Auth type <auth-type> Parameters description: vr-id: VRRP virtual router ID. intf-name: Interface name on which virtual router is based. Auth-type: VRRP interface authentication type.	Warning
6.	Event description: Checksum error of one received VRRP advertisement message. Log Message: VRRP-4-BADCHK: Received an ADV msg with incorrect checksum on VR <vr-id> at interface <intf-name> Parameters description: vr-id: VRRP virtual router ID. intf-name: Interface name on which virtual router is based.	Warning
7.	Event description: Virtual router ID mismatch of one received VRRP advertisement message. Log Message: VRRP-4-VRIDMIS: Received ADV msg virtual router ID mismatch. VR <vr-id> at interface <intf-name> Parameters description: vr-id: VRRP virtual router ID. intf-name: Interface name on which virtual router is based.	Warning

ID	Log Description	Severity
8.	Event description: Advertisement interval mismatch of one received VRRP advertisement message. Log Message: VRRP-4-ADVMIS: Received ADV msg adv interval mismatch. VR <vr-id> at interface <intf-name> Parameters description: vr-id: VRRP virtual router ID. intf-name: Interface name on which virtual router is based.	Warning
9.	Event description: A virtual MAC address is added into switch L2 table. Log Message: VRRP-5-MACADD: Added a virtual MAC <vrrp-mac-addr> into L2 table Parameters description: vrrp-mac-addr: VRRP virtual MAC address.	Notice
10.	Event description: A virtual MAC address is deleted from switch L2 table. Log Message: VRRP-5-MACDEL: Deleted a virtual MAC <vrrp-mac-addr> from L2 table Parameters description: vrrp-mac-addr: VRRP virtual MAC address.	Notice
11.	Event description: A virtual MAC address is adding into switch L3 table. Log Message: VRRP-5-MACL3ADD: Added a virtual IP <vrrp-ip-addr> MAC <vrrp-mac-addr> into L3 table Parameters description: vrrp-ip-addr: VRRP virtual IP address. vrrp-mac-addr: VRRP virtual MAC address	Notice
12.	Event description: A virtual MAC address is deleting from switch L3 table. Log Message: VRRP-5-MACL3DEL: Deleted a virtual IP <vrrp-ip-addr> MAC <vrrp-mac-addr> from L3 table. Parameters description: vrrp-ip-addr: VRRP virtual IP address vrrp-mac-addr: VRRP virtual MAC address	Notice
13.	Event description: Failed when adding a virtual MAC into switch chip L2 table. Log Message: VRRP-3-MACADDFAIL: Failed to add virtual MAC <vrrp-mac-addr> into chip L2 table. Errcode <vrrp-errcode> Parameters description: vrrp-mac-addr: VRRP virtual MAC address. vrrp-errcode: Errcode of VRRP protocol behavior.	Error
14.	Event description: Failed when deleting a virtual MAC from switch chip L2 table. Log Message: VRRP-3-MACDELFAIL: Failed to delete virtual MAC <vrrp-mac-addr> from chip L2 table. Errcode <vrrp-errcode> Parameters description: vrrp-mac-addr: VRRP virtual MAC address. vrrp-errcode: Errcode of VRRP protocol behavior.	Error
15.	Event description: Failed when adding a virtual MAC into switch L3 table. The L3 table is full. Log Message: VRRP-3-MACL3FULL: Failed to add virtual IP <vrrp-ip-addr> MAC <vrrp-mac-addr> into L3 table. L3 table is full Parameters description: vrrp-ip-addr: VRRP virtual IP address. vrrp-mac-addr: VRRP virtual MAC address.	Error

ID	Log Description	Severity
16.	Event description: Failed when adding a virtual MAC into switch L3 table. The port where the MAC is learned from is invalid. Log Message: VRRP-3-BADMAC: Failed to add virtual IP <vrrp-ip-addr> MAC <vrrp-mac-addr> into L3 table. Port <mac-port> is invalid Parameters description: vrrp-ip-addr: VRRP virtual IP address. vrrp-mac-addr: VRRP virtual MAC address. mac-port: port number of VRRP virtual MAC.	Error
17.	Event description: Failed when adding a virtual MAC into switch L3 table. The interface where the MAC is learned from is invalid. Log Message: VRRP-3-BADINTF: Failed to add virtual IP <vrrp-ip-addr> MAC <vrrp-mac-addr> into L3 table. Interface <mac-intf> is invalid Parameters description: vrrp-ip-addr: VRRP virtual IP address. vrrp-mac-addr: VRRP virtual MAC address. mac-intf: interface id on which VRRP virtual MAC address is based.	Error
18.	Event description: Failed when adding a virtual MAC into switch L3 table. The box where the MAC is learned from is invalid. Log Message: VRRP-3-BADUNIT: Failed to add virtual IP <vrrp-ip-addr> MAC <vrrp-mac-addr> into L3 table. Box id <mac-box> is invalid Parameters description: vrrp-ip-addr: VRRP virtual IP address. vrrp-mac-addr: VRRP virtual MAC address. mac-box: stacking box number of VRRP virtual MAC.	Error
19.	Event description: Failed when adding a virtual MAC into switch chip's L3 table. Log Message: VRRP-3-MACL3ADDFAIL: Failed to add virtual IP <vrrp-ip-addr> MAC <vrrp-mac-addr> into chip L3 table. Errcode <vrrp-errcode> Parameters description: vrrp-ip-addr: VRRP virtual IP address. vrrp-mac-addr: VRRP virtual MAC address. vrrp-errcode: Err code of VRRP protocol behavior.	Error
20	Event description: Failed when deleting a virtual MAC from switch chip's L3 table. Log Message: VRRP-3-MACL3DELFAIL: Failed to delete virtual IP <vrrp-ip-addr> MAC <vrrp-mac-addr> from chip L3 table. Errcode <vrrp-errcode> Parameters description: vrrp-ip-addr: VRRP virtual IP address. vrrp-mac-addr: VRRP virtual MAC address. vrrp-errcode: Err code of VRRP protocol behavior.	Error

15.1.38WAC

ID	Log Description	Severity
1.	Event description: When a client host fails to authenticate. Log Message: [WEB](RADIUS/Local) Rejected user <string> (<macaddr>) on Port <portNum> Parameters description: string: User name. macaddr: MAC address. portNum : The port number.	Warning
2.	Event description: When a client host authenticated successful. Log Message: [WEB](RADIUS/Local)Authorized user <string> (<macaddr>) on Port <portNum> to VLAN <vlanNum> Parameters description: string: User name. macaddr: MAC address. portNum : The port number. vlanNum : The VLAN number.	Informational
3.	Event description: When client table full. Log Message: [WEB]Rejected <macaddr> on Port <portNum> (auth table was full) Parameters description: macaddr: MAC address. portNum : The port number.	Notice

15.1.39Web

ID	Log Description	Severity
1.	Event description: Successful login via web. Log Message: "Successful login through Web (Username: <username>, IP: <ipaddr>)" Parameters description: username: user name. ipaddr: IP address from where user access the switch via web.	Informational
2.	Event description: Login failed via web. Log Message: Login failed through Web (Username: <username>, IP: <ipaddr>)" Parameters description: username: user name. ipaddr: IP address from where user access the switch via web.	Warning
3.	Event description: Successful login from HTTPS. Log Message: Successful login through Web(SSL) (Username: <username>, IP: <ipaddr>) Parameters description: username: user name. ipaddr: IP address from where user access the switch via secure web.	Informational
4.	Event description: login failed via secure web. Log Message: Login failed through Web(SSL) (Username: <username>, IP: <ipaddr>) Parameters description: username: user name. ipaddr: IP address from where user access the switch via secure web.	Warning
5.	Event description: Log upload successfully. Log Message: Log message uploaded by WEB successfully. (Username: <username>, IP: <ipaddr>, MAC: <macaddr>, Server IP: <ipaddr>, File Name: <filename>) Parameters description: username: user name. ipaddr: IP address from where user access the switch. macaddr: MAC address of client. server IP: TFTP server IP address. filename: the log file name.	Informational
6.	Event description: Log upload unsuccessfully. Log Message: Log message uploaded by WEB unsuccessfully. (Username: <username>, IP: <ipaddr>, MAC: <macaddr>, Server IP: <ipaddr>, File Name: <filename>) Parameters description: username: user name. ipaddr: IP address from where user access the switch. macaddr: MAC address of client. server IP: TFTP server IP address. filename: the log file name.	Informational

16 Appendix - System Trap

16.1 Appendix - System Trap Entries

16.1.1 BPDU Guard

ID	Trap Name	Trap Description	OID
1.	mnoBpduProtectionUnderAttackingTrap	BPDU attack happened, enter drop / block / shutdown mode. Binding objects: mnoBpduProtectionPortIndex The port interface. (2) mnoBpduProtectionPortMode Drop / block / shutdown mode.	1.3.6.1.4.1.396.5.5.3.4.0.1
2.	mnoBpduProtectionRecoveryTrap	BPDU attack automatically recover. Binding objects: mnoBpduProtectionPortIndex The port interface. mnoBpduProtectionRecoveryMethod Auto/manual recovers.	1.3.6.1.4.1.396.5.5.3.4.0.2

16.1.2 DDM

ID	Trap Name	Trap Description	OID
1.	mnoDdmAlarmTrap	The trap is sent when any parameter value exceeds the alarm threshold value or recovers to normal status depending on the configuration of the trap action. Binding objects: mnoDdmPort The port number mnoDdmThresholdType The ddm threshold type temperature/voltage/bias/txpower/rxpower mnoDdmThresholdExceedType The threshold that was exceeded was a high alarm threshold or a low alarm threshold (4) mnoDdmThresholdExceedOrRecover The FiberModule is exceeding its ddm threshold or recover to normal status	1.3.6.1.4.1.396.5.5.1.4.0.1
2.	mnoDdmWarningTrap	The trap is sent when any parameter value exceeds the warning threshold value or recovers to normal status depending on the configuration of the trap action. Binding objects: mnoDdmPort The port number mnoDdmThresholdType The ddm threshold type temperature/voltage/bias/txpower/rxpower mnoDdmThresholdExceedType The threshold that was exceeded was a high warning threshold or a low warning threshold (4) mnoDdmThresholdExceedOrRecover The FiberModule is exceeding its ddm threshold or recover to normal status	1.3.6.1.4.1.396.5.5.1.4.0.2

16.1.3 DHCP Server Protect

ID	Trap Name	Trap Description	OID
1.	mnoFilterDetectedTrap	Send trap when an illegal DHCP server is detected. The same illegal DHCP server IP address detected is just sent once to the trap receivers within the log ceasing unauthorized duration. Binding objects: mnoFilterDetectedIP The illegal DHCP server IP address. mnoFilterDetectedport The port interface.	1.3.6.1.4.1.396. 5.5.3.7.0.1

16.1.4 Fan

ID	Trap Name	Trap Description	OID
1.	mnoFanFailure	This notification will send out when the fan failure.	1.3.6.1.4.1.396.5.5.1.1
2.	mnoFanRecovery	This notification will send out when the fan recovery.	1.3.6.1.4.1.396.5.5.1.5

16.1.5 Gratuitous ARP

ID	Trap Name	Trap Description	OID
1.	mnoAgentGratuitousARPTrap	The trap is sent when IP address conflicted. Binding objects: agentGratuitousARPIpAddr The conflicted IP address received in the gratuitous ARP packet. agentGratuitousARPMacAddr The sender's MAC address in the gratuitous ARP packet. agentGratuitousARPPortNumber The switch's port number who received the gratuitous ARP packet. agentGratuitousARPInterfaceName The switch's IP interface name who received the gratuitous ARP.	1.3.6.1.4.1.396.5.5.3.6.0.1

16.1.6 LLDP-MED

ID	Trap Name	Trap Description	OID
1.	IldpRemTablesChange	A IldpRemTablesChange notification is sent when the value of IldpStatsRemTableLastChangeTime changes. Binding objects: (1) IldpStatsRemTablesInserts (2) IldpStatsRemTablesDeletes (3) IldpStatsRemTablesDrops (4) IldpStatsRemTablesAgeouts	1.0.8802.1.1.2.0.0.1
2.	IldpXMedTopologyChangeDetected	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	1.0.8808.1.1.2.1.5.4795.0.1

16.1.7 Loop Detect

ID	Trap Name	Trap Description	OID
1.	mnoLoopDetectNotification	Indicates the network loop occurred.	1.3.6.1.4.1.396.5.5.2.1
2.	mnoLoopRecoveryNotification	Indicates the network loop resolved.	1.3.6.1.4.1.396.5.5.2.2

16.1.8 MAC-based Access Control

ID	Trap Name	Trap Description	OID
1.	mnoMacBasedAccessControlLoggedSuccess	The trap is sent when a MAC-based Access Control host is successfully logged in. Binding objects: mnoMacBasedAuthInfoMacIndex The host MAC addresses. mnoMacBasedAuthInfoPortIndex The port interface. mnoMacBasedAuthVID The VLAN ID.	1.3.6.1.4.1.396.5.5.3.2.0.1
2.	mnoMacBasedAccessControlLoggedFail	The trap is sent when a MAC-based Access Control host login fails. Binding objects: mnoMacBasedAuthInfoMacIndex The host MAC addresses. mnoMacBasedAuthInfoPortIndex The port interface. mnoMacBasedAuthVID The VLAN ID.	1.3.6.1.4.1.396.5.5.3.2.0.2
3.	mnoMacBasedAccessControlAgesOut	The trap is sent when a MAC-based Access Control host ages out. Binding objects: mnoMacBasedAuthInfoMacIndex The host MAC addresses. (2) mnoMacBasedAuthInfoMacIndex The port interface. (3) mnoMacBasedAuthVID The VLAN ID.	1.3.6.1.4.1.396.5.5.3.2.0.3

16.1.9 MAC Notification

ID	Trap Name	Trap Description	OID
1.	mnoL2macNotification	This trap indicates the MAC addresses variation in address table Binding objects: mnoL2macNotifyInfo Devices MAC address change information. And the detailed information include : Operation Code + MAC address + Box ID + Interface ID + Zero. Operation Code: 1, 2 1 means learned a new MAC address 2 means deleted an old MAC address. Box ID: The switch box ID Interface ID: The Interface ID learned or deleted on the box. Zero: Used to separate each message (Operate Code + MAC address + Box ID + Port Number).	1.3.6.1.4.1.396 .5.5.3.1.0.1

16.1.10MSTP

ID	Trap Name	Trap Description	OID
1.	newRoot	The newRoot 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, e.g., 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
2.	topologyChange	A topologyChange trap is sent by a bridge when any of its configured ports transitions from the Learning state to the Forwarding state, or from the Forwarding state to the Blocking state. The trap is not sent if a newRoot trap is sent for the same transition. Implementation of this trap is optional	1,3,6,1,2,1,17.0.2

16.1.11PIM6[ZEQUO6700RE/6600RE]

ID	Trap Name	Trap Description	OID
1.	pimNeighborLoss	A pimNeighborLoss notification signifies the loss of an adjacency with a neighbor. This notification should be generated when the neighbor timer expires, and the router has no other neighbor on the same interface with the same IP version and a lower IP address than itself. This notification is generated whenever the counter pimNeighborLossCount is incremented, subject to the rate limit specified by pimNieghborLossNotificationsPeriod. Binding objects: (1) pimNeighborUpTime	1.3.6.1.2.1.157.0.1
2.	pimInvalidRegister	A pimInvalidRegister notification signifies that an invalid PIM Register message was received by this device. This notification is generated whenever the counter pimInvalidRegisterMsgsRcvd is incremented, subject to the rate limit specified by pimInvalidRegisterNotificationPeriod. Binding objects: (1) pimGroupMappingPimMode (2) pimInvalidRegisterAddressType (3) pimInvalidRegisterOrigin (4) pimInvalidRegisterGroup (5) pimInvalidRegisterRp	1.3.6.1.2.1.157.0.2
3.	pimInvalidJoinPrune	A pimInvalidJoinPrune notification signifies that an invalid PIM Join/Prune message was received by this device. This notification is generated whenever the counter pimInvalidJoinPruneMsgsRcvd is incremented, subject to the rate limit specified by pimInvalidJoinPruneNotificationPeriod. Binding objects: (1) pimGroupMappingPimMode (2) pimInvalidJoinPruneAddressType (3) pimInvalidJoinPruneOrigin (4) pimInvalidJoinPruneGroup (5) pimInvalidJoinPruneRp (6) pimNeighborUpTime	1.3.6.1.2.1.157.0.3
4.	pimRPMappingChage	A pimRPMappingChange notification signifies a change to the active RP mapping on this device. This notification is generated whenever the counter pimRPMappingChangeCount is incremented, subject to the rate limit specified by pimRPMappingChangeNotificationPeriod. Binding objects: (1) pimGroupMappingPimMode (2) pimGroupMappingPrecedence	1.3.6.1.2.1.157.0.4

ID	Trap Name	Trap Description	OID
5.	pimInterfaceElection	A pimInterfaceElection notification signifies that a new DR or DF has been elected on a network. This notification is generated whenever the counter pimInterfaceElectionWinCount is incremented, subject to the rate limit specified by pimInterfaceElectionNotificationPeriod. Binding objects: (1) pimInterfaceAddressType (2) pimInterfaceAddress	1.3.6.1.2.1.157.0.5

16.1.12Port Security

ID	Trap Name	Trap Description	OID
1.	mnoL2PortSecurityViolationTrap	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: mnoPortSecPortIndex The port interface. mnoL2PortSecurityViolationMac The host MAC addresses.	1.3.6.1.4.1.396.5.5.3.3.0.1

16.1.13Port

ID	Trap Name	Trap Description	OID
1.	linkUp	A notification is generated when port linkup. Binding objects: (1) ifIndex, (2) if AdminStatus (3) ifOperStatu	1.3.6.1.6. 3.1.1.5.4
2.	linkDown	A notification is generated when port linkdown. Binding objects: (1) ifIndex, (2) if AdminStatus (3) ifOperStatu	1.3.6.1.6. 3.1.1.5.3

16.1.14RMON

ID	Trap Name	Trap Description	OID
1.	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
2.	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

16.1.15SNMP Authentication

ID	Trap Name	Trap Description	OID
1.	authenticationFailure	An authenticationFailure trap signifies that the SNMPv2 entity, acting in an agent role, has received a protocol message that is not properly authenticated. While all implementations of the SNMPv2 must be capable of generating this trap, the snmpEnableAuthenTraps object indicates whether this trap will be generated.	1.3.6.1.6.3.1.1.5.5

16.1.16 Stacking

ID	Trap Name	Trap Description	OID
1.	mnoUnitInsert	Unit Hot Insert notification. Binding objects: mnoUnitMgmtId. The Box ID of hot inserted device mnoUnitMgmtMacAddr. The MAC address of hot insert device	1.3.6.1.4.1.39 6.5.5.1.3.0.1
2.	mnoUnitRemove	Unit Hot Remove notification. Binding objects: mnoUnitMgmtId. The Box ID of hot removed device mnoUnitMgmtMacAddr. The MAC address of hot removed device	1.3.6.1.4.1.39 6.5.5.1.3.0.2
3.	mnoUnitFailure	Unit Failure notification. Binding objects: mnoUnitMgmtId. The Box ID of failure device	1.3.6.1.4.1.39 6.5.5.1.3.0.3
4.	mnoUnitTPChange	The stacking topology change notification. Binding objects: mnoStackTopologyType The current stacking topology after change: chain(1) ring(2) mnoUnitMgmtId The Master's Box ID mnoUnitMgmtMacAddr The Master's MAC address	1.3.6.1.4.1.39 6.5.5.1.3.0.4
5.	mnoUnitRoleChange	The stacking unit role change notification. Binding objects: mnoStackRoleChangeType The type of stacking role change: backup-to-master(1) slave-to-master(2) mnoUnitMgmtId The Master's Box ID	1.3.6.1.4.1.39 6.5.5.1.3.0.5

16.1.17System

ID	Trap Name	Trap Description	OID
1.	coldStart	A coldStart trap signifies that the SNMPv2 entity, acting in an agent role, is reinitializing itself and that its configuration may have been altered.	1.3.6.1.6.3.1.1.5.1
2.	warmStart	A warmStart trap signifies that the SNMPv2 entity, acting in an agent role, is reinitializing itself such that its configuration is unaltered.	1.3.6.1.6.3.1.1.5.2

16.1.18Temperature

ID	Trap Name	Trap Description	OID
1.	mnoTemperatureRising Alarm	This notification will send out when current temperature more than high threshold.	1.3.6.1.4.1.396.5.5.1.2.1
2.	mnoTemperatureFalling Alarm	This notification will send out when current temperature falling from high threshold.	1.3.6.1.4.1.396.5.5.1.2.2

16.1.19 Traffic Control

ID	Trap Name	Trap Description	OID
1.	mnoPktStormOccurred	When packet storm is detected by packet storm mechanism and take shutdown as action. Binding objects: mnoPktStormCtrlPortIndex The port interface.	1.3.6.1.4.1.396.5.5.3.5.0.1
2.	mnoPktStormCleared	When the packet storm is clear. Binding objects: mnoPktStormCtrlPortIndex The port interface.	1.3.6.1.4.1.396.5.5.3.5.0.2
3.	mnoPktStormDisablePort	When the port is disabled by the packet storm mechanism. Binding objects: mnoPktStormCtrlPortIndex The port interface.	1.3.6.1.4.1.396.5.5.3.5.0.3

16.1.20VRRP

ID	Trap Name	Trap Description	OID
1.	vrrpTrapNewMaster	The newMaster trap indicates that the sending agent has transitioned to 'Master' state. Binding objects: (1) vrrpOperMasterIpAddr	1.3.6.1.2.1.68.0.1
2.	vrrpTrapAuthFailure	A vrrpAuthFailure trap signifies that a packet has been received from a router whose authentication key or authentication type conflicts with this router's authentication key or authentication type. Implementation of this trap is optional. Binding objects: (1) vrrpTrapPacketSrc (2) vrrpTrapAuthErrorType	1.3.6.1.2.1.68.0.2

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