EtherWAN

# Hardened Managed 8-port 10/100/1000BASE-T +16-port 100/1000BASE SFP +4-port 1G/10G SFP+ Layer 3 Switch

## EG97000 Series
## User's Guide - CLI

**FastFind Links**


**Introduction**

**Installing the Switch**

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**Products Supported by this Manual:**

EG97000 Series

# Preface

## Audience

This guide is designed for the person who installs, configures, deploys, and maintains the Ethernet network. This document assumes the reader has moderate hardware, computer, and networking skills.

## Document Revision Level

This section provides a history of the revision changes to this document.

| Revision | Document Version | Date | Description |
|---|---|---|---|
| A | Version 1 | 04/16/2019 | |
| A | Version 2 | 04/28/2020 | Added note to duplex/speed configuration |
| A | Version 3 | 10/29/2020 | Added console port pin definitions |
| A | Version 4 | 03/29/2021 | Removed vrf commands and parameters. |
| A | Version 5 | 03/01/2023 | Removed BFD references |
| A | Version 6 | 08/27/2024 | Added ERPS feature |

## Changes in this Revision

# Document Conventions

This guide uses the following conventions to draw your attention to certain information.

## Safety and Warnings

This guide uses the following symbols to draw your attention to certain information.

| Symbol | Meaning | Description |
|---|---|---|
| | Note | Notes emphasize or supplement important points of the main text. |
| | Tip | Tips provide helpful information, guidelines, or suggestions for performing tasks more effectively. |
| | Warning | Warnings indicate that failure to take a specified action could result in damage to the device, or could result in serious bodily injury. |

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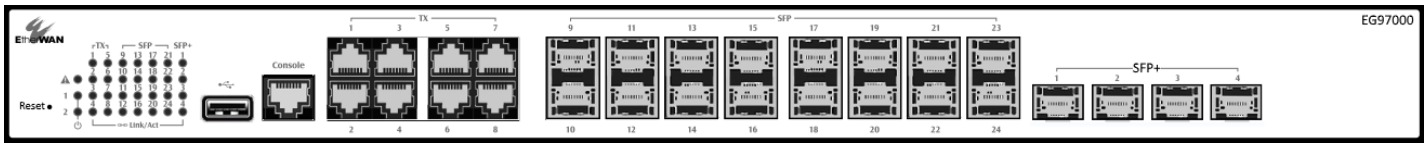
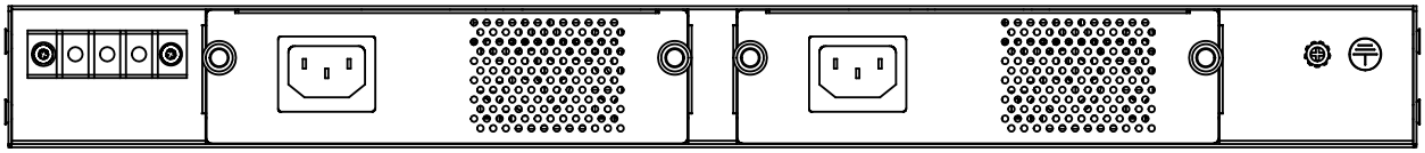
# 1 Introduction

EtherWAN's EG97000 is a gigabit Layer 3 switch designed for high bandwidth uplink or interconnection. With full wire speed switching capability, the EG97000 provides IP routing and switching across VLANs and subnetworks with no compromise in performance. The EG97000 supports comprehensive internetwork IP routings including static route, RIP v1 & v2, and OSPF v2 for IPv4. All these routing protocols can operate simultaneously with redistributions to each other and route control tools, including IP prefix-list and route-map.

In addition to Layer 3 features, the EG97000 supports a full set of EtherWAN Layer 2 features such as port security, IGMP snooping, port-based VLAN, GARP protocols, link aggregation, access control lists and STP/RSTP/MSTP. Besides in-band management via web browser, Telnet, SSH and SNMP, the EG97000 supports out-band management via a dedicated RJ-45 Management port.

The EG97000 Series provides high reliability and nonstop operation in harsh environments where temperatures range from -40° to 75°C (-40° to 167°F), as well as in areas with high electromagnetic interference (EMI). The EG97000 is also equipped with sophisticated network and system failure recovery features including VRRP, and dual redundant power supplies to minimize the chance of network or system downtime. This makes it an ideal choice for both industrial and mission critical applications where sustained connectivity is crucial.



# Unpacking and Installation

## Unpacking

Unpack the items and confirm that no items are missing or damaged. Your package should include:

- EG97000 Ethernet switch
- 2 Mounting brackets
- 12 Mounting screws
- 1 Console cable
- 1 AC Power Cord (optional)
- Quick install guide

If any item is damaged or missing, notify your authorized EtherWAN representative. Keep the carton, including the original packing material, in case you need to store the product or return it.

## Installing the Switch

Use the enclosed screws and brackets to mount the switch in an open or enclosed rack.

- Select a power source within 6 feet (1.8 meters).
- Choose a dry area with ambient temperature between -40 and 75ºC (-40 and 167ºF).
- Be sure there is adequate airflow.

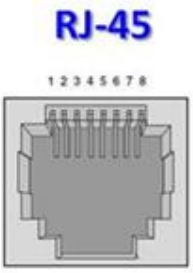
# Connecting to the Data Ports

The EG97000 has the following ports:

- 8 x 10/100/1000 Mbps RJ-45 copper ports
- 16 x 100/1000 SFP slots
- 4 x 1/10G SFP+ slots
- 1 x RJ-45 Management port
- 1 x USB port

## Console Port

Interface is RJ-45. Pin definitions are as follows:




| Pin | Signal | Function |
|---|---|---|
| 1 | 3.3V | Connected 0 ohm to RTS signal |
| 2 | 3.3V/NC | Connected 0 ohm for Backup (NC) |
| 3 | TxD | Transmit Data from Switch |
| 4 | GND | Ground |
| 5 | GND | Ground |
| 6 | RxD | Receive Data to Switch |
| 7 | NC | Not Connected |
| 8 | NC | Not Connected |

(Pin 8 of RTS with 3.3vdc for EB-232 dongle device).

### 10/100/1000BASE-TX Ports

Ports 1 to 8 are gigabit copper ports and can be connected to routers, other switches, or end devices. Use category 5 or higher STP cable.

### 100 Mbps / 1 Gbps SFP Slots

Ports 9 – 24 are dual-rate gigabit SFP slots, for connection with stackable switches to form multiple fiber interconnections. Use appropriate SFP transceivers.

### 1/10 Gbps SFP+ Slots

The dual-rate 10G SFP+ ports 1 – 4 are for uplink connection to core networks. Ensure that the same type of transceiver is used at both ends of the link and that the correct type of fiber cable is used.

## Connecting Power

### Terminal Block

If your EG97000 comes with AC power cables, connect the cables into the power modules at the back of the switch. If your switch comes with a DC or AC terminal block (no cable), then connect the switch to a suitable power supply using 12 to 24 AWG wire. Redundant power supply is supported. However, only one power input is required to operate the switch. Input voltage is 48 VDC or 100 – 240 VAC, depending on the model.

### Relay Output Alarm

The switch provides one dry contact for signaling of a user-defined power or port failure. The alarm relay default is “open” and forms a closed circuit when the event occurs. The relay output can be connected to an alarm signaling device, and supports both normally open and normally closed. Relay output current is 30VDC / 0.6A.

**NOTE:** The initial normal state of the relay is open, and if the switch loses *all* power, then this state will come into effect. This is important to remember when using the relay to indicate a power failure. The relay will close in an alarm state when there is redundant power input and an alarmed input fails.

## Initial Configuration

Connect to the switch using the enclosed Ethernet cable to connect a serial port on a PC to the RJ-45 Management port located on the front panel next to the USB port. You can also use regular Ethernet cable to connect the RJ-45 port on the PC to any of the TX ports 1 - 8. The IP address of VLAN 1 is 192.168.1.10.

**Configuration via CLI**

If using a terminal-emulation program such as Putty, configuration settings are: Baud rate: 115,200bps, Data bits: 8, Parity: none, Stop bit: 1, Flow control: none.

The default login name is “root,” no password.

**Configuration via Web Browser**

Log in to the switch by launching a web browser and entering 192.168.1.10 in the address bar.

Enter the default login ID: root (no password) and click “Login.” The system information screen will display.

Note: Starting from firmware 3.00.4.5, when logging into the GUI or the CLI for the first time, the switch will prompt you to change the default password to a new one. The new password must meet the following complexity requirements:

- Minimum 8 characters and maximum 35 characters in password length without leading or trailing blanks.
- The password must contain characters from the following categories:
  1. Uppercase English letters, (A to Z)
  2. Lowercase English letters, (a to z)
  3. Numbers, (0 to 9)
  4. Non-alphanumeric characters (e.g. @,#,$), but not including (”, ?, !)

User account will be locked after 10 (configurable) password attempts and will stay locked for 5 minutes.

### Alternate (Backup) Firmware

Under certain circumstances, such as when there is a loss of power during an upgrade, the firmware build on the switch can become unstable. There are two firmware images stored on the switch: Active and Alternate. If the Active firmware image becomes unstable, the switch will automatically boot from the Alternate image on the next boot.

## Copy Configuration to USB

The USB port can be used to save the running switch configuration to a (FAT32) USB storage device. Plug the device into the USB port, and use the “Save Configuration” command in the web interface, or “write config-file usb://FILENAME” in the CLI. You can later load the configuration from the USB drive by navigating to System --> Configuration in the GUI, or using install config-file usb://FILENAME in the CLI.

### Alternate (Backup) Firmware

Under certain circumstances, such as when there is a loss of power during an upgrade, the firmware build on the switch can become unstable. There are two firmware images stored on the switch: Active and Alternate. If the Active firmware image becomes unstable, the switch will automatically boot from the Alternate image on the next boot.

# 2 Command Line Interface Conventions and Usage

This manual describes accessing the EG97000 by using Telnet, SSH, or serial ports to configure the switch, using the Command Line Interface (CLI).

## Navigating the CLI Hierarchy

The CLI is organized into a hierarchy of command modes. The basic modes are User exec mode, Privileged exec mode, and Global configuration mode. There are also other modes, specific to certain configurations. Each mode has its own group of commands for a specific purpose. Below are examples of CLI commands needed to enter a specific mode:

```
switch_a> ← User exec mode
switch_a>enable
switch_a# ← Privileged exec mode
switch_a#configure terminal
switch_a(config) ← Global configuration mode
switch_a(config) spanning-tree mst configuration
switch_a(config-mst)# ← MSTP configuration mode

switch_a(config)# line console 0
switch_a(config-line)# ← Line configuration mode

switch_a(config)# interface ge1
switch_a(config-if)# ← Interface configuration mode

switch_a(config)#vlan database
switch_a(config-vlan)# ← VLAN database configuration mode

switch_a(config)# router ospf
switch_a(config-router)# ← Router configuration mode
```

In any mode, the **exit** command will leave the current mode and enter the previous higher-order mode:

Example:

```
switch_a(config-line)# exit
switch_a(config)#
```

## Saving a Configuration from the CLI

Command: **write**

Example:

```
switch_a>enable
switch_a#write memory
Building configuration.....
[OK]
switch_a#>
```

Command: **copy running config startup-config**

Example:

```
switch_a>enable
switch_a#copy running-config startup-config
Building configuration.....
[OK]
switch_a#>
```

## CLI Keyboard Shortcuts

Ctrl + a: place cursor at the beginning of a line

Ctrl + b: backspace one character

Ctrl + d: delete one character

Ctrl + e: place cursor at the end of the line

Ctrl + f: move cursor forward one character

Ctrl + k: delete from the current position to the end of the line

Ctrl + l: redraw the command line

Ctrl + n: display the next line in the history

Ctrl + p: display the previous line in the history

Ctrl + u: delete entire line and place cursor at start of prompt

Ctrl + w: delete one word back

## Command Syntax

The following symbols are used to describe the values and arguments for command entries in the CLI.

| | |
|---|---|
| `Monospaced courier font` | Command line example. |
| **<angle brackets>** | Variable or value that must be specified. |
| **[square brackets]** | Optional parameters or arguments. |
| **optionA \| optionB** | Vertical bar. Separates multiple exclusive items in a list of options. |
| **{braces}** | Indicate optional values or arguments, where one must be selected |
| **(parentheses)** | Indicates at least one or more of the values or arguments in the preceding syntax enclosed by braces must be specified. |

## Variable Placeholders

The command syntax uses the following tokens to represent command line variables for which you supply a value:

| Token | Description |
|---|---|
| `WORD` | A contiguous text string (excluding spaces), such as IFNAME for the name of an interface |
| `LINE` | A text string, including spaces; no other parameters can follow this parameter |
| `A.B.C.D` | IPv4 address |
| `A.B.C.D/M` | IPv4 address and mask/prefix |
| `HH:MM:SS` | Time format |
| `AA:NN` | BGP community value |
| `XX:XX:XX:XX:XX:XX` | MAC address |
| `<1-5>`<br>`<1-65535>`<br>`<0-2147483647>`<br>`<0-4294967295>` | Numeric range |

## Command Help

Help information is available from the command line by entering the following commands:

- **help** *command_name* Shows help for the specific command.
- **help ?** Shows commands for which there is help.
- *command_name* **?** Shows a list of arguments available.
- *string***?** (no space) Lists the possible commands that start with the string.

## Command Abbreviations

The CLI accepts abbreviations that uniquely identify a keyword in commands.

Example:

```
sh in ge1
```

is is the same as

```
show interface ge1
```

# 3 System Commands

## Terminal Line Commands

| exec-timeout | |
|---|---|
| **Purpose** | Set the interval from last user input for system to log out |
| **Command Mode** | Line configuration |
| **Syntax** | [no] exec-timeout (<0-35791> \| <0-2147483>) |
| **Parameters** | minutes, seconds |
| **Example usage** | `switch_a(config-line)#exec-timeout 20` |

| login | |
|---|---|
| **Purpose** | Set login type. Use login with no parameters to set single-user. |
| **Command Mode** | Line configuration |
| **Syntax** | [no] login [local \| tacplus] |
| **Parameters** | Local password checking |
| **Example usage** | `switch_a(config-line)#` |

| privilege | |
|---|---|
| **Purpose** | Change privilege level for line |
| **Command Mode** | Line configuration |
| **Syntax** | [no] privilege level <1-15, 16> |
| **Parameters** | Default privilege levels are 1 – 15, max is 16 |
| **Example usage** | `switch_a(config-line)#` |

## Basic System Configuration

| show running-config | |
|---|---|
| **Purpose** | Display the current operating configuration, hardware and firmware versions, hostname data, etc.. |
| **Command Mode** | Privilege Exec |
| **Syntax** | show running-config<br>show running-config dns<br>show hosts<br>show hostname<br>show hardware<br>show version |
| **Parameters** | none |
| **Example usage** | `switch_a(config)# show running-config` |

| Ip address | |
|---|---|
| **Purpose** | Set the IP address for an interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip address A.B.C.D<br>[no] ip address A.B.C.D/M<br>[no] ip address A.B.C.D DHCP |
| **Parameters** | A.B.C.D: IPv4 address format<br>A.B.C.D: IPv4 address format with mask M<br>DHCP: Dynamic Host Configuration Protocol |
| **Example usage** | `switch_a(config-if)# ip address 192.168.1.100/24` |

| Ipv6 address | |
|---|---|
| **Purpose** | Set the IPv6 address for an interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ipv6 address X:X::X:X/M<br>[no] ipv6 address X:X::X:X/M DHCP |
| **Parameters** | **X:X::X:X/M**: IPv6 address format with mask M<br>**X:X::X:X/M**: IPv4 address format with mask M<br>**DHCP**: Dynamic Host Configuration Protocol |
| **Example usage** | `switch_a(config-if)# ip address 192.168.1.100/24` |

| banner | |
|---|---|
| **Purpose** | Display the banner motive of the day upon login. |
| **Command Mode** | Global Configuration |
| **Syntax** | banner motd default<br>no banner motd<br>banner motd line <STRING> |
| **Parameters** | none |
| **Example usage** | `switch_a# banner motd line Howdy` |

| hostname | |
|---|---|
| **Purpose** | Set the name of the switch |
| **Command Mode** | Global configuration |
| **Syntax** | [no] hostname <name> |
| **Parameters** | One word (use dash or underscore to separate), 1 – 64 characters |
| **Example usage** | `switch_a(config)#hostname test_switch`<br>`test_switch(config)#` |

| enable password | |
|---|---|
| **Purpose** | Specify a password for the privilege level. Password can be an alpha-numeric string up to 80-characters, including spaces. The string cannot begin with a number. |
| **Command Mode** | Global configuration |
| **Syntax** | [no] enable password (8 \| <password>) |
| **Parameters** | 8 Specify that a hidden password will follow.<br>line Specify the hidden enable password string. |
| **Example usage** | `switch_a(config)#enable password xyzzy` |

| ip default-gateway | |
|---|---|
| **Purpose** | Enable/disable a default gateway - specify the default router or next hop where IP datagrams will be forwarded if no routes are found. |
| **Command Mode** | Global configuration |
| **Syntax** | [no] ip default-gateway A.B.C.D |
| **Parameters** | none |
| **Example usage** | `switch_a(config)# ip default-gateway 10.10.10.10` |

| ip http server | |
|---|---|
| **Purpose** | To enable or disable HTTP or HTTPS |
| **Command Mode** | Global configuration |
| **Syntax** | [no] ip http server<br>[no] ip http secure-server |
| **Parameters** | none |
| **Example usage** | `switch_a(config)# ip http secure-server` |

| feature telnet | |
|---|---|
| **Purpose** | Enable/disable telnet access to the switch |
| **Command Mode** | Global configuration |
| **Syntax** | [no] feature telnet |
| **Parameters** | none |
| **Example usage** | `switch_a(config)#feature telnet` |
| **NOTE** | If using Telnet to run the CLI Command that disables telnet, you will lose your connection. |

| feature ssh | |
|---|---|
| **Purpose** | Enable/disable SSH access to the switch |
| **Command Mode** | Global configuration |
| **Syntax** | [no] feature ssh |
| **Parameters** | none |
| **Example usage** | `switch_a(config)#feature ssh` |
| **NOTE** | If using SSH to run the CLI Command that disables SSH, you will lose your connection. |

| install config-file | |
|---|---|
| **Purpose** | Load a configuration from a TFTP server or USB flash drive |
| **Command Mode** | Privileged exec |
| **Syntax** | install config-file usb://(path/)<filename><br>install config-file tftp://A.B.C.D(:port)(/path)/<filename> |
| **Parameters** | IP address and port of tftp server |
| **Example usage** | `switch_a# install config-file tftp://10.10.10.10/EG97000_backup` |

| ip domain-list | |
|---|---|
| **Purpose** | Define a list of default domain names used to complete unqualified host names. Each domain in the list is to be tried in turn. The ip domain-list command is similar to the **ip domain-name** command, except that with the ip domain-list command you can define a list of domains, each to be tried in turn.<br>If there is no domain list, the default domain name specified with the ip domain-name command is used. If there is a domain list, the default domain name is not used. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip domain-list DOMAIN-NAME<br>no ip domain-list DOMAIN-NAME |
| **Parameters** | DOMAIN-NAME: Domain name, e.g. mycompany.com |
| **Example usage** | `switch_a(config)# ip domain-list compa.com`<br>`switch_a(config)# ip domain-list compbb.com` |

| ip domain-lookup | |
|---|---|
| **Purpose** | Enable DNS hostname-to-address translation |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ip domain-lookup |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# ip domain-lookup` |

| ip domain-name | |
|---|---|
| **Purpose** | Set the detault domain name used to complete unqualified host names (names without a dotted decimal domain name). |
| **Command Mode** | Global Configuration |
| **Syntax** | ip domain-name DOMAIN-NAME<br>no ip domain-name DOMAIN-NAME |
| **Parameters** | DOMAIN-NAME: Domain name, e.g. mycompany.com |
| **Example usage** | `switch_a(config)# ip domain-name chaon.com` |

| ip host | |
|---|---|
| **Purpose** | Define 1-2 static hostname-to-address mappings in DNS. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip host WORD A.B.C.D<br>ip host WORD (A.B.C.D) (A.B.C.D)<br>no ip host WORD A.B.C.D<br>no ip host WORD A.B.C.D A.B.C.D |
| **Parameters** | WORD: Hostname, such as mycompany.com<br>A.B.C.D: IPv4 address of the host |
| **Example usage** | `switch_a(config)# ip host grooscompany.com 123.70.0.23 123.70.0.24` |

| ip name-server | |
|---|---|
| **Purpose** | Add 1-3 DNS server addresses that are used to translate hostnames to IP addresses. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip name-server A.B.C.D<br>ip name-server (A.B.C.D) (A.B.C.D)<br>ip name-server (A.B.C.D) (A.B.C.D) (A.B.C.D)<br>no ip name-server A.B.C.D<br>no ip name-server A.B.C.D A.B.C.D<br>no ip name-server A.B.C.D A.B.C.D A.B.C.D |
| **Parameters** | A.B.C.D: IPv4 address of the name server |
| **Example usage** | `switch_a(config)# ip name-server 123.70.0.23 123.70.0.24` |

| service auto-config enable | |
|---|---|
| **Purpose** | Enable auto save of configuration, and set interval |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] service auto-config enable<br>service auto-config interval <*number*> |
| **Parameters** | Number is interval time in seconds, <5-65535> |
| **Example usage** | `switch_a(config)#service auto-config enable`<br>`switch_a(config)#service auto-config interval 10` |

| show firmware | |
|---|---|
| **Purpose** | Display the current primary and alternate firmware versions. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show firmware |
| **Parameters** | none |
| **Example usage** | `switch_a# show firmware` |

| install image | |
|---|---|
| **Purpose** | Load a firmware image from a TFTP server |
| **Command Mode** | Privileged exec |
| **Syntax** | install image <A.B.C.D> FILENAME [reload] |
| **Parameters** | IP address of tftp server and filename of firmware image to load<br>**reload** option will reboot the switch after the firmware is updated |
| **Example usage** | `switch_a# install image tftp://10.10.10.10 flash.tgz` |
| **NOTE** | Depending on the firmware being loaded, the extension may not be .tgz. The Switch does not use the extension to validate the firmware file. |

| reload | |
|---|---|
| **Purpose** | Reboot the switch |
| **Command Mode** | Privileged exec |
| **Syntax** | reload |
| **Parameters** | none |
| **Example usage** | `switch_a#reload` |

| logout | |
|---|---|
| **Purpose** | Log out from the switch |
| **Command Mode** | User Exec Mode or Privileged Exec Mode |
| **Syntax** | logout |
| **Parameters** | none |
| **Example usage** | `switch_a#logout` |

| restore default | |
|---|---|
| **Purpose** | Restore switch to default settings and reboot |
| **Command Mode** | Privileged exec |
| **Syntax** | restore default |
| **Parameters** | none |
| **Example usage** | `switch_a#restore default` |

| reset log file | |
|---|---|
| **Purpose** | Reset the current, open log file. |
| **Command Mode** | Privileged exec |
| **Syntax** | reset log file |
| **Parameters** | none |
| **Example usage** | `switch_a# reset log file` |

| write config-file | |
|---|---|
| **Purpose** | Save a configuration from a TFTP server or USB flash drive |
| **Command Mode** | Privileged exec |
| **Syntax** | write config-file [usb://<path/><filename> \| tftp://server<:port></path>/<filename>] |
| **Parameters** | Server: A.B.C.D IP address of tftp server |
| **Example usage** | `switch_a# write config-file tftp://10.10.10.10/image.tgz` |

## User Account

| username | |
|---|---|
| **Purpose** | Establish user name authentication |
| **Command Mode** | Global Configuration |
| **Syntax** | username <*WORD* > privilege <*admin* \| *operator* \| *technician*><br>password < *8* \| *blank*> <*password*><br>no username <*WORD* > |
| **Parameters** | WORD is the user name: 4-6 characters<br>Password: 1 to 35 characters<br>Entering and “8” after the password command specifies a HIDDEN password will follow. It will be encrypted in the configuration file. |
| **Example usage** | `switch_a(config)# username cooluser privilege operator password 1234` |

# 4 Diagnostic Commands

## System and Settings Information

| show system-log | |
|---|---|
| **Purpose** | Shows the system log |
| **Command Mode** | User Exec or Privileged Exec |
| **Syntax** | show system-log |
| **Parameters** | none |
| **Example usage** | `switch_a# show system-log` |

| show cpu-usage | |
|---|---|
| **Purpose** | Shows current and max CPU utilization |
| **Command Mode** | Privileged Exec |
| **Syntax** | show cpu-usage [reset] |
| **Parameters** | none |
| **Example usage** | `switch_a# show cpu-usage` |

| show memory-usage | |
|---|---|
| **Purpose** | Shows memory utilization |
| **Command Mode** | Privileged Exec |
| **Syntax** | show memory-usage |
| **Parameters** | none |
| **Example usage** | `switch_a# show memory-usage` |

| show system-log | |
|---|---|
| **Purpose** | Show the system log |
| **Command Mode** | Privilegd Exec |
| **Syntax** | show system-log |
| **Parameters** | none |
| **Example usage** | `switch_a(config)#show system-log` |

| show rmon | |
|---|---|
| **Purpose** | Shows rmon data |
| **Command Mode** | Privileged Exec |
| **Syntax** | show rmon [alarm \| event \| history \| statistics] |
| **Parameters** | alarm: RMON alarm table, event: event table, history, statistics |
| **Example usage** | `switch_a# show rmon alarm` |

| remote-log | |
|---|---|
| **Purpose** | Configure remote logging |
| **Command Mode** | Global config |
| **Syntax** | [no] remote-log enable<br>remote-log add <A.B.C.D><br>remote-log del [A.B.C.D \| all] |
| **Parameters** | Ip address of syslog server |
| **Example usage** | `switch_a(config)#remote-log enable`<br>`switch_a(config)#remote-log add 192.168.1.100` |

# Alarm Configuration

| show alarm, show alarm-trigger | |
|---|---|
| **Purpose** | Shows alarm information and settings for link down, power failure, temperature, and SFP transceiver |
| **Command Mode** | Privileged Exec |
| **Syntax** | show alarm<br>show alarm-trigger link<br>show alarm-trigger power<br>show alarm-trigger temper<br>show alarm-trigger sfp <temper \| vcc \| tx-bias \| tx-pow \| rx-pow> <major \| minor> |
| **Parameters** | Temper: temperature, vcc: voltage, tx-bias: TX bias current, tx,rx-pow: TX, RX power major/minor: severity |
| **Example usage** | `switch_a# show alarm-trigger link` |

| alarm-trigger | |
|---|---|
| **Purpose** | Set alarms for link down, power failure, temperature, and SFP transceiver |
| **Command Mode** | Global config |
| **Syntax** | [no] alarm-trigger link <IFNAME><br>[no] alarm-trigger power <LEVEL><br>[no] alarm-trigger temper<br>[no] alarm-trigger sfp <IFNAME> <temper \| vcc \| tx-bias \| tx-pow \| rx-pow> <major \| minor> |
| **Parameters** | LEVEL is a power input (1-2), Temper: temperature, vcc: voltage, tx-bias: TX bias current, tx,rx-pow: TX, RX power, major/minor: alarm severity |
| **Example usage** | Set alarms to trigger if port ge1 goes down, power input 2 fails, an excessive temperature is reached, and signal an alarm with major severity if there is a voltage error on xe1. |
| | `switch(config)#alarm-trigger link ge10`<br>`switch(config)#alarm-trigger power 2`<br>`switch(config)#alarm-trigger temper`<br>`switch(config)#alarm-trigger sfp xe1 vcc major` |

# DDM (Digital Diagnostics Monitoring) Configuration

| show | |
|---|---|
| **Purpose** | Show alarm and digital input configuration and settings. |
| **Command Mode** | Privileged exec |
| **Syntax** | show sfp-alarm-trigger <IFNAME><br>show threshold sfp <IFNAME><br>show digital-input |
| **Parameters** | IFNAME: Interface name |
| **Example usage** | `switch_a# show sfp-alarm-trigger xe1` |

| threshold sfp | |
|---|---|
| **Purpose** | Set threshold values for Digital Diagnostics Monitoring (DDM) alarms on SFP modules. The SFP module must support DDM. |
| **Command Mode** | Global config |
| **Syntax** | threshold sfp IFNAME vcc <high-major \| low-major \| high-minor \| low-minor> <LEVEL><br>threshold sfp IFNAME tx-bias <high-major \| low-major \| high-minor \| low-minor> <LEVEL><br>threshold sfp IFNAME tx-pow < high-major \| low-major \| high-minor \| low-minor > <LEVEL><br>threshold sfp IFNAME rx-pow < high-major \| low-major \| high-minor \| low-minor > <LEVEL> |
| **Parameters** | vcc: Supply voltage in volts < 0 - 6.55><br>tx-bias: TX Bias Current threshold in milliamps <0 - 131><br>tx-pow: TX power threshold in dBm <-40.0 - 8.16><br>rx-pow: RX power threshold in dBm <-40.0 - 8.16><br>IFNAME: Interface name<br>LEVEL: Numerical threshold value |
| **Example usage** | `switch(config)#threshold sfp xe1` |

## Email Alerts

| show | |
|---|---|
| **Purpose** | Configure email alerts through msmtp. |
| **Command Mode** | Privileged exec |
| **Syntax** | [no] msmtp enable<br>msmtp host WORD<br>msmtp passwd<br>[no] msmtp receive <1-5><br>[no] msmtp ssl<br>msmtp username WORD1 |
| **Parameters** | WORD: smtp.server.com format<br>WORD1: user@domain.com format |
| **Example usage** | `switch_a(config)# msmtp host smtp.frodo.com username chaon@frodo.com passwd 1234 ssl` |

# 5 Port Commands

## Port Configuration

| show interface | |
|---|---|
| **Purpose** | Display the port status for a port, the description, port statistics, and modes of the Layer 2 interfaces |
| **Command Mode** | Privileged Exec |
| **Syntax** | show interface <IFNAME><br>show interface description <IFNAME><br>show interface statistics <IFNAME><br>show interface switchport bridge <GROUP NUMBER> |
| **Parameters** | IFNAME: interface name, GROUP NUMBER: the bridge group number |
| **Example usage** | `switch_a# show interface ge5` |

| show running-config interface | |
|---|---|
| **Purpose** | Display configuration for an interface. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show running-config interface <IFNAME> |
| **Parameters** | IFNAME: interface name |
| **Example usage** | `switch_a# show running-config interface ge5` |

| description | |
|---|---|
| **Purpose** | Provide a custom description for a port |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] description <DESCRIPTION TEXT> |
| **Parameters** | DESCRIPTION TEXT: 1 – 80 characters, can use spaces |
| **Example usage** | `switch(config-if)#description second floor printer` |

| shutdown | |
|---|---|
| **Purpose** | Enable or disable a port |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] shutdown |
| **Parameters** | None |
| **Example usage** | `switch(config-if)#shutdown` |

| bandwidth | |
|---|---|
| **Purpose** | Set the maximum port speed for a port |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] bandwidth <1-10000000000(UNIT)> |
| **Parameters** | UNIT: <1-10000000> k for 1 to 10000000 kilobits<br><1-10000> m for 1 to 10000 megabits<br><1-10> g for 1 to 10 gigabits<br><1-10000000000.0> for 1 to 10000000000 bits |
| **Example usage** | `switch(config-if)#bandwidth 1000000k` |

| duplex | |
|---|---|
| **Purpose** | Set duplex to interface |
| **Command Mode** | Interface Configuration |
| **Syntax** | duplex <auto \| full \| half><br>no duplex |
| **Parameters** | Auto: auto-negotiate, full: full-duplex, half: half-duplex |
| **Example usage** | `switch(config-if)#duplex full` |
| **Note** | It is recommended to manually select the speed required instead of using the Auto option. |

| flowcontrol | |
|---|---|
| **Purpose** | Set IEEE 802.3x Flow Control on a port |
| **Command Mode** | Interface Configuration |
| **Syntax** | no flowcontrol<br>flowcontrol both<br>flowcontrol receive <on / off><br>flowcontrol send <on / off><br>flowcontrol wmpause <0-255> wmcancel <0-255> |
| **Parameters** | **both**: flow control on send and receive<br>**receive**: flow control on receive<br>**send**: flow control on send<br>**wmpause**: watermark pause<br>**wmcancel**: watermark cancel |
| **Example usage** | `switch(config-if)#flowcontrol both` |

| show mirror | |
|---|---|
| **Purpose** | Show all port mirroring, show port mirroring for specific interface |
| **Command Mode** | Privileged Exec |
| **Syntax** | show port mirror [interface <IFNAME>] |
| **Parameters** | **IFNAME**: interface name |
| **Example usage** | `switch_a# show port mirror interface ge5` |

| mirror interface | |
|---|---|
| **Purpose** | Configure a port for port mirroring |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] mirror interface <IFNAME> direction <both \| transmit \| receive> |
| **Parameters** | IFNAME: interface name<br>**both:** mirror traffic in both directions<br>**receive:** mirror received traffic<br>**transmit:** mirror transmitted traffic. |
| **Example usage** | `switch(config-if)#mirror interface ge2 direction transmit` |
| **Note** | This command run must separately for each source port. Port mirroring can only be performed on the same type of interfaces, e.g., only a switchport interface can mirror a switchport interface. Issuing a switchport command on a port where mirroring is enabled will |

| | |
|---|---|
| | remove port mirroring on that interface. |

| rate-control | |
|---|---|
| **Purpose** | Set a port rate control |
| **Command Mode** | Interface Configuration |
| **Syntax** | rate-control (ingress \| egress) value <RATE> burst <2-1048576><br>no rate-control (ingress \| egress) |
| **Parameters** | **RATE:** kbps <1-1000000> |
| **Example usage** | `switch_a(config-if)#rate-control ingress value 100000` |

| no switchport | |
|---|---|
| **Purpose** | Set the interface to Layer 3 (Routed port) |
| **Command Mode** | Interface Configuration |
| **Syntax** | no switchport |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)#no switchport` |

## MAC Table

| show mac | |
|---|---|
| **Purpose** | Display MAC address information, including lists, tables, groups, and notifications |
| **Command Mode** | Privileged Exec |
| **Syntax** | show mac<br>show mac access-lists<br>show mac address-table<br>show mac-access-group<br>show mac-notification |
| **Parameters** | none |
| **Example usage** | `switch_a# show mac-access-group` |

| ageing-time | |
|---|---|
| **Purpose** | Set the amount of time that a networked device's MAC address will persist in the switch's memory before being removed |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge 1 ageing-time (TIME) |
| **Parameters** | **TIME**: in seconds <10-1000000> |
| **Example usage** | `switch_a(config)# bridge 1 ageing-time 5000` |

| bridge acquire | |
|---|---|
| **Purpose** | Enable dynamic learning of mac addresses (enabled by default) |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] bridge <1-32> acquire |
| **Parameters** | **<1-32>**: the bridge group ID |
| **Example usage** | `switch_a(config)# bridge 3 acquire` |

| clear mac address-table | |
|---|---|
| **Purpose** | Clear the filtering database for the default bridge. Command options are:<br>• clear the filtering database<br>• clear all filtering database entries configured through CLI (static)<br>• clear all multicast filtering database entries<br>• clear all multicast filtering database entries for a given VLAN or interface<br>• clear all static or multicast database entries based on a mac address. |
| **Command Mode** | Privileged Exec |
| **Syntax** | clear mac address-table dynamic<br>clear mac address-table dynamic bridge <1-32><br>clear mac address-table dynamic (address MACADDR \| interface IFNAME (instance INST \|) \| vlan VID)<br>clear mac address-table dynamic (address MACADDR \| interface IFNAME (instance INST \|) \| vlan VID) bridge <1-32><br>clear mac address-table (dynamic \| static \| multicast) cvlan VID<br>clear mac address-table (dynamic \| static \| multicast) cvlan VID svlan VID<br>clear mac address-table (dynamic\|static\|multicast) cvlan VID svlan VID bridge <1-32><br>clear mac address-table (static \| multicast)<br>clear mac address-table (static \| multicast) bridge <1-32><br>clear mac address-table (static \| multicast) (address MACADDR \| interface IFNAME \| vlan VID)<br>clear mac address-table (static\|multicast) (address MACADDR \| interface IFNAME \| vlan VID) bridge <1-32> |
| **Parameters** | **dynamic**: Clears all dynamic entries.<br>**multicast**: Clears all multicast filtering database entries.<br>**static**: Clears all entries configured through management.<br>**address**: Clear the specified MAC Address.<br>**MACADDR**: xxxx.xxxx.xxxx format<br>**IFNAME**: Interface name<br>**bridge**: Clears the bridge group ID <1-32><br>**cvlan**: Clears all MAC address for the specified CVLAN <1-4094>.<br>**svlan**: Clears all mac address for the specified SVLAN <1-4094>.<br>**interface**: Clears all MAC address for the specified interface.<br>**bridge**: Clears the bridge group ID. <1-32>.<br>**instance**: Clears MSTP instance ID. Range is <1-63>.<br>**vlan**: Clears all MAC address for the specified VLAN. Range is 1-4094. |
| **Example usage** | Clear all filtering database entries configured through the CLI: |
| | `switch_a#clear mac address-table static` |
| | Clear multicast filtering database entries: |
| | `switch_a#clear mac address-table multicast` |
| | Clear all filtering database entries for a given interface: |

| | |
|---|---|
| | `switch_a#clear mac address-table static interface eth0` |
| | Clear multicast filtering database entries for a given VLAN: |
| | `switch_a#clear mac address-table multicast vlan 2` |
| | Clear static filtering database entries for a given MAC address: |
| | `switch_a#clear mac address-table static address 0202.0202.0202` |
| | Clear all filtering database entries configured through CLI: |
| | `switch_a#clear mac address-table static bridge 1` |
| | Clear multicast filtering database entries: |
| | `switch_a#clear mac address-table multicast bridge 1` |
| | Clear all filtering database entries for a given interface: |
| | `switch_a#clear mac address-table static interface eth0 bridge 1` |
| | Clear multicast filtering database entries for a given VLAN. |
| | `switch_a#clear mac address-table multicast vlan 2 bridge 1` |
| | Clear static filtering database entries for a given MAC address: |
| | `switch_a#clear mac address-table static address 0202.0202.0202 bridge 1` |
| | Clear all filtering database entries learned through bridge operation for a given MAC address. |
| | `switch_a#clear mac address-table dynamic address 0202.0202.0202` |

| **bridge max-age** | |
|---|---|
| **Purpose** | Set the maximum age for a bridge |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] bridge <1-32> max-age <6-40> |
| **Parameters** | **<1-32>**:: Bridge group ID<br>**<6-40>**: The maximum time in seconds, to listen for the root bridge |
| **Example usage** | `switch_a(config)# bridge 2 max-age 12` |
| **Note** | Maximum age is the max time in seconds for which (if a bridge is the root bridge) a message is considered valid. The value of maximum age should be greater than twice the value of hello time plus 1, but less than twice the value of forward delay minus 1. The allowable range for max-age is 6-40 seconds. Configure this value sufficiently high, so that a frame generated by root can be propagated to leaf nodes without exceeding the maximum age. |

## Static MAC Entry

| mac-address-table | |
|---|---|
| **Purpose** | Configure the static forwarding table entry for the default bridge. Use the no parameter to remove the entry for the default bridge. |
| **Command Mode** | Global Configuration |
| **Syntax** | mac-address-table static MAC (forward \| discard) IFNAME<br>mac-address-table static MAC (forward \| discard) IFNAME vlan <2-4094><br>mac-address-table static MAC (forward \| discard) IFNAME vlan <2-4094> svlan <2-4094><br>no mac-address-table static MAC (forward \| discard) IFNAME<br>no mac-address-table static MAC (forward \| discard) IFNAME vlan <2-4094><br>no mac-address-table static MAC (forward \| discard) IFNAME vlan <2-4094><br>svlan <2-4094> |
| **Parameters** | **static**: Configure a static address<br>**MAC**: Media Access Control address in HHHH.HHHH.HHHH format.<br>**forward**: Forward matching frames.<br>**discard**: Discard matching frames.<br>**IFNAME**: Interface on which the frame comes out.<br>**vlan**: Identity of the VLAN in range of <2-4094>.<br>**svlan**: Identity of the SVLAN in range of <2-4094>. |
| **Example usage** | `switch_a(config)# mac-address-table static 2222.2222.2222 forward ge5` |

| bridge address | |
|---|---|
| **Purpose** | Statically configure a bridge entry to forward or discard matching frames from matching MAC addresses. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] bridge <1-32> address MAC discard IFNAME<br>[no] bridge <1-32> address MAC discard IFNAME vlan <2-4094><br>[no] bridge <1-32> address MAC discard IFNAME vlan <2-4094> svlan <2-4094><br>[no] bridge <1-32> address MAC forward IFNAME<br>[no] bridge <1-32> address MAC forward IFNAME vlan <2-4094><br>[no] bridge <1-32> address MAC forward IFNAME vlan <2-4094> svlan <2-4094> |
| **Parameters** | **<1-32>**: Bridge group ID<br>**MAC:** Media Access Control (MAC) address in HHHH.HHHH.HHHH format<br>**forward**: forward matching frames<br>**discard**: discard matching frames<br>**IFNAME:** Interface on which the frame are sent<br>**vlan**: VLAN ID in range of <2-4094><br>**svlan**: SVLAN ID in range of <2-4094> |
| **Example usage** | `switch_a(config)# bridge 2 address 2222.2222.2222 forward eth0` |

| bridge forward-time | |
|---|---|
| **Purpose** | Set the time (in seconds) after which (if this bridge is the root bridge) each port changes states to learning and forwarding. This value is used by all instances. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] bridge <1-32> forward-time <4-30> |
| **Parameters** | **<1-32>:** Bridge group ID<br>**<4-30>**: forwarding time delay in seconds. |
| **Example usage** | `switch_a(config)# bridge 3 forward-time 6` |

| bridge mac-priority-override | |
|---|---|
| **Purpose** | Set a MAC priority override |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] bridge <1-32> mac-priority-override mac-address MAC interface IFNAME vlan VLANID<br>(static \| static-priority-override \| static-mgmt \| static-mgmt-priority-overide)<br>priority <0-7> |
| **Parameters** | **<1-32>**: Bridge group ID.<br>**mac-address**: MAC address in HHHH.HHHH.HHHH format.<br>**interface**: Interface information<br>**IFNAME**: interface name<br>**vlan**: add a single VLAN ID<br>**static**: MAC is a static entry<br>**static-mgmt**: MAC is a Static Management<br>**static-mgmt-priority-override**: MAC is a Static Management with priority override<br>**static-priority-override**: MAC is a static with priority override<br>**priority**: <0-7> priority value |
| **Example usage** | `switch_a(config)# bridge 1 mac-priority-override mac-address 1111.1111.1111 interface ge1 vlan 2 static priority 80` |

| bridge shutdown | |
|---|---|
| **Purpose** | Disable a bridge |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] bridge shutdown <1-32> [bridge-forward] |
| **Parameters** | **<1-32>**: the bridge group ID<br>**bridge-forward**: put all ports of the bridge into forwarding state |
| **Example usage** | `switch_a(config)# bridge shutdown 4` |
| **Note** | Use the no parameter to reset the bridge. |

| bridge transmit-holdcount | |
|---|---|
| **Purpose** | Set the maximum number of transmissions of BPDUs by the transmit state machine. Use the no parameter to restore the default transmit hold-count value. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] bridge <1-32> transmit-holdcount <1-10> |
| **Parameters** | **<1-32>**: Bridge group ID<br>**<1-10>**: transmit hold-count value. |
| **Example usage** | `switch_a(config)# bridge 1 transmit-holdcount 5` |

| bridge group | |
|---|---|
| **Purpose** | Bind an interface with a bridge specified by the parameter. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] bridge-group <1-32> |
| **Parameters** | **<1-32>**: Bridge group ID |
| **Example usage** | `switch_a(config-if)# bridge-group 2` |

| bridge-group path-cost | |
|---|---|
| **Purpose** | Set the cost of a path associated with a bridge group. The lower the path cost, the greater the likelihood of the bridge becoming root. Use the no parameter to restore the default priority value. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] bridge-group <1-32> path-cost <1-200000000> |
| **Parameters** | **<1-32>**: Bridge group ID<br>path-cost: the path-cost of a port <1-200000000> |
| **Example usage** | `switch_a(config-if)# bridge-group 3 path-cost 123` |

| bridge-group priority | |
|---|---|
| **Purpose** | Set the port priority for a bridge. A lower priority indicates a greater likelihood of the bridge becoming root. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] bridge-group <1-32> path-cost <1-200000000> |
| **Parameters** | <1-32> the bridge group ID<br>path-cost: the path-cost of a port <1-200000000> |
| **Example usage** | `switch_a(config-if)# bridge-group 4 priority 96` |
| **Note** | Default priority is 1 |

## Storm Control

| show storm-control | |
|---|---|
| **Purpose** | Display information on storm control, storm detect, andrate control. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show storm-control <level \| pps><br>show storm-control <level \| pps> <IFNAME><br>show storm-detect port-state<br>show utilization<br>show ratecontrol<br>show ratecontrol <IFNAME> |
| **Parameters** | **None** |
| **Example usage** | `switch_a(config-if)# show storm-control pps` |
| **Note** | By default, storm control is disabled. |

| storm-control | |
|---|---|
| **Purpose** | Use this command to set the rising threshold level for broadcast, multicast, or destination lookup failure traffic. The storm control action occurs when traffic utilization reaches this level.<br>Storm control is used to block the forwarding of unnecessary flooded traffic. A packet storm occurs when a large number of broadcast packets are received on a port. Forwarding these packets can cause the network to slow down or time out. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] storm-control (broadcast \| multicast \| dlf) level LEVEL<br>storm-control broadcast pps <1-8388608><br>no storm-control broadcast pps<br>storm-control multicast pps <1-8388608><br>no storm-control multicast pps<br>storm-control dlf pps <1-8388608><br>no storm-control dlf pps |
| **Parameters** | **broadcast**: broadcast rate limiting<br>**multicast**: multicast rate limiting<br>**dlf**: destination lookup failure limiting<br>**level**: The percentage of the threshold<br>**LEVEL**: percentage of the maximum speed (pps) of the interface <0.01-100.00><br>**<1-8388608>**: PPS value |
| **Example usage** | `switch_a(config-if)# storm-control broadcast level 30` |
| **Note** | By default, storm control is disabled. |

## Storm Detect

| storm-detect | |
|---|---|
| **Purpose** | Configure a switch to disable a port that is receiving a large number of Broadcast and/or Multicast packets. The switch can monitor for packets and take action based on percentage of bandwidth utilization or number of packets per second. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] bridge <1-32> storm-detect errdisable<br>bridge <1-32> storm-detect interval <2-65535><br>bridge 1 storm-detect errdisable-recovery <0-65535> |
| **Parameters** | **<1-32>**: Bridge group ID |
| **Example usage** | `switch_a(config)# bridge 1 storm-detect errdisable` |

| storm-detect interval | |
|---|---|
| **Purpose** | Set the storm detect interval |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge <1-32> storm-detect interval <2-65535> |
| **Parameters** | **<1-32>** the bridge group ID<br>**Storm Detect interval**: <2- 65535> in seconds |
| **Example usage** | `switch_a(config)# bridge 1 storm-detect errdisable-recovery 60` |
| **Note** | Default interval is 0 (disabled). |

| storm-detect recovery | |
|---|---|
| **Purpose** | Set the Storm-Detect errdisable-recovery time. This value determines if the switch should re-enable the port after the specified value or leave the port disabled. |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge 1 storm-detect errdisable-recovery <0-65535> |
| **Parameters** | **<1-32>**: Bridge group ID |
| **Example usage** | `switch_a(config)# bridge 1 storm-detect errdisable 60` |

| storm-detect packet type | |
|---|---|
| **Purpose** | Enable this port's storm detect by detect number of broadcast or broadcast plus multicast packets per second. Unit is packets per second. |
| **Command Mode** | Interface Configuration |
| **Syntax** | storm-detect (bc \| mc-bc) pps <0-100000> |
| **Parameters** | **bc**: broadcast only<br>**mc-bc**: count broadcast & multicast packets together.<br>**pps <0-100000>**: packets per second |
| **Example usage** | `switch_a(config-if)# storm-detect mc-bc pps 50000` |
| **Note** | The Default is 0 (disabled). |

| storm detect utilization | |
|---|---|
| **Purpose** | Set the By Utilization(%) for a port. Setting this will cause the port to be disabled when the defined percentage of bandwidth is reached. |
| **Command Mode** | Interface Configuration |
| **Syntax** | storm-detect utilization <0-100> |
| **Parameters** | **<0-100>**: percentage of bandwidth |
| **Example usage** | `switch_a(config-if)# storm-detect utilization 80` |
| **Note** | The Default is 0 (disabled). |

| no storm-detect port enable | |
|---|---|
| **Purpose** | Disable storm detect on a port. |
| **Command Mode** | Interface Configuration |
| **Syntax** | no storm-detect port enable |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if# no storm-detect port enable` |

## Trunking

| show etherchannel | |
|---|---|
| **Purpose** | Display information about LACP channels. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show etherchannel <1-65535><br>show etherchannel all<br>show etherchannel detail<br>show etherchannel load-balance<br>show etherchannel summary |
| **Parameters** | **<1-65535>**: channel-group number. |
| **Example usage** | `switch_a# show etherchannel 5` |

| static-channel-group | |
|---|---|
| **Purpose** | Create a static aggregator, or add a member port to an existing static aggregator. This command adds the interface to the static aggregator with the specified key. If the aggregator does not exist, it is created, and the interface added to it. If the port is the last member to be detached, the static aggregator is deleted. |
| **Command Mode** | Interface Configuration |
| **Syntax** | static-channel-group <1-12><br>no static-channel-group |
| **Parameters** | **<1-12>**: Channel group number. |
| **Example usage** | `switch_a(config-if)# static-channel-group 2` |

## LACP Trunking

| channel-group mode | |
|---|---|
| **Purpose** | Add a port to a channel group specified by the channel group number (<1-12>). This command enables link aggregation on a port, so that it may be selected for aggregation by the local system. |
| **Command Mode** | Interface Configuration |
| **Syntax** | channel-group mode <active \| passive><br>no channel-group |
| **Parameters** | **<1-65535>**: Channel group number.<br>**mode**: Channel mode.<br>**active**: enable initiation of LACP negotiation on a port.<br>**passive**: disable initiation of LACP negotiation on a port. |
| **Example usage** | `switch_a(config-if)# channel-group 4 mode active` |

| show lacp-counter | |
|---|---|
| **Purpose** | Display the packet traffic on all ports of all present LACP aggregators, or a given LACP aggregator. |
| **Command Mode** | Exec and Privileged Exec |
| **Syntax** | show lacp-counter <1-65535> |
| **Parameters** | **<1-65535>**: channel-group number. |
| **Example usage** | `switch_a# show lacp-counter 555` |

| show lacp sys-id | |
|---|---|
| **Purpose** | Display LACP system id and priority |
| **Command Mode** | Exec and Privileged Exec |
| **Syntax** | show lacp sys-id |
| **Parameters** | None |
| **Example usage** | `switch_a# show lacp sys-id` |

| clear lacp | |
|---|---|
| **Purpose** | Clear all counters of all present LACP aggregators or a given LACP aggregator. |
| **Command Mode** | Exec and Privileged Exec |
| **Syntax** | clear lacp <1-65535> counters<br>clear lacp counters |
| **Parameters** | **<1-65535>**: channel-group number. |
| **Example usage** | `switch_a# clear lacp counters` |

| debug LACP | |
|---|---|
| **Purpose** | Turn on/off LACP debugging at various levels. |
| **Command Mode** | Exec and Privileged Exec |
| **Syntax** | [no] debug lacp (event \| cli \| timer \| packet \| sync \| ha \| all)<br>[no] debug lacp timer detail |
| **Parameters** | **all**: enable all LACP debugging.<br>**cli**: echo commands to console.<br>**event**: set the debug options for LACP events.<br>**ha**: echo High Availability events to console.<br>**packet**: set the debug option for LACP packets.<br>**sync**: echo synchronization to console.<br>**timer**: echo timer expiry to console.<br>**detail**: echo timer start/stop to console. |
| **Example usage** | `switch_a# debug lacp all` |

| lacp port-priority | |
|---|---|
| **Purpose** | Set the priority of a channel. Channels are selected for aggregation based on their priority with the higher priority (numerically lower) channels selected first. |
| **Command Mode** | Interface Configuration |
| **Syntax** | lacp port-priority <1-65535><br>no lacp port-priority |
| **Parameters** | **<1-65535>**: LACP port priority |
| **Example usage** | `switch_a(config-if)# lacp port-priority 34` |

| lacp system-priority | |
|---|---|
| **Purpose** | Set the system priority of a local system. This determines the system responsible for resolving conflicts in choice of aggregation groups. |
| **Command Mode** | Global Configuration |
| **Syntax** | lacp system-priority <1-65535><br>no lacp port-priority |
| **Parameters** | **<1-65535>**: LACP system priority |
| **Example usage** | `switch_a(config)# lacp system-priority 6700` |
| **Note** | Lower numerical values have higher priorities. Default system priority is 32768. |

| lacp timeout | |
|---|---|
| **Purpose** | Set either a short or long timeout value on a port. The timeout value is the number of seconds before invalidating a received LACP data unit. |
| **Command Mode** | Interface Configuration |
| **Syntax** | lacp timeout (short \| long) |
| **Parameters** | **short**: LACP short timeout. Short timeout value is 3 seconds.<br>**long**: LACP long timeout. Long timeout value is 90 seconds. |
| **Example usage** | `switch_a(config-if)# lacp timeout short` |

| port-channel load-balance | |
|---|---|
| **Purpose** | Configure LACP port-channel load-balancing and set port selection criteria (PSC) on an interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | port-channel load-balance (dst-mac \| src-mac \| src-dst-mac \| dst-ip \| src-ip \| src-dstip \| dst-port \|src-port \| src-dst-port)<br>no port-channel load-balance |
| **Parameters** | **dst-ip**: Destination IP address-based load balancing.<br>**dst-mac**: Destination MAC address-based load balancing.<br>**dst-port**: Destination TCP/UDP address-based load balancing.<br>**src-dst-ip**: Source and Destination IP address-based load balancing.<br>**src-dst-mac**: Source and Destination MAC address-based load balancing.<br>**src-dst-port**: Source and Destination TCP/UDP address-based load balancing.<br>**src-ip**: Source IP address-based load balancing.<br>**src-mac**: Source MAC address-based load balancing.<br>**src-port**: Source port address-based load balancing. |
| **Example usage** | `switch_a(config-if)# port-channel load-balance src-dst-mac` |

## GVRP

| show gvrp | |
|---|---|
| **Purpose** | Display GVRP configuration, finite state machine, statistics, and timer. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show gvrp configuration<br>show gvrp machine<br>show gvrp statistics<br>show gvrp timer |
| **Parameters** | None |
| **Example usage** | `switch_a# show gvrp configuration` |

| clear gvrp | |
|---|---|
| **Purpose** | Clear GVRP statistics for all VLANS in a bridge or interface, |
| **Command Mode** | Privileged Exec |
| **Syntax** | clear gvrp statistics<br>clear gvrp statistics all<br>clear gvrp statistics bridge BRIDGE_NAME<br>clear gvrp statistics IFNAME |
| **Parameters** | **all**: Clears a port name.<br>**BRIDGE_NAME**: Bridge identifier.<br>**IFNAME**: Interface name. |
| **Example usage** | `switch_a# clear gvrp statistics all` |

| set gvrp enable/disable | |
|---|---|
| **Purpose** | Enable/disable GVRP globally for a default bridge instance, not for all ports of the bridge. After enabling GVRP globally, use **set port gvrp** to enable GVRP on individual ports of the bridge. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gvrp [enable \| disable]<br>set gvrp enable bridge BRIDGE_NAME<br>set gvrp disable bridge BRIDGE_NAME |
| **Parameters** | **BRIDGE_NAME**: Bridge identifier. |
| **Example usage** | `switch_a(config)# set gvrp disable bridge 12` |

| set gvrp dynamic-vlan-creation | |
|---|---|
| **Purpose** | Enable/disable dynamic VLAN creation for default bridge instance. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gvrp dynamic-vlan-creation enable<br>set gvrp dynamic-vlan-creation enable bridge BRIDGE_NAME<br>set gvrp dynamic-vlan-creation disable<br>set gvrp dynamic-vlan-creation disable bridge BRIDGE_NAME |
| **Parameters** | **BRIDGE_NAME**: Bridge identifier. |
| **Example usage** | `switch_a(config)# set gvrp dynamic-vlan-creation enable bridge 2` |

| set gvrp registration | |
|---|---|
| **Purpose** | Set GVRP registration type to fixed, forbidden, or normal. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gvrp registration <fixed \| forbidden \| normal> IF_NAME |
| **Parameters** | **fixed**: Determine that registered multicast groups are applied to the port, but that subsequent registrations or de-registrations do not affect the port. This means that none of the registered multicast groups on the port are to be de-registered based on GARP timers.<br>**forbidden**: All GVRP multicasts are de-registered, and prevents further GVRP multicast registration on the port.<br>**normal**: Sets dynamic GVRP multicast registration and de-registration on the port.<br>**IF_NAME**: Name of the interface. 1 to 16 characters in length. |
| **Example usage** | `switch_a(config)# set gvrp registration fixed eth0` |

| set gvrp applicant | |
|---|---|
| **Purpose** | Set the GVRP applicant state to normal or active. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gvrp applicant state normal IF_NAME<br>set gvrp applicant state active IF_NAME |
| **Parameters** | **active**: Sets the active state.<br>**normal**: Sets the normal state.<br>**IF_NAME**: Name of the interface. |
| **Example usage** | `switch_a(config)# set gvrp applicant state active eth0` |

| set gvrp timer | |
|---|---|
| **Purpose** | Set the GVRP timers. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gvrp timer join TIMER_VALUE IF_NAME<br>set gvrp timer leave TIMER_VALUE IF_NAME<br>set gvrp timer leaveall TIMER_VALUE IF_NAME |
| **Parameters** | **join**: the timer for joining the group.<br>**leave**: the timer for leaving a group.<br>**leaveall**: the timer for leaving all groups.<br>**TIMER_VALUE**: timer value in hundredths of a second.<br>**IF_NAME**: name of the interface. |
| **Example usage** | `switch_a(config)# set gvrp timer leave 245 eth0` |

| set port gvrp | |
|---|---|
| **Purpose** | Enable or disable GVRP on a port or all ports in a bridge. |
| **Command Mode** | Global Configuration |
| **Syntax** | set port gvrp enable (IF_NAME \| all)<br>set port gvrp disable (IF_NAME \| all) |
| **Parameters** | **enable**: Enables GVRP on a port.<br>**disable**: Disables GVRP on a port.<br>**all**: All ports added to recently configured bridge.<br>**IF_NAME**: name of the interface. |
| **Example usage** | `switch_a(config)# set port gvrp enable eth0` |

## GMRP

| show gmrp | |
|---|---|
| **Purpose** | Show GMRP configurations, GMRP finite state machine, GMRP statistics, and GMRP timer. |
| **Command Mode** | Privileged exec |
| **Syntax** | show gmrp configuration<br>show gmrp machine<br>show gmrp statistics<br>show gmrp timer |
| **Parameters** | None |
| **Example usage** | `switch_a# show gmrp configuration` |

| clear gmrp statistics | |
|---|---|
| **Purpose** | Clear GMRP statistics for a given VLAN or all the VLANs . |
| **Command Mode** | Privileged exec |
| **Syntax** | clear gmrp statistics all<br>clear gmrp statistics all bridge BRIDGE_NAME<br>clear gmrp statistics vlanid <1-4094><br>clear gmrp statistics vlanid <1-4094> bridge <1-32> |
| **Parameters** | **BRIDGE_NAME**: Bridge identifier.<br>**<1-4094>**: VLAN identifiers, **<1-32>**: bridge identifier. |
| **Example usage** | `switch_a# clear gmrp statistics vlan 12 bridge 2` |

| set gmrp enable | |
|---|---|
| **Purpose** | Enable GMRP globally on a switch for the default bridge. This command does not enable GMRP for all ports of the bridge. After enabling GMRP globally, use the **set port gmrp** command to enable GMRP on individual ports. GMRP cannot be enabled if IGMP Snooping is enabled or if GMRP is configured for a VLAN. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gmrp enable<br>set gmrp enable bridge BRIDGE_NAME<br>set gmrp enable bridge BRIDGE_NAME vlan VLANID<br>set gmrp enable vlan VLANID |
| **Parameters** | **BRIDGE_NAME**: Bridge identifier.<br>**VLANID**: VLAN identifier <1-4094>. |
| **Example usage** | `switch_a(config)# set gmrp enable bridge 2` |

| set gmrp disable | |
|---|---|
| **Purpose** | Disable GMRP globally on a switch for the default bridge. This command does not disable GMRP in all ports of the bridge. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gmrp disable<br>set gmrp disable bridge BRIDGE_NAME<br>set gmrp disable bridge BRIDGE_NAME vlan VLANID<br>set gmrp disable vlan VLANID |
| **Parameters** | **BRIDGE_NAME**: Bridge identifier.<br>**VLANID**: VLAN identifier <1-4094>. |
| **Example usage** | `switch_a(config)# set gmrp disable bridge 2 vlan 2` |

| set gmrp extended-filtering | |
|---|---|
| **Purpose** | Enable or disable extended filtering on a bridge as per Table 8-7 of IEEE802.1Q-2003. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gmrp extended-filtering enable<br>set gmrp extended-filtering enable bridge BRIDGE_NAME<br>set gmrp extended-filtering disable<br>set gmrp extended-filtering disable bridge BRIDGE_NAME |
| **Parameters** | enable: Enables GMRP on a switch.<br>disable: Disables GMRP on a switch.<br>BRIDGE_NAME: Bridge identifier. |
| **Example usage** | `switch_a(config)#set gmrp extended-filtering enable` |

| set gmrp fwdall | |
|---|---|
| **Purpose** | Set the **GMRP forward all** option for an interface. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gmrp fwdall disable IF_NAME<br>set gmrp fwdall enable IF_NAME |
| **Parameters** | enable: Enables GMRP on a switch.<br>disable: Disables GMRP on a switch.<br>IF_NAME: Interface name. |
| **Example usage** | `switch_a(config)# set gmrp fwdall enable ge5` |

| set gmrp registration | |
|---|---|
| **Purpose** | Set GMRP registration type. To de-register a multicast port, the port must be in the **normal** registration mode. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gmrp registration fixed IF_NAME<br>set gmrp registration forbidden IF_NAME<br>set gmrp registration normal IF_NAME<br>set gmrp registration restricted IF_NAME |
| **Parameters** | **fixed**: Determine that the multicast groups currently registered on the switch are applied to the port, but that subsequent registrations or de-registrations do not affect the port. This means that none of the registered multicast groups on the port are to be de-registered based on GARP timers.<br>**forbidden**: All GMRP multicasts are de-registered, and prevents further GMRP multicast registration on the port.<br>**normal**: dynamic GMRP multicast registration and de-registration on the port.<br>**restricted**: Restricted registration.<br>**IF_NAME**: Interface name, from 1 to 16 characters in length |
| **Example usage** | `switch_a(config)# set gmrp registration normal ge5 bridge 2` |

| set gmrp timer | |
|---|---|
| **Purpose** | Set the values for the GMRP Join, Leave, and Leaveall timers for a specified bridge. The relationship for the timer values are as follows:<br>• Leave timer must be greater than, or equal to, three times the join timer.<br>• Leaveall timer must be greater than the leave timer. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gmrp timer join TIMER_VALUE IF_NAME<br>set gmrp timer leave TIMER_VALUE IF_NAME<br>set gmrp timer leaveall TIMER_VALUE IF_NAME |
| **Parameters** | **join**: The timer for joining the group.<br>**leave**: The timer for leaving a group.<br>**leaveall**: The timer for leaving all groups.<br>**TIMER_VALUE**: Timer value in hundredths of a second.<br>**IF_NAME**: Interface name. |
| **Example usage** | `switch_a(config)# set gmrp timer join 100 eth0` |
| **Note** | Default for the join timer is 200 milliseconds (ms).<br>Default for the leave timer is 600 milliseconds.<br>Default for the leaveall timer is 10000 ms. |

| set port gmrp | |
|---|---|
| **Purpose** | Enable or disable GMRP on a particular port in all VLANs or all ports in a bridge. GMRP on a port cannot be enabled for all VLANs if GMRP has already been configured for a particular VLAN for the port. |
| **Command Mode** | Global Configuration |
| **Syntax** | set port gmrp disable (IF_NAME\|all)<br>set port gmrp enable (IF_NAME\|all)<br>set port gmrp disable IF_NAME vlan VLANID<br>set port gmrp enable IF_NAME vlan VLANID |
| **Parameters** | **enable**: Enables GMRP on a switch.<br>**disable**: Disables GMRP on a switch.<br>**all**: All ports added to recently configured bridge.<br>**IFNAME**: Interface name<br>**VLANID**: VLAN identifier <1-4094>. |
| **Example usage** | `switch_a(config)# set port gmrp enable eth0` |

## VLAN Translation

| vlan translate | |
|---|---|
| **Purpose** | Turn VLAN translation on/off |
| **Command Mode** | Global Configuration |
| **Syntax** | vlan translate on<br>vlan translate off |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# vlan translate on` |

| switchport vlantrans | |
|---|---|
| **Purpose** | Set the ingress/egress VLAN translation from VLAN_ID to VLAN_ID |
| **Command Mode** | Interface Configuration |
| **Syntax** | switchport vlantrans ingress vlan VLAN_ID vlan VLAN_ID<br>switchport vlantrans egress vlan VLAN_ID vlan VLAN_ID<br>no switchport vlantrans ingress vlan VLAN_ID<br>no switchport vlantrans egress vlan VLAN_ID |
| **Parameters** | **VLAN_ID**: VLAN ID |
| **Example usage** | `switch_a(config-if)# no switchport vlantrans ingress vlan 20` |

# 7 IGMP

## IGMP Information

| show ip igmp | |
|---|---|
| **Purpose** | Show multicast groups with receivers connected and learned through IGMP. Show state of IGMP, IGMP Proxy service for specified interface, or all interfaces. Show state of IGMP Proxy services for specified interface or for all interfaces. Show Source-Specific-Multicast Mapping, VPN Routing/Forwarding instance. |
| **Command Mode** | Privileged exec |
| **Syntax** | show ip igmp groups<br>show ip igmp interface (IFNAME \|)<br>show ip igmp proxy<br>show ip igmp ssm-map |
| **Parameters** | |
| **Example usage** | `switch_a# show ip igmp groups` |

| clear ip igmp | |
|---|---|
| **Purpose** | Clear IGMP local-memberships on interfaces. |
| **Command Mode** | Privileged exec |
| **Syntax** | clear ip igmp<br>clear ip igmp group *<br>clear ip igmp group A.B.C.D<br>clear ip igmp group A.B.C.D IFNAME<br>clear ip igmp interface IFNAME |
| **Parameters** | *****: Clears all groups on all interfaces.<br>**A.B.C.D**: Group address's local-membership cleared from all interfaces.<br>**interface**: All groups learned from this interface are deleted.<br>**group**: Deletes IGMP group cache entries. |
| **Example usage** | `switch_a# clear ip igmp interface eth1` |

| ip multicast-routing | |
|---|---|
| **Purpose** | Turn on/off multicast routing on the router |
| **Command Mode** | Global configuration |
| **Syntax** | [no] ip multicast-routing |
| **Parameters** | |
| **Example usage** | `switch_a(config)# no ip multicast-routing` |

| ip igmp | |
|---|---|
| **Purpose** | Enable the IGMP protocol operation on an interface. This command enables IGMP protocol operation in stand-alone mode, and can be used to learn local-membership information prior to enabling a multicast routing protocol on the interface. This command will has no effect on interfaces configured for IGMP Proxy.<br>Use the no parameter to return all IGMP related configuration to the default (including IGMP Snooping or IGMP Proxy service). |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip igmp |
| **Parameters** | none |
| **Example usage** | `switch_a(config-if)# ip igmp` |

| ip igmp version | |
|---|---|
| **Purpose** | Set the current IGMP protocol version on an interface. This command applies to interfaces configured for IGMP Layer-3 multicast protocols, IGMP Snooping, or IGMP Proxy.<br>Use the no parameter to return to the default version. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip igmp version <1-3><br>no ip igmp version |
| **Parameters** | <1-3>: IGMP version number. |
| **Example usage** | `switch_a(config-if)# ip igmp version 2` |

| ip igmp join-group | |
|---|---|
| **Purpose** | Configure a join multicast group. Use the no parameter to delete group membership entry. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip igmp join-group A.B.C.D {(source (A.B.C.D)\|)}<br>no ip igmp join-group A.B.C.D {(source (A.B.C.D)\|)} |
| **Parameters** | **A.B.C.D**: Standard IP multicast group address to be configured as a group member.<br>**source**: Static source to be joined.<br>**A.B.C.D**: Standard IP source address to be configured as a source from where multicast packets originate. |
| **Example usage** | `switch_a(config-if)# ip igmp join-group 1.1.1.1 source 1.1.1.2` |

| ip igmp proxy-service | |
|---|---|
| **Purpose** | Designate an interface to be the IGMP proxy-service (upstream host-side) interface, thus enabling IGMP host-side protocol operation on this interface. All associated downstream router-side interfaces will have their memberships consolidated on this interface, according to IGMP host-side functionality. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip igmp proxy-service |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ip igmp join-group 1.1.1.1 source 1.1.1.2` |
| **Note** | This command should not be used when configuring interfaces enabled for IGMP in association with a multicast-routing protocol, otherwise the behavior will be undefined. |

| ip igmp mroute-proxy | |
|---|---|
| **Purpose** | Specify the IGMP Proxy service (upstream host-side) interface with which to be associated. IGMP router-side protocol operation is enabled only when the specified upstream proxy-service interface is functional. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip igmp mroute-proxy IFNAME<br>no ip igmp mroute-proxy |
| **Parameters** | **IFNAME**: Interface name |
| **Example usage** | `switch_a(config-if)# ip igmp mroute-proxy ge5` |
| **Note** | This command should not be used when configuring interfaces enabled for IGMP in association with a multicast-routing protocol, otherwise the behavior will be undefined. |

| ip igmp immediate-leave | |
|---|---|
| **Purpose** | In IGMP version 2, use this command to minimize the leave latency of IGMP memberships. This command is used when only one receiver host is connected to each interface. This command applies to interfaces configured for IGMP Layer-3 multicast protocols, IGMP Snooping, or IGMP Proxy. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip igmp immediate-leave group-list (<1-99> \| <1300-1999> \| WORD)<br>no ip igmp immediate-leave |
| **Parameters** | **group-list**: Standard access-list name or number that defines multicast groups in which the immediate leave feature is enabled.<br>**<1-99>**: Access-list number.<br>**<1300-1999>**: Access-list number (expanded range).<br>**WORD**: Standard IP access-list name. |
| **Example usage** | `switch_a(config-if)# ip igmp immediate-leave group-list 34` |

| ip igmp access-group | |
|---|---|
| **Purpose** | Control the multicast local-membership groups learnt on an interface. This command applies to interfaces configured for IGMP Layer-3 multicast protocols, IGMP Snooping, or IGMP Proxy. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip igmp access-group (<1-99> \| WORD)<br>no ip igmp access-group |
| **Parameters** | **<1-99>**: Access-list number.<br>**WORD**: Standard IP access-list name. |
| **Example usage** | In this example, hosts serviced by interface ge5 can only join the group 225.2.2.2:<br>`switch_a#configure terminal`<br>`switch_a(config)#access-list 1 permit 225.2.2.2 0.0.0.0`<br>`switch_a(config)#interface ge5`<br>`switch_a(config-if)#ip igmp access-group 1` |

| ip igmp limit | |
|---|---|
| **Purpose** | Configure limit for maximum number of group membership states, at router level, or for the specified interface. Once the specified number of group memberships is reached, additional local memberships are ignored. An exception access-list can be used to specify group-addresses to be excluded from the limit. This command is for interfaces configured for IGMP Layer-3 multicast protocols, IGMP Snooping, or IGMP Proxy. When configured for IGMP Snooping, this command can be issued on only VLAN interfaces. The limit applies, individually, to each of its constituent interfaces. |
| **Command Mode** | Global configuration and Interface Configuration |
| **Syntax** | ip igmp limit (<1-2097152> (except (<1-99>\|<1300-1999>\| WORD)\|)<br>no ip igmp limit |
| **Parameters** | **<1-2097152>**: Max number of group membership states.<br>**except**: Multicast groups that are exempted from limit.<br>**<1-99>**: Access-list number, **<1300-1999>**: Access-list number (expanded range), **WORD**: Standard IP access-list name. |
| **Example usage** | Set IGMP limit of 100 group-membership states across all interfaces on which IGMP is enabled, and excludes group 224.1.1.1 from this limitation.<br>`switch_a(config)# access-list 1 permit 224.1.1.1 0.0.0.0`<br>`switch_a(config)# ip igmp limit 100 except 1` |

## IGMP Snooping

| show igmp snooping | |
|---|---|
| **Purpose** | Show multicast groups with receivers connected and learned through IGMP. Show state of IGMP, IGMP Proxy service for specified interface, or all interfaces. Show state of IGMP Proxy services for specified interface or for all interfaces. Show Source-Specific-Multicast Mapping, VPN Routing/Forwarding instance. |
| **Command Mode** | Privileged exec |
| **Syntax** | show igmp snooping group<br>show igmp snooping interface<br>show igmp snooping mrouter<br>show igmp snooping statistics |
| **Parameters** | None |
| **Example usage** | `switch_a# show igmp snooping statistics` |

| show igmp snooping | |
|---|---|
| **Purpose** | Show IGMP multicast group membership, interface information, multicast router information, and statistics. |
| **Command Mode** | Privileged exec |
| **Syntax** | show igmp snooping group<br>show igmp snooping interface<br>show igmp snooping mrouter<br>show igmp snooping statistics |
| **Parameters** | None |
| **Example usage** | `switch_a# show igmp snooping statistics` |

| ip igmp snooping enable | |
|---|---|
| **Purpose** | Enable IGMP Snooping. (non-querier role) |
| **Command Mode** | Global configuration |
| **Syntax** | ip igmp snooping enable<br>no ip igmp snooping |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# ip igmp snooping enable` |

| ip igmp snooping querier | |
|---|---|
| **Purpose** | Enable IGMP snooping querier role. |
| **Command Mode** | Global configuration |
| **Syntax** | ip igmp snooping querier<br>no ip igmp snooping querier |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# igmp snooping querier` |

| igmp snooping report-suppression | |
|---|---|
| **Purpose** | Enable Report suppression on global level. |
| **Command Mode** | Global configuration |
| **Syntax** | igmp snooping report-suppression<br>no igmp snooping report-suppression |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# igmp snooping report-suppression` |

| ip igmp snooping force-forward | |
|---|---|
| **Purpose** | Control how the switch will forward unknown multicast packets when the switch is in IGMP Passive mode, both with or without a Querier Port present. |
| **Command Mode** | Global configuration |
| **Syntax** | ip igmp snooping force-forward (LINE \| all \| none) |
| **Parameters** | **LINE**: Do not forward multicast packets to any interface<br>**all**: Flood all unknown multicast packets<br>**none**: Forward all multicast packets to all interfaces |
| **Example usage** | `switch_a(config-)# igmp snooping force-forward all` |

| ip igmp snooping passive-forward | |
|---|---|
| **Purpose** | Control how the switch will forward unknown multicast packets when the switch is in IGMP Passive mode and also without a Querier Port present. |
| **Command Mode** | Global configuration |
| **Syntax** | ip igmp snooping passive-forward (LINE \| all \| none) |
| **Parameters** | **LINE**: Do not forward multicast packets to any interface<br>**all**: Flood all unknown multicast packets<br>**none**: Drop all unknown multicast packets |
| **Example usage** | `switch_a(config-if)# igmp snooping passive-forward none` |

| ip igmp snooping | |
|---|---|
| **Purpose** | Enable IGMP Snooping in the VLAN interface. |
| **Command Mode** | Interface mode for VLAN |
| **Syntax** | [no] ip igmp snooping |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ip igmp snooping` |

| igmp snooping fast-leave | |
|---|---|
| **Purpose** | Enable IGMP Snooping fast-leave processing. Fast-leave processing is analogous to immediate leave processing; the IGMP group-membership is removed as soon as an IGMP leave group message is received without sending out a group-specific query. |
| **Command Mode** | Interface mode for VLAN |
| **Syntax** | [no] igmp snooping fast-leave |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ip igmp snooping fast-leave` |

| igmp snooping mrouter | |
|---|---|
| **Purpose** | Configure the specified VLAN constituent interface as a multicast router interface for IGMP Snooping in that VLAN. |
| **Command Mode** | Interface mode for VLAN |
| **Syntax** | [no] igmp snooping mrouter interface IFNAME |
| **Parameters** | **IFNAME**: Name of the interface |
| **Example usage** | `switch_a(config-if)# igmp snooping mrouter interface ge8` |

| ip igmp snooping querier | |
|---|---|
| **Purpose** | Enable IGMP snooping querier functionality in VLAN interface. |
| **Command Mode** | Interface mode for VLAN |
| **Syntax** | ip igmp snooping querier<br>no ip igmp snooping querier |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ip igmp snooping querier` |

| igmp snooping report-suppression | |
|---|---|
| **Purpose** | Enable report suppression for IGMP version 1, 2 and 3 reports. |
| **Command Mode** | Interface mode for VLAN |
| **Syntax** | igmp snooping report-suppression<br>no igmp snooping report-suppression |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# igmp snooping report-suppression` |

| igmp snooping static-group | |
|---|---|
| **Purpose** | Configure an interface belonging to a VLAN as a static member of a multicast group. Interface can be specified by type and number. |
| **Command Mode** | Interface mode for VLAN |
| **Syntax** | [no] igmp snooping static-group A.B.C.D [source A.B.C.D] interface IFNAME |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# igmp snooping static-group 230.0.0.1 interface ge10` |

# 8 STP

## STP Information

| show spanning-tree | |
|---|---|
| **Purpose** | Show the state of the spanning tree for all STP or RSTP bridge-groups, including named interface and VLANs. |
| **Command Mode** | Privileged exec |
| **Syntax** | show spanning-tree<br>show spanning-tree interface IFNAME<br>show spanning-tree mst<br>show spanning-tree mst config<br>show spanning-tree mst interface IFNAME<br>show spanning-tree mst detail<br>show spanning-tree mst detail interface IFNAME<br>show spanning-tree mst instance (<1-63> \| spbm) interface IFNAME<br>show spanning-tree mst instance (<1-63> \| spbm \| te-msti)<br>show spanning-tree rpvst+<br>show spanning-tree rpvst+ config<br>show spanning-tree rpvst+ detail<br>show spanning-tree rpvst+ detail interface IFNAME<br>show spanning-tree rpvst+ interface IFNAME<br>show spanning-tree rpvst+ vlan <1-4094><br>show spanning-tree rpvst+ vlan <1-4094> interface IFNAME<br>show spanning-tree statistics bridge <1-32><br>show spanning-tree statistics interface IFNAME (instance (<1-63> \| spbm) \| vlan <2-4094>) bridge <1-32><br>show spanning-tree statistics (interface IFNAME \| (instance (<1-63> \| spbm) \| vlan <1-4094>)) bridge <1-32><br>show spanning-tree vlan range-index |
| **Parameters** | **interface**: interface information<br>**IFNAME**: Interface name<br>**mst**: Display MST information<br>**rpvst+**: Display RPVST information<br>**statistics**: Display statistics of the BPDUs<br>**vlan range-index**: Display a VLAN range-index value |
| **Example usage** | `switch_a# show spanning-tree` |

## Global Configuration

| bridge protocol ieee | |
|---|---|
| **Purpose** | Add an IEEE 802.1d Spanning Tree Protocol bridge. After creating a bridge instance, add interfaces to the bridge using the **bridge-group** command. Bring the bridge instance into operation with the **no shutdown** command in interface mode. |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge <1-32> protocol ieee (vlan-bridge\|)<br>no bridge <1-32> protocol ieee |
| **Parameters** | **<1-32>**: Bridge group ID, **vlan-bridge**: Specify VLAN-aware bridge. |
| **Example usage** | `switch_a(config)# bridge <1-32> protocol ieee` |

| bridge spanning-tree | |
|---|---|
| **Purpose** | Enable/disable Spanning Tree Protocol on a bridge. |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge <1-32> spanning-tree enable<br>no bridge <1-32> spanning-tree enable (bridge-forward\|) |
| **Parameters** | **<1-32>**: Bridge group ID.<br>**enable**: Enable spanning tree protocol on this bridge.<br>**bridge-forward**: Puts all ports of bridge into forwarding state. |
| **Example usage** | `switch_a(config)# bridge 2 spanning-tree enable` |

| bridge spanning-tree errdisable-timeout | |
|---|---|
| **Purpose** | Enable the error-disable-timeout facility, which sets a timeout for ports disabled by the BPDU guard feature. The timer sets the interval for the port to be enabled back. |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge <1-32> spanning-tree errdisable-timeout enable<br>bridge <1-32> spanning-tree errdisable-timeout interval <10-1000000><br>no bridge <1-32> spanning-tree errdisable-timeout enable<br>no bridge <1-32> spanning-tree errdisable-timeout interval |
| **Parameters** | **enable**: Enable the timeout mechanism for the port<br>**interval:** The interval after which port shall be enabled.<br>**<10-1000000>**: Error-disable-timeout interval in seconds. |
| **Example usage** | `switch_a(config)# bridge 1 spanning-tree errdisable-timeout enable` |

| bridge spanning-tree force-version | |
|---|---|
| **Purpose** | Set the version for the bridge. A version identifier of less than a value of 2 enforces the spanning tree protocol. Although the command supports an input range of 0-4, for RSTP, the valid range is 0-2. When the forceversion is set for a bridge, all ports of the bridge have the same spanning tree version set.<br><br>Use the **show spanning tree** command to display administratively configured and currently running values of the BPDU filter parameter for the bridge and port. |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge <1-32> spanning-tree force-version <0-4><br>no bridge <1-32> spanning-tree force-version |
| **Parameters** | **<1-32>**: Bridge group ID.<br>**force-version**: Specify a force version identifier:<br>0 STP<br>1 Not supported<br>2 RSTP<br>3 MSTP<br>4 SPB |
| **Example usage** | `switch_a(config)# bridge 1 spanning-tree force-version 0` |

| bridge spanning-tree pathcost | |
|---|---|
| **Purpose** | Set a spanning-tree path cost method. If the short parameter is used, the switch uses a value for the default path cost a number in the range 1 through 65,535. If the long parameter is used, the switch uses a value for the default path cost a number in the range 1 through 200,000,000. Use the no option to return the path cost method to the default setting.<br><br>The default path cost method for STP is short and for MSTP/RSTP is long. |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge <1-32> spanning-tree pathcost method (short \| long)<br>no bridge <1-32> spanning-tree pathcost method |
| **Parameters** | <1-32>: The bridge group ID.<br>method: Method used to calculate default port path cost.<br>long: 16-bit values for default port path costs.<br>short: 32-bit values for default port path costs. |
| **Example usage** | `switch_a(config)#bridge 1 spanning-tree pathcost method short` |

| bridge spanning-tree portfast | |
|---|---|
| **Purpose** | Set the portfast BPDU (Bridge Protocol Data Unit) guard or filter for the bridge. Use the **show spanning tree** command to display administratively configured and currently running values of the BPDU filter parameter.<br><br>**BPDU Filter** — All ports that have their BPDU filter set to default take the same value of BPDU filter as that of the bridge. The Spanning Tree Protocol sends BPDUs from all ports. Enabling the BPDU Filter feature ensures that PortFast-enabled ports do not transmit or receive any BPDUs.<br><br>**BPDU Guard** — When the BPDU guard feature is set for a bridge, all portfast-enabled ports of the bridge that have the BPDU guard set to default shut down the port on receiving a BPDU. In this case, the BPDU is not processed. The port can be brought back up manually with the **no shutdown** command, or the **errdisable-timeout** feature can be used to to re-enable the port after a specified time interval. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] bridge <1-32> spanning-tree portfast bpdu-guard<br>[no] bridge <1-32> spanning-tree portfast bpdu-filter |
| **Parameters** | **<1-32>**: Bridge group ID.<br>**bpdu-filter**: Filter the BPDUs on portfast enabled ports.<br>**bpdu-guard**: Guard the portfast ports against BPDU receive. |
| **Example usage** | `switch_a(config)# bridge 3 spanning-tree portfast bpdu-filter` |

| bridge vlan priority | |
|---|---|
| **Purpose** | Create or delete a mapping between an MSTI and VLAN for RPVST+ operation. The bridge instance must already be configured for RPVST+ operation.<br><br>This command sets the priority value for the spanning-tree on the bridge. The lower the priority of the VLAN on a bridge, the better the chances of the bridge becoming a root bridge, or a designated bridge for the VLAN. The permitted range of values is 0-61440. The no command resets to default **priority** (32768). |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge <1-32> vlan <2-4094> priority <0-61440><br>no bridge <1-32> vlan <2-4094> priority |
| **Parameters** | **<1-32>**: Bridge group ID, **vlan**: Identity of VLAN <2-4094>.<br>**priority**: The bridge priority for the common instance.<br>**<0-61440>**: Bridge priority in increments of 4096 |
| **Example usage** | `switch_a(config)# bridge 1 vlan 2 priority 80` |

| bridge hello-time | |
|---|---|
| **Purpose** | Set the hello-time, the time in seconds after which (if this bridge is the root bridge) all the bridges in a bridged LAN exchange Bridge Protocol Data Units (BPDUs). A very low value of this parameter leads to excessive traffic on the network, while a higher value delays the detection of topology change.This value is used by all instances.<br><br>Configure the bridge instance name before using this command. The allowable range of values is 1-10 seconds. Make sure that the value of hello time is always greater than the value of hold time (2 seconds by default).<br><br>Use the no parameter to restore the default value of the hello time. Default hello time value is 2 seconds. |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge <1-32> hello-time <1-10><br>no bridge <1-32> hello-time |
| **Parameters** | **<1-32>**: Bridge group ID.<br>**<1-10>**: Hello BPDU interval in seconds. |
| **Example usage** | `switch_a(config)# bridge 3 hello-time 3` |

| bridge priority | |
|---|---|
| **Purpose** | Set the bridge priority for the common instance. Using a lower priority indicates a greater likelihood of the bridge becoming root. The priority values can be set only in increments of 4096. Use the no parameter to reset it to the default value. The default priority is 32768 (or hex 0x8000). |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge (<1-32> \| ) priority <0-61440><br>no bridge (<1-32> \| ) |
| **Parameters** | **<1-32>**: Bridge group ID.<br>**<0-61440>**: Bridge priority |
| **Example usage** | `switch_a(config)# bridge 2 priority 4096` |

| bridge max-age | |
|---|---|
| **Purpose** | Set the maximum age for a bridge. This value is used by all instances. Maximum age is the maximum time in seconds for which (if a bridge is the root bridge) a message is considered valid.<br><br>This prevents the frames from looping indefinitely. The value of maximum age should be greater than twice the value of hello time plus 1, but less than twice the value of forward delay minus 1. The allowable range for max-age is 6-40 seconds. Configure this value sufficiently high, so that a frame generated by root can be propagated to the leaf nodes without exceeding the maximum age.<br><br>Use the no parameter to restore the default value of the maximum age (20 seconds). |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge <1-32> max-age <6-40><br>no bridge <1-32> max-age |
| **Parameters** | **<1-32>**: Bridge group ID.<br>**<6-40>**: Maximum time, in seconds, to listen for the root bridge. |
| **Example usage** | `switch_a(config)# bridge 2 max-age 12` |

| bridge forward-time | |
|---|---|
| **Purpose** | Set the time (in seconds) after which (if this bridge is the root bridge) each port changes states to learning and forwarding. This value is used by all instances. Use the no parameter to restore the default value (15 seconds). |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge <1-32> forward-time <4-30><br>no bridge <1-32> forward-time |
| **Parameters** | **<1-32>**: Bridge group ID.<br>**<6-40>**: Maximum time, in seconds, to listen for the root bridge. |
| **Example usage** | `switch_a(config)# bridge 2 max-age 12` |
| **Note** | Be careful when setting this value lower than 7 seconds |

| spanning-tree acquire | |
|---|---|
| **Purpose** | Enable the default bridge to learn station location information for an instance. This helps in making forwarding decisions. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] spanning-tree acquire |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# spanning-tree acquire` |
| **Note** | Learning is enabled by default for all instances. |

| bridge-group spanning-tree | |
|---|---|
| **Purpose** | Enable or disable the spanning-tree on a configured bridge. |
| **Command Mode** | Interface Configuration |
| **Syntax** | bridge-group <1-32> spanning-tree (disable \| enable) |
| **Parameters** | **<1-32>**: Bridge group ID.<br>**disable**: Disable spanning tree on the interface.<br>**enable**: Enable spanning tree on the interface. |
| **Example usage** | `switch_a(config-if)# bridge-group 1 spanning-tree enable` |
| **Note** | Spanning-tree is enabled by default. |

| bridge-group path-cost | |
|---|---|
| **Purpose** | Set the cost of a path. Before setting a path-cost in a VLAN configuration, add an MST instance to a port using the **bridge-group instance** command.<br>Use the no parameter to restore the default cost value of the path, which varies according to bandwidth. |
| **Command Mode** | Interface Configuration |
| **Syntax** | bridge-group <1-32> path-cost <1-200000000><br>no bridge-group <1-32> path-cost |
| **Parameters** | **<1-32>**: Bridge group ID.<br>**<1-200000000>**: Cost of the path (lower means a greater likelihood of the interface becoming root). |
| **Example usage** | `switch_a(config-if)# bridge-group 4 path-cost 1000` |
| **Note** | Assuming a 10 Mb/s link speed, the default value is 200,000. |

| bridge-group priority | |
|---|---|
| **Purpose** | Set the port priority for a bridge. A lower priority indicates a greater likelihood of the bridge becoming root. |
| **Command Mode** | Interface Configuration |
| **Syntax** | bridge-group <1-32> priority <0-240> |
| **Parameters** | **<1-32>**: Bridge group ID.<br>**<0-240>**: Port priority, . The priority values can only be set in increments of 16. |
| **Example usage** | `switch_a(config-if)# bridge-group 4 priority 32` |

| bridge-group instance | |
|---|---|
| **Purpose** | Assign a Multiple Spanning Tree (MST) instance to a port. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] bridge-group (<1-32> \| backbone) instance (<1-63> \| spbm \| te-msti) |
| **Parameters** | **<1-32>**: Bridge identifier.<br>**<1-63>**: Multiple spanning tree instance identifier.<br>**spbm**: Shortest Path Bridging - MAC instance.<br>**te-msti**: Traffic engineering MSTI instance. |
| **Example usage** | `switch_a(config-if)# bridge-group 1 instance te-msti` |

| bridge-group instance path-cost | |
|---|---|
| **Purpose** | Set a path cost for a multiple spanning tree instance. Before using this command, add an MST instance to a port using the **bridge-group instance** command. Use the no form to set the path cost to default, which varies according to bandwidth. |
| **Command Mode** | Interface Configuration |
| **Syntax** | bridge-group (<1-32> \| backbone) instance <1-63> path-cost <1-200000000><br>no bridge-group ( <1-32> \| backbone) instance <1-63> path-cost |
| **Parameters** | **<1-32>**: Bridge identifier.<br>**<1-63>**: Multiple spanning tree instance identifier.<br>**<1-200000000>**: Path cost for a port (lower path cost means greater likelihood of becoming root). |
| **Example usage** | `switch_a(config-if)# bridge-group 4 instance 3 path-cost 1000` |

| bridge-group instance priority | |
|---|---|
| **Purpose** | Set the priority of a multiple spanning tree instance. The Multiple Spanning Tree Protocol uses port priority as a tiebreaker to determine which port should forward frames for a particular instance on a LAN, or which port should be the root port for an instance. A lower value implies a better priority. In the case of the same priority, the interface index will serve as the tiebreaker, with the lower-numbered interface being preferred over others. |
| **Command Mode** | Interface Configuration |
| **Syntax** | bridge-group (<1-32>) instance (<1-63>) priority <0-240> |
| **Parameters** | **<1-32>**: Bridge identifier.<br>**<1-63>**: Multiple spanning tree instance identifier.<br>**<0-240>**: Port priority, set in increments of 16. |
| **Example usage** | `switch_a(config-if)# bridge-group 2`<br>`switch_a(config-if)# bridge-group 2 instance 4`<br>`switch_a(config-if)# bridge-group 2 instance 4 priority 64` |
| **Note** | Default value of port priority is 128. |

| spanning tree autoedge | |
|---|---|
| **Purpose** | Set automatic identification of the edge port. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] spanning-tree autoedge |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# spanning tree autoedge` |

| spanning tree edgeport | |
|---|---|
| **Purpose** | Set a port as an edge-port and to enable rapid transitions. Use the no parameter to set port to default state (not an edge-port) and to disable rapid transitions. This command is an alias to the **spanning-tree portfast** command, can be used interchangeably. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] spanning-tree edgeport |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# spanning tree edgeport` |

| spanning tree guard root | |
|---|---|
| **Purpose** | Enable the root guard feature for the port. This feature disables reception of superior BPDUs. The root guard feature makes sure that the port on which it is enabled is a designated port. If the root guard enabled port receives a superior BPDU, it goes to a Listening state (for STP) or discarding state (for RSTP and MSTP). |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] spanning-tree guard root |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# spanning tree guard root` |

| spanning tree portfast | |
|---|---|
| **Purpose** | Enable fast transitions, with port placed in the forwarding state immediately. Port does not go through listening, learning, and forwarding states. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] spanning-tree portfast |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# spanning tree portfast` |

| spanning tree bpdu-guard | |
|---|---|
| **Purpose** | Enable or disable the BPDU Guard feature on a port. This command supersedes the bridge level configuration for the BPDU Guard feature. When the enable or disable parameter is used with this command, this configuration takes precedence over bridge configuration. However, when the default parameter is used with this command, the bridge-level BPDU Guard configuration takes effect.<br>Use the **show spanning tree** command to display currently running values of the BPDU filter parameter. |
| **Command Mode** | Interface Configuration |
| **Syntax** | spanning-tree bpdu-guard (enable \| disable \| default)<br>no spanning-tree bpdu-guard |
| **Parameters** | None: |
| **Example usage** | `switch_a(config-if)# spanning-tree bpdu-guard enable` |

| spanning tree hello-time | |
|---|---|
| **Purpose** | Set the hello-time, the time in seconds after which (if this bridge is the root bridge) all the default bridges in a bridged LAN exchange Bridge Protocol Data Units (BPDUs). A very low value of this parameter leads to excessive traffic on the network, while a higher value delays the detection of topology change. This value is used by all instances. Use the no parameter to return to the default value for the hello time. |
| **Command Mode** | Interface Configuration |
| **Syntax** | spanning-tree hello-time <1-10><br>no spanning-tree hello-time |
| **Parameters** | **<1-10>**: BPDU in seconds |
| **Example usage** | `switch_a(config-if)# spanning-tree hello-time 5` |
| **Note** | Default hello time is 2. The value of the hello time must always be greater than the value of the hold time. |

| spanning tree enable/disable | |
|---|---|
| **Purpose** | Enable or disable spanning tree on an interface for the default bridge. |
| **Command Mode** | Interface Configuration |
| **Syntax** | spanning-tree enable<br>spanning-tree disable |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# spanning-tree enable` |
| **Note** | Spanning-tree is enabled by default if the **switchport** command is configured. |

| spanning-tree instance restricted-role | |
|---|---|
| **Purpose** | Set the restricted role value for the instance to TRUE. Use the no parameter to set the restricted role to default (FALSE). |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] spanning-tree instance <1-63> restricted-role |
| **Parameters** | **<1-63>**: Instance ID |
| **Example usage** | `switch_a(config-if)# spanning-tree instance 2 restricted-role` |

| spanning-tree instance restricted-tcn | |
|---|---|
| **Purpose** | Set the restricted Topology Change Notification (TCN) value for the instance to TRUE. Use the no parameter to set the restricted role value for the instance to default (FALSE). |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] spanning-tree instance <1-63> restricted-tcn |
| **Parameters** | **<1-63>**: Instance ID |
| **Example usage** | `switch_a(config-if)# spanning-tree instance 2 restricted-tcn` |

| spanning-tree link-type | |
|---|---|
| **Purpose** | Enable or disable point-to-point or shared link types. RSTP has a backward-compatible STP mode, spanning-tree link-type **shared**. An alternative is the spanning-tree **force-version 0**. |
| **Command Mode** | Interface Configuration |
| **Syntax** | spanning-tree link-type (auto \| point-to-point \| shared)<br>no spanning-tree link-type |
| **Parameters** | **auto**: Sets to either point-to-point or shared based on duplex state.<br>**point-to-point**: Enables rapid transition.<br>**shared**: Disables rapid transition. |
| **Example usage** | `switch_a(config-if)# spanning-tree link-type point-to-point` |

| spanning-tree bpdu-filter | |
|---|---|
| **Purpose** | Set the BPDU filter value for individual ports. The **enable** or **disable** parameters cause this configuration to take precedence over bridge configuration. The **default** parameter causes the bridge level BPDU filter configuration to take effect for the port. Use the **show spanning tree command** to display currently running values of the BPDU filter parameter. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] spanning-tree bpdu-filter (enable \| disable \| default) |
| **Parameters** | **default**: Sets the bpdu-filter to the default level.<br>**disable**: Disables the BPDU-filter.<br>**enable**: Enables the BPDU-filter. |
| **Example usage** | `switch_a(config-if)# spanning-tree bpdu-filter enable` |

| spanning-tree restricted-role | |
|---|---|
| **Purpose** | Set the restricted role value for the instance to TRUE. Use the no parameter to set the restricted role value for the instance to FALSE. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] spanning-tree restricted-role |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# spanning-tree restricted-role` |
| **Note** | Default restricted role value is FALSE. |

| spanning-tree restricted-tcn | |
|---|---|
| **Purpose** | Set the restricted TCN value for the instance to TRUE, restricting the Topology Change Notification (TCN) BPDUs sent on the port. Use the no parameter to set the restricted role value for the instance to FALSE. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] spanning-tree restricted-tcn |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# spanning-tree restricted-tcn` |
| **Note** | Default restricted tcn value is FALSE. |

| spanning-tree vlan | |
|---|---|
| **Purpose** | Set restrictions for the port of a particular VLAN. |
| **Command Mode** | Interface Configuration |
| **Syntax** | spanning-tree vlan <2-4094> restricted-role<br>spanning-tree vlan <2-4094> restricted-tcn<br>no spanning-tree vlan <2-4094> restricted-role<br>no spanning-tree vlan <2-4094> restricted-tcn |
| **Parameters** | **<2-4094>**: VLAN identifier.<br>**restricted-role**: Restrict the role of the port<br>**restricted-tcn**: Restrict propagation of topology change notifications from the port |
| **Example usage** | `switch_a(config-if)# spanning-tree vlan 3 restricted-role` |

| traffic-class-table | |
|---|---|
| **Purpose** | Set the user priority and number of supported traffic classes. |
| **Command Mode** | Interface Configuration |
| **Syntax** | traffic-class-table user-priority <0-7> num-traffic-classes <1-8> value <0-7><br>traffic-class-table user-priority <0-7> value <0-3> |
| **Parameters** | **user-priority**: User priority associated with the traffic class table<br>**<0-7>**: User priority value<br>**num-traffic-classes**: Number of traffic classes<br>**<1-8>**: Number of traffic classes<br>**value**: Value for the given user priority/num traffic classes<br>**<0-7>**: Value for the given user priority classes<br>**<0-3>**: Value for the given user priority classes |
| **Example usage** | `switch_a(config-if)# traffic-class-table user-priority 3 num-traffic-classes 4 value 5` |

| user-priority | |
|---|---|
| **Purpose** | Set the default user priority associated with the interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | user-priority <0-7><br>no user-priority |
| **Parameters** | **<0-7>**: User priority value |
| **Example usage** | `switch_a(config-if)# user-priority 3` |

| user-priority-regen-table | |
|---|---|
| **Purpose** | Set the value for the mapping of user-priority to regenerated user-priority. |
| **Command Mode** | Interface Configuration |
| **Syntax** | user-priority-regen-table user-priority <0-7> regenerated-user-priority <0-7> |
| **Parameters** | **user-priority**: Port priority that has to be mapped.<br>**<0-7>**: User priority value.<br>**regenerated-user-priority**: Regenerated values used for the user priority.<br>**<0-7>**: Regenerated user priority value. |
| **Example usage** | `switch_a(config-if)# user-priority-regen-table user-priority 3 regenerateduser-priority 5` |

## RSTP Port Setting

| bridge protocol rstp | |
|---|---|
| **Purpose** | Add an IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) bridge. After creating a bridge instance, add interfaces to the bridge using the bridge-group command. Bring the bridge instance into operation with the **no shutdown** command in Interface mode. Use the no parameter to remove the bridge. |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge <1-32> protocol rstp (ring \|)<br>bridge <1-32> protocol rstp (vlan-bridge \|)(ring \|)<br>no bridge <1-32> |
| **Parameters** | **<1-32>:**: Bridge group ID.<br>**ring**: Add an RSTP bridge for a ring topology.<br>**vlan-bridge**: Add a VLAN-aware bridge. |
| **Example usage** | `switch_a(config)# bridge 3 protocol rstp vlan-bridge` |

| bridge rapid-spanning-tree | |
|---|---|
| **Purpose** | Enable or disable RSTP on a specific bridge. Use the **bridge-forward** option with the no form of the command to place all ports on the specified bridge into the forwarding state. |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge (<1-32> \| backbone) rapid-spanning-tree enable<br>no bridge <1-32> rapid-spanning-tree enable (bridge-forward \|) |
| **Parameters** | **<1-32>:**: Bridge group ID.<br>**enable**: Enable the spanning tree protocol.<br>**bridge-forward**: Put all ports of specified bridge in forwarding state. |
| **Example usage** | `switch_a(config)# bridge 2 rapid-spanning-tree enable` |
| **Note** | When the **bridge-forward** option is not used with the no parameter, the default behavior puts all bridge ports in the blocking state. |

## MSTP Properties

| bridge protocol mstp | |
|---|---|
| **Purpose** | Create a multiple spanning-tree protocol (MSTP) bridge of a specified parameter. This command creates an instance of the spanning tree and associates the VLANs specified with that instance. The MSTP bridges can have different spanning-tree topologies for different VLANs inside a region of “similar” MSTP bridges. The multiple spanning tree protocol, like the rapid spanning tree protocol, provides rapid reconfiguration capability, while providing load balancing ability. A bridge created with this command forms its own separate region unless it is added explicitly to a region using the region name command. |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge <1-32> protocol mstp (ring \|)<br>no bridge <1-32> |
| **Parameters** | **<1-32>**: Bridge group ID.<br>**ring**: (Optional) Enable rapid ring spanning-tree. |
| **Example usage** | `switch_a(config)# bridge 2 protocol mstp ring` |

| bridge multiple-spanning-tree | |
|---|---|
| **Purpose** | Enable MSTP on a bridge. |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge <1-32> multiple-spanning-tree enable<br>no bridge <1-32> multiple-spanning-tree enable (bridge-forward\|) |
| **Parameters** | **<1-32>**: Bridge group ID.<br>**enable**: Enable the spanning tree protocol.<br>**bridge-forward**: Put all ports of specified bridge in forwarding state. |
| **Example usage** | `switch_a(config)# bridge 2 multiple-spanning-tree enable` |
| **Note** | When the **bridge-forward** option is not used with the no parameter, the default behavior puts all bridge ports in the blocking state. |

## MSTP Instance Setting

| bridge max-hops | |
|---|---|
| **Purpose** | Set the maximum allowed hops for a BPDU in an MST region |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] <1-32> max-hops <1-40> |
| **Parameters** | **<1-32>**: Bridge group ID<br>**<1-40>**: Maximum hops for which the BPDU will be valid. |
| **Example usage** | `switch_a(config)# bridge 2 max-hops 25` |
| **Note** | Default maximum hops in an MST region are 20. |

| spanning-tree mst configuration | |
|---|---|
| **Purpose** | Enter the Multiple Spanning Tree Configuration mode. |
| **Command Mode** | Global Configuration |
| **Syntax** | spanning-tree mst configuration |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# spanning-tree mst configuration`<br>`switch_a(config-mst)#` |

| bridge instance | |
|---|---|
| **Purpose** | Add an MST instance to a bridge. |
| **Command Mode** | MST Configuration mode |
| **Syntax** | [no] bridge (<1-32> \| backbone) instance (<1-63> \| spbm \| spbv) |
| **Parameters** | **<1-32>**: Bridge identifier.<br>**backbone**: Backbone bridge.<br>**<1-63>**: MST instance identifier.<br>**spbm**: Shortest Path Bridging - MAC instance.<br>**spbv**: Shortest Path Bridging - VID instance. |
| **Example usage** | `switch_a(config-mst)# bridge 4 instance 3` |

| bridge instance priority | |
|---|---|
| **Purpose** | Set the bridge instance priority. The lower the priority of the bridge, the better the chances is of the bridge becoming a root bridge or a designated bridge for the LAN. |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge (<1-32> \| backbone) instance <1-63> priority <0-61440><br>no bridge (<1-32> \| backbone) instance <1-63> priority |
| **Parameters** | **<1-32>**: Bridge group ID<br>**<1-63>**: The instance identifier.<br>**<0-61440>**: Bridge priority value. |
| **Example usage** | `switch_a(config)# bridge 4 instance 3 priority 16384` |
| **Note** | The priority values can be set only in increments of 4096. The default value is 32768. |

| bridge instance vlan | |
|---|---|
| **Purpose** | Add multiple VLANs for the corresponding instance of a bridge.The VLANs must already be created. Use the no form to simultaneously remove multiple VLANs for the corresponding instance of a bridge. |
| **Command Mode** | MST Configuration mode |
| **Syntax** | bridge (<1-32> \| backbone) instance (<1-63> \| spbm \| spbv) vlan VLANID<br>no bridge (<1-32> \| backbone) instance (<1-63> \| spbm \| spbv) vlan VLANID |
| **Parameters** | **<1-32>**: Bridge identifier.<br>**backbone**: Backbone bridge.<br>**<1-63>**: MST instance identifier.<br>**spbm**: Shortest Path Bridging - MAC instance.<br>**spbv**: Shortest Path Bridging - VID instance.<br>**VLANID**: <2-4094>. Specify a single VLAN, a range, or a list. |
| **Example usage** | Associate VLANs 10 and 20 to instance 1 of bridge 1: |
| | `switch_a(config-mst)# bridge 1 instance 1 vlan 10,20` |
| | Add VLANs 10, 11, 12, 13, 14, and 15 to instance 1 of bridge 1: |
| | `switch_a(config-mst)# bridge 1 instance 1 vlan 10-15` |
| | Delete VLANs 10 and 11 from instance 1 of bridge 1: |
| | `switch_a(config-mst)# no bridge 1 instance 1 vlan 10,11` |
| **Note** | For a VLAN range, specify two VLAN identifiers: lowest then highest separated by hyphen. For a VLAN list, specify VLAN identifiers separated by commas. Do not enter spaces between the hyphens or commas. |

| instance vlan | |
|---|---|
| **Purpose** | Create an instance(s) of a VLAN for the default bridge (0). This command can be used only after the VLANs are defined; that is, LANs must be created before being associated with an MST instance (MSTI). |
| **Command Mode** | MST Configuration mode |
| **Syntax** | instance <1-63> vlan VLANID<br>no instance <1-63> vlan VLANID |
| **Parameters** | **<1-63>**: MST instance identifier.<br>**VLANID**: VLAN identifier(s) |
| **Example usage** | `switch_a(config-mst)# instance 2 vlan 30` |

| bridge region | |
|---|---|
| **Purpose** | Use this command to create an MST region and specify its name. MST bridges of a region form different spanning trees for different VLANs. |
| **Command Mode** | MST Configuration mode |
| **Syntax** | bridge <1-32> region REGION_NAME<br>no bridge <1-32> region |
| **Parameters** | **<1-32>**: The bridge group ID.<br>**REGION_NAME**: The name of the region. |
| **Example usage** | `switch_a(config-mst)# bridge 3 region IPI` |
| **Note** | By default, each MST bridge starts with the region name as its bridge address. This means each MST bridge is a region by itself, unless specifically added to one. |

| bridge revision | |
|---|---|
| **Purpose** | Specify the revision number, to be used for configuration information tracking. |
| **Command Mode** | MST Configuration mode |
| **Syntax** | bridge <1-32> revision <0-65535><br>no bridge <1-32> |
| **Parameters** | **<1-32>**:  The bridge group ID<br>**<0-65535>**: Revision number |
| **Example usage** | `switch_a(config-mst)# bridge 3 revision 25` |
| **Note** | The default value of revision number is 0. |

| region | |
|---|---|
| **Purpose** | Create an MST region of the default bridge, and specify a name to it. |
| **Command Mode** | MST Configuration mode |
| **Syntax** | [no] region REGION_NAME |
| **Parameters** | **REGION_NAME**: Name of the region |
| **Example usage** | `switch_a(config-mst)# region IPI` |

# 9 VLAN

## VLAN Information

| show vlan | |
|---|---|
| **Purpose** | Show information for VLANs globally and per port. |
| **Command Mode** | Privileged exec |
| **Syntax** | show vlan brief<br>show vlan private-valn<br>show vlan classifier<br>show vlan access-list<br>show vlan access-map<br>show vlan all<br>show vlan auto<br>show vlan filter<br>show vlan static |
| **Parameters** | **None** |
| **Example usage** | `switch_a# show vlan brief` |

## VLAN Setting

| vlan database | |
|---|---|
| **Purpose** | Enter the VLAN configuration mode |
| **Command Mode** | Global configuration |
| **Syntax** | vlan database |
| **Parameters** | **None** |
| **Example usage** | `switch_a(config)# vlan database` |

| vlan bridge | |
|---|---|
| **Purpose** | Add or remove a vlan under a bridge. |
| **Command Mode** | VLAN database |
| **Syntax** | vlan <1-3999> bridge<1-32> state [enable \| disable]<br>no vlan <2-4094> bridge <1-32> |
| **Parameters** | **<1-3999>:** VLAN ID<br>**<1-32>:** Bridge ID |
| **Example usage** | `switch_a(config-vlan)# vlan 100 bridge 1 enable` |

| vlan mtu | |
|---|---|
| **Purpose** | Set the Maximum Transmission Unit (MTU) for a specified VLAN. Packets larger than the set MTU size are discarded. |
| **Command Mode** | VLAN database |
| **Syntax** | vlan <2-4094> mtu MTU_VAL<br>vlan <2-4094> mtu MTU_VAL bridge <1-32><br>no vlan <2-4094> mtu<br>no vlan <2-4094> mtu bridge <1-32> |
| **Parameters** | **MTU_VAL:** Value of the Maximum Transmission Unit<br>**bridge:** Bridge group ID |
| **Example usage** | `switch_a(config-vlan)# vlan 2 mtu 1000 bridge 1` |

| vlan name | |
|---|---|
| **Purpose** | Enable or disable the name of a VLAN on the default bridge. |
| **Command Mode** | VLAN database |
| **Syntax** | vlan <2-4094> name WORD [state (enable \| disable)] |
| **Parameters** | **enable:** Sets VLAN into enable state<br>**disable:** Sets VLAN into disable state |
| **Example usage** | `switch_a(config-vlan)# vlan 100 name dilvish state enable` |

## Port Settings

| switchport mode access | |
|---|---|
| **Purpose** | Set the interface to access mode, and classify untagged frames only. Received frames are classified based on the VLAN characteristics, then accepted or discarded based on the filtering criteria. |
| **Command Mode** | Interface Configuration |
| **Syntax** | switchport mode access [ingress-filter (enable \| disable)] |
| **Parameters** | **ingress-filter**: Set the ingress filtering for the received frames.<br>**enable**: Set the ingress filtering for received frames<br>**disable**: Turn off ingress filtering to accept frames that do not meet the classification criteria. This is the default value. |
| **Example usage** | `switch_a(config-if)# switchport mode access ingress-filter enable` |

| switchport access | |
|---|---|
| **Purpose** | Change the default VLAN on the current interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | switchport access vlan VLAN_ID<br>no switchport access vlan |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# switchport access vlan 30` |

| switchport mode trunk | |
|---|---|
| **Purpose** | Set the interface as trunk, and specify only tagged frames. |
| **Command Mode** | Interface Configuration |
| **Syntax** | switchport mode trunk [ingress-filter (enable \| disable)] |
| **Parameters** | **ingress-filter**: Set the ingress filtering for the received frames.<br>**enable**: Set the ingress filtering for received frames.<br>**disable**: Turn off ingress filtering to accept frames that do not meet the classification criteria. This is the default value. |
| **Example usage** | `switch_a(config-if)# switchport mode trunk ingress-filter enable` |

| switchport trunk allowed | |
|---|---|
| **Purpose** | Set the interface to trunk and add VLANs.<br>For a VLAN range, specify two VLAN identifiers: the lowest and then the highest separated by a hyphen. For a VLAN list, specify the VLAN identifiers separated by commas. Do not enter spaces between the hyphens or commas. Use the no parameter to remove all VLAN identifiers configured on this port. |
| **Command Mode** | Interface Configuration |
| **Syntax** | switchport trunk allowed vlan all<br>switchport trunk allowed vlan none<br>switchport trunk allowed vlan add VLAN_ID<br>switchport trunk allowed vlan except VLAN_ID<br>switchport trunk allowed vlan remove VLAN_ID<br>no switchport trunk |
| **Parameters** | **all**: Allow all VLANs to transmit and receive through the interface.<br>**none**: Allow no VLANs to transmit and receive through the interface.<br>**add**: Add these VLANs to the member set.<br>**VLAN_ID**: VLAN identifier(s) <2-4094>. Specify a single VLAN, a VLAN range, or a VLAN list.<br>**except**: All VLANs except these VLANs are part of the member set.<br>**remove**: Remove these VLANs from the member set. |
| **Example usage** | `switch_a(config-if)# switchport trunk allowed vlan add V2` |
| **Note** | The result of not using this command is that ingress filtering is off, and that all frame types are classified and accepted. |

| switchport mode hybrid | |
|---|---|
| **Purpose** | Set the switching characteristics of the Layer 2 interface as hybrid, and classify both tagged and untagged frames.<br>Set the interface acceptable frame types. This processing occurs after VLAN classification. |
| **Command Mode** | Interface Configuration |
| **Syntax** | switchport mode hybrid<br>no switchport hybrid<br>switchport mode hybrid acceptable-frame-type (all \| vlan-tagged)<br>switchport mode hybrid ingress-filter (enable \| disable) |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# switchport mode hybrid acceptable-frame-type all` |

| switchport hybrid | |
|---|---|
| **Purpose** | Set the switching characteristics of the Layer 2 interface as hybrid, and set the VLANs that will transmit/receive through the Layer 2 interface. Set the default VLAN for the interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | switchport hybrid allowed vlan all<br>switchport hybrid allowed vlan none<br>switchport hybrid allowed vlan except VLAN_ID<br>switchport (hybrid) allowed vlan remove VLAN_ID<br>switchport (hybrid) allowed vlan add VLAN_ID egress-tagged (enable\|disable)<br>no switchport hybrid<br>switchport hybrid vlan VLAN_ID |
| **Parameters** | **all**: All VLANs can transmit and receive through the interface.<br>**none**: No VLANs can transmit and receive through the interface.<br>**except**: Allow all VLANs except these VLANs to transmit and receive through the interface.<br>**VLAN_ID**: VLAN identifier <2-4094>. Specify a single VLAN, a VLAN range, or a VLAN list.<br>**remove**: Remove these VLANs from the member set.<br>**add**: Add these VLANs to the member set.<br>**egress-tagged**: Tag outgoing frames.<br>**enable**: Enable egress tagging for outgoing frames.<br>**disable**: Disable egress tagging for outgoing frames. |
| **Example usage** | `switch_a(config-if)# switchport hybrid allowed vlan add 2 egress-tagged enable` |

## Private VLAN

| private-vlan primary | |
|---|---|
| **Purpose** | Create a primary VLAN. |
| **Command Mode** | VLAN Configuration |
| **Syntax** | [no] private-vlan <2-4094> primary bridge <1-32> |
| **Parameters** | **<2-4094>:** Private VLAN identifier.<br>**<1-32>**: Bridge ID |
| **Example usage** | `switch_a(config-vlan)# private-vlan 2 primary bridge 1` |

| private-vlan association | |
|---|---|
| **Purpose** | Associate a secondary VLAN to a primary VLAN. Only one isolated VLAN can be associated to a primary VLAN. Multiple community VLANs can be associated to a primary VLAN. |
| **Command Mode** | VLAN Configuration |
| **Syntax** | private-vlan <2-4094> association add VLAN_ID bridge <1-32><br>private-vlan <2-4094> association remove VLAN_ID bridge <1-32><br>no private-vlan <2-4094> association bridge <1-32> |
| **Parameters** | **<2-4094>**: Private VLAN identifier.<br>**add**: Add values associated with a single VLAN.<br>**remove**: Remove values associated with a single VLAN.<br>**VLAN_ID**: Secondary VLAN identifier <2-4094>.<br>**<1-32>**: Bridge group ID. |
| **Example usage** | `switch_a(config-vlan)# private-vlan 2 association add 3-4 bridge` |

| private-vlan isolated | |
|---|---|
| **Purpose** | Create an isolated VLAN. Use the no form to remove the specified private VLAN. |
| **Command Mode** | VLAN Configuration |
| **Syntax** | private-vlan <2-4094> isolated bridge <1-32><br>no private-vlan <2-4094> isolated bridge <1-32> |
| **Parameters** | **<2-4094>**: Private VLAN identifier.<br>**<1-32>**: Bridge identifier. |
| **Example usage** | `switch_a(config-vlan)# private-vlan 3 isolated bridge 1` |

| private-vlan community | |
|---|---|
| **Purpose** | Set a VLAN type for a private (community) VLAN. Use the no form to remove the specified private VLAN. |
| **Command Mode** | VLAN Configuration |
| **Syntax** | private-vlan <2-4094> community bridge <1-32><br>no private-vlan <2-4094> community bridge <1-32> |
| **Parameters** | **<2-4094>**: Private VLAN identifier.<br>**<1-32>**: Bridge identifier. |
| **Example usage** | `switch_a(config-vlan)# private-vlan 4 community bridge 1` |

| switchport mode private-vlan | |
|---|---|
| **Purpose** | Make a Layer 2 port a host port or promiscuous port. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] switchport mode private-vlan (host \| promiscuous) |
| **Parameters** | **host**: Port can communicate with all other host ports assigned to the same community VLAN, but it cannot communicate with the ports in the same isolated VLAN. All communications outside of this VLAN must pass through a promiscuous port in the associated primary VLAN.<br>**promiscuous**: Port can communicate with all interfaces, including the community and isolated ports within a private VLAN |
| **Example usage** | `switch_a(config-if)# switchport mode private-vlan promiscuous` |

| switchport private-vlan host-association | |
|---|---|
| **Purpose** | Associate a primary VLAN and a secondary VLAN to a host port. Only one primary and secondary VLAN can be associated to a host port. |
| **Command Mode** | Interface Configuration |
| **Syntax** | switchport private-vlan host-association <2-4094> add <2-4094><br>no switchport private-vlan host-association |
| **Parameters** | **<2-4094>**: VLAN identifier of the primary VLAN.<br>**add**: Add the secondary VLAN.<br>**<2-4094>**: VLAN identifier of the secondary VLAN (either isolated or community). |
| **Example usage** | `switch_a(config-if)# switchport private-vlan host-association 2 add 3` |

## MAC/Subnet/Protocol Based VLAN

| vlan classifier rule ipv4 | |
|---|---|
| **Purpose** | Create a subnet-based VLAN classifier rule and map it to a specific VLAN. If the source IP address matches the IP subnet specified in the VLAN classifier rule, received packets are mapped to the designated VLAN. |
| **Command Mode** | Global Configuration |
| **Syntax** | vlan classifier rule <1-256> ipv4 <A.B.C.D/M> vlan <2-4094><br>no vlan classifier rule <1-256> ipv4 <A.B.C.D/M> |
| **Parameters** | **A.B.C.D/M**: The IPv4 address classification in A.B.C.D/M format.<br>**vlan**: The VLAN to which an untagged packet is mapped<br>**<2-4094>**: VLAN ID |
| **Example usage** | `switch_a(config)# vlan classifier rule 2 ipv4 20.20.20.2/24 vlan 2` |

| vlan classifier rule mac | |
|---|---|
| **Purpose** | Create a subnet-based VLAN classifier rule and map it to a specific VLAN. If the source IP address matches the IP subnet specified in the VLAN classifier rule, received packets are mapped to the designated VLAN. |
| **Command Mode** | Global Configuration |
| **Syntax** | vlan classifier rule <1-256> mac WORD vlan <2-4094><br>no vlan classifier rule <1-256> |
| **Parameters** | **WORD**: Mac address classification. Enter the address in HHHH.HHHH.HHHH format.<br>**vlan**: The VLAN to which an untagged packet is mapped <2-4094>. |
| **Example usage** | `switch_a(config)# vlan classifier rule 2 mac fe80::22e::b5ff:fee8:6/64 vlan 2` |

| vlan classifier rule proto | |
|---|---|
| **Purpose** | Create a subnet-based VLAN classifier rule for a protocol and map it to a specific VLAN. If the source IP address matches the IP subnet specified in the VLAN classifier rule, received packets are mapped to the designated VLAN. |
| **Command Mode** | Global Configuration |
| **Syntax** | vlan classifier rule <1-256> proto (ip \| ipv6 \| ipx \| x25 \| arp \| rarp \| atalkddp \| atalkaarp \| atmmulti \| atmtransport \| pppdiscovery \| pppsession \| xeroxpup \| xeroxaddrtrans \| g8bpqx25 \| ieeepup \| ieeeaddrtrans \| dec \| decdnadumpload \| decdnaremoteconsole \| decdnarouting \| declat \| decdiagnostics \| deccustom \| decsyscomm \| <0-65535>) encap (ethv2 \| snapllc \| nosnapllc) (vlan <2-4094>\|)<br>no vlan classifier rule <1-256> |
| **Parameters** | **<0-65535>**: Ethernet decimal<br>**arp**: Address Resolution Protocol<br>**atalkaarp**: Appletalk AARP<br>**atalkddp**: Appletalk DDP<br>**atmmulti**: MultiProtocol Over ATM<br>**atmtransport**: Frame-based ATM Transport<br>**dec**: DEC Assigned<br>**deccustom**: DEC Customer use<br>**decdiagnostics**: EC Diagnostics<br>**decdnadumpload**: DEC DNA Dump/Load<br>**decdnaremoteconsole**: DEC DNA Remote Console<br>**decdnarouting**: DEC DNA Routing<br>**declat**: DEC LAT<br>**decsyscomm**: DEC Systems Comms Arch<br>**g8bpqx25**: G8BPQ AX.25<br>**ieeeaddrtrans**: Xerox IEEE802.3 PUP Address Translation<br>**ieeepup**: Xerox IEEE802.3 PUP<br>**ip**: IP address<br>**ipv6**: IPv6 address<br>**ipx**: IPX address<br>**pppdiscovery**: PPPoE discovery<br>**pppsession**: PPPoE session<br>**rarp**: Reverse Address Resolution<br>**x25**: CCITT X.25<br>**xeroxaddrtrans**: Xerox PUP Address Translation<br>**Xerox**: PUP<br>**encap**: packet encapsulation<br>**ethv2**: Ethernet v2<br>**nosnapllc**: LLC without snap encapsulation<br>**snapllc**: LLC snap encapsulation<br>**vlan**: The VLAN to which an untagged packet is mapped <2-4094>. |
| **Example usage** | `switch_a(config)# vlan classifier rule 2 proto ip encap ethv2 vlan 2` |

| vlan classifier group | |
|---|---|
| **Purpose** | Create a subnet-based VLAN classifier group. A group indicates a VLAN classifier group ID. |
| **Command Mode** | Global Configuration |
| **Syntax** | vlan classifier group <1-16> (add \| delete) rule <1-256><br>no vlan classifier group <1-16> |
| **Parameters** | **add**: Adds a rule to a group.<br>**delete**: Deletes a rule from a group.<br>**rule**: Indicates the VLAN classifier rule identifier <1-256>. |
| **Example usage** | `switch_a(config)# vlan classifier group 1 delete rule 1` |

| vlan classifier activate | |
|---|---|
| **Purpose** | Activate VLAN classifier |
| **Command Mode** | Interface Configuration |
| **Syntax** | vlan classifier activate <1-16> vlan <1-3999><br>no vlan classifier activate <1-16> |
| **Parameters** | **add**: Adds a rule to a group.<br>**delete**: Deletes a rule from a group.<br>**rule**: Indicates the VLAN classifier rule identifier <1-256>. |
| **Example usage** | `switch_a(config-if)# vlan classifier activate 1 vlan 100` |

# 10 QOS

## Global Configuration

| show mls qos | |
|---|---|
| **Purpose** | Display various QoS configuration and statistics. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show mls qos<br>show mls qos aggregate-policer <NAME><br>show mls qos cosq-stats <IFNAME> <0-7><br>show mls qos interface <IFNAME><br>show mls qos map dscp-queue<br>show qos tail-drop counters <IFNAME> <0-7><br>show user-priority interface <IFNAME> |
| **Parameters** | **NAME**: aggregator policer name<br>**<0-7>**: queue number |
| **Example usage** | `switch_a# show mls qos` |

| mls qos | |
|---|---|
| **Purpose** | Enable/disable QoS |
| **Command Mode** | Global Configuration |
| **Syntax** | mls qos enable<br>no mls qos |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# mls qos enable` |

| mls qos aggregate-police | |
|---|---|
| **Purpose** | Specify policer parameters to apply to multiple traffic classes in the same policy map. |
| **Command Mode** | Global Configuration |
| **Syntax** | mls qos aggregate-police NAME <1-1000000> <1-20000><br>no mls qos aggregate-police NAME |
| **Parameters** | **NAME**: Name of the aggregate policer.<br>**<1-1000000>**: Average traffic rate in bits per second (kbps).<br>**<1-20000>**: Normal burst size in kilobytes (bytes). |
| **Example usage** | `switch_a(config)# mls qos aggregate-police transmit1 48000 8000` |

| mls qos cos-queue | |
|---|---|
| **Purpose** | Configure CoS (Class of Service) queue. |
| **Command Mode** | Global Configuration |
| **Syntax** | mls qos cos-queue <0-7> <0-3><br>no mls qos cos-queue <0-7> <0-3> |
| **Parameters** | **<0-7>:** Priority for the queue.<br>**<0-3>**: Queue identifier |
| **Example usage** | `switch_a(config)# mls qos cos-queue 5 3` |

| mls qos trust | |
|---|---|
| **Purpose** | Configure the port trust state |
| **Command Mode** | Global Configuration |
| **Syntax** | mls qos trust cos<br>no mls qos trust cos<br>mls qos trust dscp<br>no mls qos trust dscp<br>mls qos trust cos dscp<br>no mls qos trust<br>no mls qos trust cos dscp |
| **Parameters** | **None** |
| **Example usage** | `switch_a(config)# mls qos trust cos dscp` |

| priority-queue | |
|---|---|
| **Purpose** | Set the egress expedit queue or weighted deficit round robin. |
| **Command Mode** | Global Configuration |
| **Syntax** | priority-queue strict<br>priority-queue wdrr<br>no priority-queue out |
| **Parameters** | **strict**: egress expedite queue<br>**wdrr**: weighted deficit round robin |
| **Example usage** | `switch_a(config)#priority-queue strict` |

| wrr-queue bandwidth | |
|---|---|
| **Purpose** | Specify the bandwidth ratios of the transmit queues. |
| **Command Mode** | Global Configuration |
| **Syntax** | wrr-queue bandwidth <1-127> <1-127> <1-127> <1-127> <1-127> <1-127> <1-127> <1-127><br>no wrr-queue bandwidth |
| **Parameters** | **<1-127>**: Weight of queues 0-7.<br>**<0-7>**: QoS queue ID. |
| **Example usage** | `switch_a(config)# wrr-queue bandwidth 1 30 40 20 60 80 70 100` |

| wrr-queue cos-map | |
|---|---|
| **Purpose** | Specify CoS values for a queue. |
| **Command Mode** | Global Configuration |
| **Syntax** | wrr-queue cos-map <0-7> (<0-7> \| <0-7> <0-7> \| <0-7> <0-7> <0-7> \| <0-7> <0-7> <0-7> <0-7> \| <0-7> <0-7> <0-7> <0-7> <0-7> \| <0-7> <0-7> <0-7> <0-7> <0-7> <0-7> \| <0-7> <0-7> <0-7> <0-7> <0-7> <0-7> <0-7> \| <0-7> <0-7> <0-7> <0-7> <0-7> <0-7> <0-7> <0-7>)<br>no wrr-queue cos-map <0-7> |
| **Parameters** | **<0-7>**: Queue identifier.<br>**<0-7>**: 1-8 CoS values separated by spaces. |
| **Example usage** | `switch_a(config)# wrr-queue bandwidth 1 30 40 20 60 80 70 100` |

## DSCP

| mls qos map dscp-queue | |
|---|---|
| **Purpose** | Set dscp to queue |
| **Command Mode** | Global Configuration |
| **Syntax** | mls qos map dscp-queue <0-63> <0-7><br>no mls qos map dscp-queue |
| **Parameters** | **<0-63>**: dscp value.<br>**<0-7>**: CoS Queue ID |
| **Example usage** | `switch_a(config)# mls qos map dscp-queue 10 5` |

## Interface

| tail-drop threshold | |
|---|---|
| **Purpose** | Configure the tail-drop threshold percentages for a queue. Use the no parameter return to the default setting. |
| **Command Mode** | Interface Configuration |
| **Syntax** | tail-drop threshold <0-7> <1-100> <1-100> |
| **Parameters** | **<0-7>** Queue identifier.<br>**<1-100>** Minimum threshold percentage.<br>**<1-100>** Maximum threshold percentage. |
| **Example usage** | `switch_a(config-if)# tail-drop threshold 1 60 1005` |

# 11 Access Control Lists (ACL)

## ACL Information

| show class-map | |
|---|---|
| **Purpose** | Display the QoS class maps to define the match criteria to classify traffic. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show class-map NAME |
| **Parameters** | **NAME**: Name of the class map |
| **Example usage** | `switch_a# show class-map cmap10` |

| show policy-map | |
|---|---|
| **Purpose** | Display the QoS class maps to define the match criteria to classify traffic. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show policy-map<br>show policy-map NAME |
| **Parameters** | **NAME**: Name of the policy map |
| **Example usage** | `switch_a# show policy-map pmap10` |

| show access-lists | |
|---|---|
| **Purpose** | Display current access lists. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show access-lists |
| **Parameters** | None |
| **Example usage** | `switch_a# show access-lists` |

| show ip access-lists | |
|---|---|
| **Purpose** | Display contents of all current IP access lists. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show ip-access-lists [<1-99> \| <100-199> \| <1300-1999> \| <2000-2699> \| WORD] |
| **Parameters** | **<1-99>**: Standard access list<br>**<100-199>**: Extended access list<br>**<1300-1999>**: Standard access list (expanded range)<br>**<2000-2699>**: Extended access list (expanded range)<br>**WORD**: Access list name |
| **Example usage** | `switch_a# show ip access-lists 50` |

| show qos-access-list | |
|---|---|
| **Purpose** | Display IP and MAC ACLs. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show qos-access-list<br>show qos-access-list [<1-99> \| <100-199> \| <1300-1999> \| <2000-2699> \| WORD] |
| **Parameters** | **<1-99>**: Standard access list<br>**<100-199>**: Extended access list<br>**<1300-1999>**: Standard access list (expanded range)<br>**<2000-2699>**: Extended access list (expanded range)<br>**WORD**: Access list name |
| **Example usage** | `switch_a# show qos-access-list 1` |

# ACL Configuration

| access-list | |
|---|---|
| **Purpose** | Add an access list entry. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] access-list (<1-99> \| <1300-1999>) (deny \| permit) any<br>[no] access-list (<1-99> \| <1300-1999>) (deny \| permit) host <A.B.C.D><br>[no] access-list (<1-99> \| <1300-1999>) (deny \| permit) <A.B.C.D> WILD<br>[no] access-list (<1-99> \| <1300-1999>) remark <LINE> |
| **Parameters** | **<1-99>**: IP standard access list<br>**<1300-1999>**: IP standard access list (expanded range).<br>**deny**: Route to reject.<br>**permit**: Route to permit.<br>**A.B.C.D**: IP address to match<br>**WILD**: Wildcard bits<br>**any**: Allows any IP address or prefix to match.<br>**remark**: Access list entry comment.<br>**LINE**: Multi-line, access-list entry comment up to 100 characters. |
| **Example usage** | `switch_a(config)# access-list 67 deny 1.1.1.0 0.0.0.255` |

| ip-access-list (std) | |
|---|---|
| **Purpose** | Create a standard IP access-control list (ACL). Use the no parameter to delete the ACL. Enable QoS globally before using this command. Use the no parameter to delete the ACL. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ip-access-list (<1-99> \| <1300-1999>) (deny \| permit) A.B.C.D<br>[no] ip-access-list (<1-99> \| <1300-1999>) (deny \| permit) A.B.C.D WILD<br>[no] ip-access-list (<1-99> \| <1300-1999>) (deny \| permit) [any \| host <A.B.C.D>] |
| **Parameters** | **<1-99>**: IP standard ACL. **<100-199>**: IP extended ACL.<br>**deny**: Deny traffic if conditions matched.<br>**permit**: Permit traffic if conditions matched.<br>**A.B.C.D**: Address to match.<br>**WILD**: Wildcard bits.<br>**any**: Any source host.<br>**host**: A single source host for extended ACLs. |
| **Example usage** | `switch_a(config)#ip-access-list 1 permit 192.5.255.0 0.0.0.255` |

| ip-access-list (extd) | |
|---|---|
| **Purpose** | Create an extended IP access-control list (ACL). Use the no parameter to delete the ACL. Enable QoS globally first. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ip-access-list (<100-199> \| <2000-2699>) (deny \| permit) (PROTOCOL) any [any \| host <A.B.C.D> \| <A.B.C.D> <A.B.C.D>]<br>[no] ip-access-list (<100-199>\|<2000-2699>) (deny \| permit) (PROTOCOL) host [<A.B.C.D> any \| <A.B.C.D> host <A.B.C.D> \| <A.B.C.D> WILD <A.B.C.D>]<br>[no] ip-access-list (<100-199>\|<2000-2699>) (deny \| permit) (PROTOCOL) <A.B.C.D> WILD any<br>[no] ip-access-list (<100-199>\|<2000-2699>) (deny \| permit) (PROTOCOL) <A.B.C.D> WILD host <A.B.C.D><br>[no] ip-access-list (<100-199>\|<2000-2699>) (deny \| permit) (PROTOCOL) <A.B.C.D> WILD <A.B.C.D> WILD |
| **Parameters** | **<100-199>**: Range for IP extended ACL.<br>**<2000-2699>**: Range for IP extended access list (expanded range).<br>**PROTOCOL**: ip, udp, tcp, gre, igmp, pim, rsvp, ospf, vrrp, ipcomp, any, <0-255> (IANA assigned protocol).<br>**deny**: Deny traffic if conditions matched.<br>**permit**: Permit traffic if conditions matched.<br>**A.B.C.D**: Source / destination to match.<br>**WILD**: Wildcard bits in A.B.C.D format.<br>**any**: Any source host.<br>**host**: A single source host for extended ACLs. |
| **Example usage** | `ip-access-list 199 deny gre any any` |

| ip-access-list standard | |
|---|---|
| **Purpose** | Create a named standard IP access-control list (ACL). Use the no parameter to delete the ACL. Enable QoS globally first. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ip-access-list standard <NAME> (deny \| permit) any<br>[no] ip-access-list standard <NAME> (deny \| permit) <A.B.C.D><br>[no] ip-access-list standard <NAME> (deny \| permit) <A.B.C.D> WILD |
| **Parameters** | **NAME**: Name of standard ACL.<br>**deny**: Deny certain traffic if conditions matched.<br>**permit**: Permit certain traffic if conditions matched.<br>**A.B.C.D**: Address to match.<br>**WILD**: Wildcard bits in A.B.C.D format.<br>**any**: Any source host. |
| **Example usage** | `switch_a(config)#ip-access-list standard test2 permit 192.5.255.0 0.0.0.255` |

| ip-access-list extended | |
|---|---|
| **Purpose** | Create a named extended IP access-control list (ACL). Enable QoS globally first. Use no parameter to delete ACL. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ip-access-list extended <NAME> (deny \| permit) (PROTOCOL) any any<br>[no] ip-access-list extended <NAME> (deny \| permit) (PROTOCOL) any host <A.B.C.D><br>[no] ip-access-list extended <NAME> (deny \| permit) (PROTOCOL) any <A.B.C.D> WILD<br>[no] ip-access-list extended <NAME> (deny \| permit) (PROTOCOL) host <A.B.C.D> any<br>[no] ip-access-list extended <NAME> (deny \| permit) (PROTOCOL) host <A.B.C.D> host <A.B.C.D><br>[no] ip-access-list extended <NAME> (deny \| permit) (PROTOCOL) host <A.B.C.D> WILD <A.B.C.D><br>[no] ip-access-list extended <NAME> (deny \| permit) (PROTOCOL) <A.B.C.D> WILD any<br>[no] ip-access-list extended <NAME> (deny \| permit) (PROTOCOL) <A.B.C.D> WILD host <A.B.C.D><br>[no] ip-access-list extended <NAME> (deny \| permit) (PROTOCOL) <A.B.C.D> WILD <A.B.C.D> WILD |
| **Parameters** | **NAME**: Name of extended ACL.<br>**PROTOCOL**: ip, udp, tcp, gre, igmp, pim, rsvp, ospf, vrrp, ipcomp, any, <0-255> (IANA assigned protocol).<br>**deny**: Deny traffic if conditions matched.<br>**permit**: Permit traffic if conditions matched.<br>**A.B.C.D**: Source / destination address.<br>**WILD**: Wildcard bits in A.B.C.D format.<br>**any**: Any source host.<br>**host**: A single source host for extended ACLs. |
| **Example usage** | `switch_a(config)# ip-access-list extended 2001`<br>`permit ip 192.5.255.0 0.0.0.255 any` |

| mac-access-list | |
|---|---|
| **Purpose** | Create a MAC access-control list (ACL). Use the no parameter to delete the ACL. Enable QoS globally before using this command. |
| **Command Mode** | Global Configuration |
| **Syntax** | **MAC ACL for any source and a destination specified by the MAC and MASK parameters:**<br>mac-access-list <2000-2699> (deny \| permit) any MAC MASK <1-8><br><br>**MAC ACL for a source specified by the MAC and MASK parameters and any destination:**<br>mac-access-list <2000-2699> (deny \| permit) MAC MASK any <1-8><br><br>**MAC ACL for a source specified by the first MAC and MASK parameters and a destination specified by the second MAC and MASK parameters:**<br>mac-access-list <2000-2699> (deny \| permit) MAC MASK MAC MASK <1-8><br><br>**MAC ACL for a source or destination specified by the MAC parameter:**<br>mac-access-list <2000-2699> (source \| destination) MAC priority <0-7><br>no mac-access-list <2000-2699> (deny \| permit) any MAC MASK <1-8><br>no mac-access-list <2000-2699> (deny \| permit) MAC MASK any <1-8><br>no mac-access-list <2000-2699> (deny \| permit) MAC MASK MAC MASK <1-8><br>no mac-access-list <2000-2699> (source \| destination) MAC priority <0-7> |
| **Parameters** | **<2000-2699>**: Expanded range for IP extended ACL.<br>**deny**: Deny certain traffic if conditions match.<br>**permit**: Permit certain traffic if conditions match.<br>**any**: Any source or destination.<br>**MAC**: MAC address; in HHHH.HHHH.HHHH format.<br>**MASK**: Part of the MAC address to ignore in hexadecimal format.<br>**<1-8>**: Packet format: 1 Ethernet II, 2 802.3, 4 SNAP, 8 LLC<br>**source**: Packets with source MAC address<br>**destination**: Packets with destination MAC address.<br>**priority**: Priority class.<br>**<0-7>**: Priority value. |
| **Example usage** | `switch_a(config)# mac-access-list 2002 permit 2222.2222.2222 8 any 2` |

| class-map | |
|---|---|
| **Purpose** | Create a class map. Enable QoS globally before using this command. Use the no parameter to delete the class map. This command will put the switch into Class Map Configuration mode |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] class-map NAME |
| **Parameters** | **NAME**: Name of class map |
| **Example usage** | `switch_a(config)# class-map ahax`<br>`switch_a(config-cmap)#` |

| match access-group | |
|---|---|
| **Purpose** | Define match criterion for a class map. Enable QoS globally before using this command. |
| **Command Mode** | Class Map Configuration |
| **Syntax** | [no] match access-group (<1-199> \| <1300-2699> \| WORD) |
| **Parameters** | **<1-99>**: Number of standard ACL<br>**<1300-2699>**: Number of extended ACL<br>**WORD**: Name of the ACL |
| **Example usage** | Configure a class map named test10 with 1 match criterion: access list 103, which allows traffic from any source to any destination.<br>`switch_a(config)#ip-access-list 103 permit ip any any`<br>`switch_a(config)#class-map test10`<br>`switch_a(config-cmap)#match access-group 103` |

| match cos | |
|---|---|
| **Purpose** | Match packetS based on class of service (CoS). Enable QoS first. |
| **Command Mode** | Class Map Configuration |
| **Syntax** | match cos (<0-7> \| <0-7> \| <0-7> \| <0-7> \| <0-7> \| <0-7> \| <0-7> \| <0-7>)<br>no match cos<br>match cos inner (<0-7> \| <0-7> \| <0-7> \| <0-7> \| <0-7> \| <0-7> \| <0-7> \| <0-7>)<br>no match cos inner |
| **Parameters** | **<0-7>**: IEEE 802.1Q/ISL CoS value<br>**inner**: Match the inner cos of QinQ packets |
| **Example usage** | `switch_a(config-cmap)# match cos 7` |

| match ip-dscp | |
|---|---|
| **Purpose** | Define the list to match against incoming packets. Enable QoS globally before using this command. Use the no parameter to disable this configuration. |
| **Command Mode** | Class Map Configuration |
| **Syntax** | match ip-dscp (<0-63> \| <0-63> <0-63> \| <0-63> <0-63> <0-63> \| <0-63> <0-63> <0-63> <0-63> \| <0-63> <0-63> <0-63> <0-63> <0-63> \| <0-63> <0-63><0-63> <0-63> <0-63> <0-63> \| <0-63> <0-63> <0-63> <0-63> <0-63> <0-63> <0-63> \| <0-63> <0-63> <0-63> <0-63> <0-63> <0-63> <0-63> <0-63>)<br>no match ip-dscp |
| **Parameters** | **<0-63>**: 1-8 IP DSCP values separated by a space. |
| **Example usage** | `switch_a(config-cmap)# match ip-dscp 56` |

| match ip-precedence | |
|---|---|
| **Purpose** | Identify IP precedence values as match criteria. Use the no parameter to remove IP precedence values from a class map. |
| **Command Mode** | Class Map Configuration |
| **Syntax** | match ip-precedence (<0-7> \| <0-7> <0-7> \| <0-7> <0-7> <0-7> \| <0-7> <0-7> <0-7> <0-7> \| <0-7> <0-7> <0-7> <0-7> <0-7> \| <0-7> <0-7> <0-7> <0-7><0-7> <0-7> \| <0-7> <0-7> <0-7> <0-7> <0-7> <0-7> <0-7> \| <0-7> <0-7> <0-7> <0-7> <0-7> <0-7> <0-7> <0-7>)<br>no match ip-precedence <0-7> |
| **Parameters** | **<0-7>**: 1-8 precedence values separated by a space. |
| **Example usage** | `switch_a(config-cmap)# match ip-precedence 5 6 4 3` |

| match layer4 | |
|---|---|
| **Purpose** | Identify UDP or TCP ports as the match criteria. Use the no parameter to remove match criteria. |
| **Command Mode** | Class Map Configuration |
| **Syntax** | match layer4 (any \| tcp \| udp) (source-port \| destination-port) <1-65535><br>no match layer4 (any \| tcp \| udp) (source-port \| destination-port) <1-65535><br>match layer4-range (any \| tcp \| udp) (source-port \| destination-port) <1-65535> to <1-65535><br>no match layer4-range |
| **Parameters** | **source-port**: Source UDP or TCP port.<br>**destination-port**: Destination UDP or TCP port. |
| **Example usage** | `switch_a(config-cmap)# match layer4 source-port 20` |

| match mpls exp-bit topmost | |
|---|---|
| **Purpose** | Define the match criterion of the MPLS (Multiprotocol Label Switching) experimental bit value in the topmost label for a class map. Use the no parameter to remove this criterion from a class map. |
| **Command Mode** | Class Map Configuration |
| **Syntax** | match mpls exp-bit topmost (<0-7> \| <0-7> \| <0-7> \| <0-7> \| <0-7> \| <0-7> \| <0-7> \| <0-7>)<br>no match mpls exp-bit topmost |
| **Parameters** | **<0-7>**: 1-8 experimental values separated by a space. |
| **Example usage** | `switch_a(config-cmap)# match mpls exp-bit topmost 0 1 2 3 4 5 6 7` |

| match traffic-type | |
|---|---|
| **Purpose** | Set the match criteria according to traffic type. |
| **Command Mode** | Class Map Configuration |
| **Syntax** | match traffic-type (TYPE) (traffic-type-and-queue \| traffic-type-or-queue)<br>no match traffic-type [TYPE] |
| **Parameters** | **TYPE**: all, arp, broadcast, management, multicast, non-tcp-udp, queue0, queue1, queue2, queue3, tcp-control, tcp-data, udp, unicast, unknown-multicast, unknown-unicast |
| **Example usage** | `switch_a(config-cmap)# match traffic-type all` |

| match vlan | |
|---|---|
| **Purpose** | Define the VLAN identifier or a range of VLANS used as a match criteria to classify traffic. Use the no parameter to disable the VLAN ID used as match criteria. |
| **Command Mode** | Class Map Configuration |
| **Syntax** | match vlan <1-3999><br>no match vlan<br>match vlan inner <1-3999><br>no match vlan inner<br>match vlan-range <1-3999> to <1-3999><br>no match vlan-range<br>match vlan-range inner <1-3999><br>no match vlan-range inner |
| **Parameters** | **<1-3999>**: VLAN identifier |
| **Example usage** | `switch_a(config-cmap)# match vlan 1000` |

| policy-map | |
|---|---|
| **Purpose** | Create a policy map. Use the no parameter to delete an existing policy map. This command will put the switch into Policy Map Configuration mode. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] policy-map NAME |
| **Parameters** | **NAME**: name of the policy map |
| **Example usage** | `switch_a(config)# policy-map groo`<br>`switch_a(config-pmap)#` |

| class | |
|---|---|
| **Purpose** | Define a traffic classification. Enable QoS globally before using this command. Use the no parameter to delete an existing class-map. Using this command will put the switch into Policy Map Class configuration mode (pmap-c ). |
| **Command Mode** | Policy Map Configuration |
| **Syntax** | [no] class NAME |
| **Parameters** | **NAME**: name of the class map |
| **Example usage** | `switch_a(config-pmap)# class arcadio`<br>`switch_a(config-pmap-c)#` |

| set cos | |
|---|---|
| **Purpose** | Set a CoS value to assign to classified traffic or enable copying the priority bit (pbit) from the inner VLAN to the outer VLAN based on policy. Use the no parameter to remove a CoS value, or disable pbit copying. |
| **Command Mode** | Policy Map Class Configuration |
| **Syntax** | set cos <0-7><br>set cos <0-7> (map \| remark)<br>set cos <0-7> cos-inner (map \| remark)<br>no set cos<br>set cos-inner (<0-7> \| cos)<br>no set cos-inner |
| **Parameters** | **<0-7>**: CoS value to assign to classified traffic.<br>**cos-inner**: Copy pbit from the inner VLAN to the outer VLAN based on policy.<br>**map**: Map to cos value (default)<br>**remark**: Remark to cos value |
| **Example usage** | `switch_a(config-cmap-c)# set cos 2` |

| set drr-priority | |
|---|---|
| **Purpose** | Set a deficit round-robin (DRR) priority. Use the no parameter to remove this priority. |
| **Command Mode** | Policy Map Class Configuration |
| **Syntax** | set drr-priority <0-7> quantum <1-255><br>no set drr-priority |
| **Parameters** | **<0-7>**: CoS value to assign to classified traffic.<br>**<1-255>**: DRR quantum value. |
| **Example usage** | `switch_a(config-cmap-c)# set drr-priority 1 quantum 1` |

| set ip-dscp | |
|---|---|
| **Purpose** | Set a DSCP value to assign to classified traffic. Use the no parameter to remove a DSCP value. |
| **Command Mode** | Policy Map Class Configuration |
| **Syntax** | set ip-dscp <0-63><br>no set ip-dscp |
| **Parameters** | **<0-63>**: DSCP value. |
| **Example usage** | `switch_a(config-cmap-c)# set ip-dscp 40` |

| set ip-precedence | |
|---|---|
| **Purpose** | Set an IP-precedence value to assign to classified traffic. Use the no parameter to remove an IP-precedence value. |
| **Command Mode** | Policy Map Class Configuration |
| **Syntax** | set ip-precedence <0-7><br>no set ip-precedence |
| **Parameters** | **<0-7>**: IP precedence value |
| **Example usage** | `switch_a(config-cmap-c)# set ip-precedence 2` |

| set mirror-to-port | |
|---|---|
| **Purpose** | Set a new value in the packet redirect packet to new interface (interface name). |
| **Command Mode** | Policy Map Class Configuration |
| **Syntax** | set mirror-to-port <IFNAME><br>no set mirror-to-port |
| **Parameters** | **IFNAME**: Interface name |
| **Example usage** | `switch_a(config-cmap-c)# set mirror-to-port ge7` |

| set mpls exp-bit topmost | |
|---|---|
| **Purpose** | Set the MPLS experimental-bit value in the topmost label for a policy map. Set a new MPLS experimental-bit value in a packet to classify MPLS traffic. Use the no parameter to remove this setting from a policy map. |
| **Command Mode** | Policy Map Class Configuration |
| **Syntax** | set mpls exp-bit topmost <0-7><br>no set mpls exp-bit topmost |
| **Parameters** | **<0-7>**: Experimental value. |
| **Example usage** | `switch_a(config-cmap-c)# set mpls exp-bit topmost 7` |

| set redirect-to-port | |
|---|---|
| **Purpose** | Set a new value in the packet redirect packet to new interface (interface name). |
| **Command Mode** | Policy Map Class Configuration |
| **Syntax** | set redirect-to-port <IFNAME><br>no set redirect-to-port |
| **Parameters** | **IFNAME**: Interface name |
| **Example usage** | `switch_a(config-cmap-c)# set redirect-to-port ge1` |

| set vlan | |
|---|---|
| **Purpose** | Set a new value in the packet VLAN (VLAN value), or set a new value in the packet VLAN (VLAN value) (CoS value) |
| **Command Mode** | Policy Map Class Configuration |
| **Syntax** | set vlan <1-3999><br>set vlan <1-3999> <0-7><br>no set vlan |
| **Parameters** | **<1-3999>**: new VLAN value<br>**<0-7>**: CoS value. |
| **Example usage** | `switch_a(config-cmap-c)# set vlan 1000 6` |

| set vlan-priority | |
|---|---|
| **Purpose** | Set a VLAN priority for the queues. |
| **Command Mode** | Policy Map Class Configuration |
| **Syntax** | set vlan-priority <0-7> <0-7> <0-7> <0-7> <0-7> <0-7> <0-7> <0-7><br>no set vlan-priority |
| **Parameters** | **<0-7>**: Priorities for queues. |
| **Example usage** | `switch_a(config-cmap-c)# set vlan-priority 1 1 1 1 1 1 1 1` |

| mode | |
|---|---|
| **Purpose** | Set operation mode (allow accept flow traffic) (deny drop flow traffic). |
| **Command Mode** | Policy Map Class Configuration |
| **Syntax** | mode (allow\|deny)<br>no mode (allow\|deny) |
| **Parameters** | **allow**: Allow accept flow traffic (default mode)<br>**deny**: Deny drop flow traffic |
| **Example usage** | `switch_a(config-cmap-c)# mode deny` |

| police | |
|---|---|
| **Purpose** | Specify a Single Rate Three Color Marker (srTCM) or Two Rate Three Color Marker (trTCM) policer. |
| **Command Mode** | Policy Map Class Configuration |
| **Syntax** | police [srtcm \| trtcm]<1-1000000> <1-20000> <1-20000> exceed-action (drop \| flow-control) resetflow-control-mode available-bucket-room (full \| cbs)<br>no police [srtcm \| trtcm] <1-1000000> <0-20000000> <1-20000000> exceed-action (drop \| flow-control)<br>reset-flow-control-mode available-bucket-room (full \| cbs) |
| **Parameters** | **<1-1000000>**: Average traffic rate in kbps.<br>**<1-20000>**: Burst size in kbps.<br>**<1-20000>**: Exceed burst size in kbps.<br>**exceed-action**: Action when rates are exceeded.<br>**drop**: Drop the frame.<br>**flow-control**: Send a pause frame and pass the packet.<br>**reset-flow-control-mode**: Generate flow control.<br>**available-bucket-room**: When to de-assert flow control.<br>**full**: When bucket room is full.<br>**cbs**: When bucket has enough room. |
| **Example usage** | `switch_a(config-cmap-c)# police 48000 8000 exceed-action drop` |

| police-aggregate | |
|---|---|
| **Purpose** | Set add an access list entry standard access list (Address to match) (Wildcard bits) |
| **Command Mode** | Policy Map Class Configuration |
| **Syntax** | police-aggregate <NAME><br>no police-aggregate <NAME> |
| **Parameters** | **NAME**: Aggregate policer name |
| **Example usage** | `switch_a(config-cmap-c)# police-aggregate grativo` |

| policing meter | |
|---|---|
| **Purpose** | Set a policer meter for the classified traffic average traffic rate by burst rate (policing ratio). |
| **Command Mode** | Policy Map Class Configuration |
| **Syntax** | policing meter <1-255><br>no policing meter |
| **Parameters** | **<1-255>**: policing ratio |
| **Example usage** | `switch_a(config-cmap-c)# policing meter 100` |

| service-policy input/output | |
|---|---|
| **Purpose** | Apply a policy map to the input or output of an interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | service-policy input <NAME><br>no service-policy input <NAME><br>service-policy output <NAME><br>no service-policy output <NAME> |
| **Parameters** | **NAME**: Policy input or output name |
| **Example usage** | `switch_a(config-if)# service-policy input pmap1` |

# 12 SNMP (Simple Network Management Protocol)

## SNMP Configuration

| snmp-server | |
|---|---|
| **Purpose** | Configure an SNMP server. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] snmp-server enable<br>snmp-server community (get \| set) WORD<br>snmp-server contact WORD<br>snmp-server location WORD<br>snmp-server description WORD<br>snmp-server mac-nofitication (history-size \| interval) <1-65535><br>snmp-server trap-community <1-5> LINE<br>snmp-server trap-ipaddr <1-5> <A.B.C.D><br>[no] snmp-server trap-type enable [linkdown \| linkup \| mac-notification] |
| **Parameters** | **WORD**: SNMP community name<br>**WORD**: Contact string<br>**WORD**: Location string<br>**WORD**: Description string<br>**history size**: Maximum number of entries in the MAC notification history table<br>**interval**: the notification trap interval in seconds between each set of traps that are generated <1-65535><br>**LINE**: Community name |
| **Example usage** | `switch_a(config)# snmp-server trap-community 1 Trap_Group_1` |

| snmp-server trap mac-notification | |
|---|---|
| **Purpose** | Enable SNMP traps for MAC-notification events. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] snmp-server trap mac-notification |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# snmp-server trap mac-notification` |

| snmp v3-user | |
|---|---|
| **Purpose** | Configure SNMP version 3 user |
| **Command Mode** | Global Configuration |
| **Syntax** | snmp v3-usRD (ro \| rw) (auth \| noauth) ((md5 \| sha) WORD\|)<br>snmp v3-user WORD (ro \| rw) priv (md5 \| sha) WORD des WORD<br>no snmp v3-user WORD |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# snmp v3-user test ro auth` |

# 13 IEEE 802.1X

## 802.1x Information

| show dot1x | |
|---|---|
| **Purpose** | Display dot1x configuration and settings |
| **Command Mode** | Privileged Exec |
| **Syntax** | show dot1x<br>show dot1x all<br>show dot1x diagnostics interface IFNAME<br>show dot1x interface IFNAME<br>show dot1x sessionstatistics interface IFNAME<br>show dot1x statistics interface IFNAME |
| **Parameters** | **IFNAME**: Interface name |
| **Example usage** | `switch_a# show dot1x interface ge5` |

## 802.1x Configuration

| dot1x initialize | |
|---|---|
| **Purpose** | Unauthorize a port, and attempt reauthentication on the specified interface. |
| **Command Mode** | Privileged Exec |
| **Syntax** | dot1x initialize interface IFNAME |
| **Parameters** | **IFNAME**: Interface name |
| **Example usage** | `switch_a# dot1x initialize interface ge5` |

| dot1x keytxenabled | |
|---|---|
| **Purpose** | Enable or disable key transmission over an Extensible Authentication Protocol (EAP) packet between the authenticator and supplicant. |
| **Command Mode** | Interface Configuration |
| **Syntax** | dot1x keytxenabled (enable \| disable) |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# dot1x keytxenabled disable` |

| dot1x port-control | |
|---|---|
| **Purpose** | Force a port state. Use the no parameter to remove a port from the 802.1x management. |
| **Command Mode** | Interface Configuration |
| **Syntax** | dot1x port-control dir (in \| both)<br>dot1x port-control (force-unauthorized \| force-authorized \| auto)<br>no dot1x port-control |
| **Parameters** | **auto**: Enable authentication on port.<br>**dir**: Specify the packet control direction.<br>**both**: Discard receive and transmit packets from the supplicant<br>**in**: Discard receive packets from the supplicant<br>**force-authorized**: Force a port to always be in an authorized state.<br>**force-unauthorized**: Force a port to always be in an unauthorized state. |
| **Example usage** | `switch_a(config-if)# dot1x port-control auto` |

| dot1x reauthentication | |
|---|---|
| **Purpose** | Enable reauthentication on a port. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] dot1x reauthentication |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# dot1x reauthentication` |

| dot1x system-auth-ctrl | |
|---|---|
| **Purpose** | Enable authentication globally. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] dot1x system-auth-ctrl |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# dot1x system-auth-ctrl` |

| dot1x protocol-version | |
|---|---|
| **Purpose** | Set the protocol version of dot1x to 1 or 2. The protocol version must be synchronized with the Xsupplicant being used in that interface.<br>Use the no parameter to set the protocol version to the default value (2). |
| **Command Mode** | Interface Configuration |
| **Syntax** | dot1x protocol-version <1-2><br>no dot1x protocol-version |
| **Parameters** | **<1-2>**: EAP Over LAN (EAPOL) version. |
| **Example usage** | `switch_a(config-if)# dot1x protocol-version 2` |

| dot1x quiet-period | |
|---|---|
| **Purpose** | Set the quiet-period time interval. When a switch cannot authenticate a client, the switch remains idle for a quiet-period interval of time, then tries again. By administratively changing the quiet-period interval, by entering a lower number than the default, a faster response time can be provided.<br>Use the no parameter to set the configured quiet period to the default (60 seconds). |
| **Command Mode** | Interface Configuration |
| **Syntax** | dot1x quiet-period <1-65535><br>no dot1x quiet-period |
| **Parameters** | **<1-65535>**: Seconds between the retrial of authentication. |
| **Example usage** | `switch_a(config-if)# dot1x quiet-period 200` |

| dot1x reauthMax | |
|---|---|
| **Purpose** | Set the maximum reauthentication value, which sets the maximum number of reauthentication attempts after which the port will be unauthorized.<br>Use the no parameter to set the reauthentication maximum to the default value (2). |
| **Command Mode** | Interface Configuration |
| **Syntax** | dot1x reauthMax <1-10><br>no dot1x reauthMax |
| **Parameters** | **<1-10>**: Maximum number of reauthentication attempts after which the port will be unauthorized. |
| **Example usage** | `switch_a(config-if)# dot1x reauthMax 5` |

| dot1x timeout re-authperiod | |
|---|---|
| **Purpose** | Set the interval between reauthorization attempts. Use the no parameter to disable the interval between reauthorization attempts. |
| **Command Mode** | Interface Configuration |
| **Syntax** | dot1x timeout re-authperiod <1-4294967295><br>no dot1x timeout re-authperiod |
| **Parameters** | **<1-4294967295>**: Seconds between reauthorization attempts |
| **Example usage** | `switch_a(config-if)# dot1x timeout re-authperiod 25` |

| dot1x timeout server-timeout | |
|---|---|
| **Purpose** | Set the authentication sever response timeout. |
| **Command Mode** | Interface Configuration |
| **Syntax** | dot1x timeout server-timeout <1-65535><br>no dot1x timeout server-timeout |
| **Parameters** | **<1-65535>**: Authentication server response timeout |
| **Example usage** | `switch_a(config-if)# dot1x timeout server-timeout 555` |

| dot1x timeout supp-timeout | |
|---|---|
| **Purpose** | Set the interval for a supplicant to respond. |
| **Command Mode** | Interface Configuration |
| **Syntax** | dot1x timeout supp-timeout <1-65535><br>no dot1x timeout supp-timeout |
| **Parameters** | **<1-65535>**: Authentication supplicant response timeout |
| **Example usage** | `switch_a(config-if)# dot1x timeout supp-timeout 40` |

| dot1x timeout tx-period | |
|---|---|
| **Purpose** | Set the interval between successive attempts to request an ID. |
| **Command Mode** | Interface Configuration |
| **Syntax** | dot1x timeout tx-period <1-65535><br>no dot1x timeout tx-period |
| **Parameters** | **<1-65535>**: Interval between attempts. |
| **Example usage** | `switch_a(config-if)# dot1x timeout tx-period 34` |

| ip radius source-interface | |
|---|---|
| **Purpose** | Set the local address sent in packets to the radius server. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip radius source-interface HOSTNAME PORT<br>no ip radius source-interface |
| **Parameters** | **HOSTNAME**: Radius client in IP address or hostname format.<br>**PORT**: Radius client port number. The default port number is 1812. |
| **Example usage** | `switch_a(config)# ip radius source-interface groohost 1812` |

| radius-server deadtime | |
|---|---|
| **Purpose** | Specify the time that a nonresponding radius server is passed over by requests for authentication. The no form sets the default (0). |
| **Command Mode** | Global Configuration |
| **Syntax** | radius-server deadtime MIN<br>no radius-server deadtime |
| **Parameters** | **MIN**: Length of time (in minutes), maximum of 1440. |
| **Example usage** | `switch_a(config)# radius-server deadtime 10` |

| radius-server host | |
|---|---|
| **Purpose** | Specify the IP address or host name of the remote radius server host and assign authentication and accounting destination port numbers. Multiple radius-server host commands can be used to specify multiple hosts. The software searches for hosts in the order they are specified. If no host-specific timeout, retransmit, or key values are specified, the global values apply to that host.<br><br>If the auth-port parameter is not specified, it will take the default value of the auth-port. If you do not specify the authport to unconfigure, and the default value of the auth-port does not match the port you are trying to unconfigure, the specified radius-server host will not be unconfigured. |
| **Command Mode** | Global Configuration |
| **Syntax** | radius-server host HOSTNAME<br>radius-server host HOSTNAME {key STRING \| retransmit RETRIES \| timeout SEC \| auth-port PORTNO}<br>no radius-server host HOSTNAME (auth-port PORT\|) |
| **Parameters** | **auth-port**: (Optional) Specify the UDP destination port for authentication requests; the host is not used for authentication if set to 0.<br>**key**: (Optional) Specify the authentication and encryption key for all radius communications between the router and the radius server. This key must match the encryption used on the radius daemon. All leading spaces are ignored, but spaces within and at the end of the string are used. If spaces are used in the string, do not enclose the string in quotation marks unless the quotation marks themselves are part of the key.<br>**retransmit**: (Optional) The number of times a radius request is re-sent to a server, if that server is not responding or responding slowly. This setting overrides the global setting of the radiusserver retransmit command. Enter a value in the range 1 to 100. If no retransmit value is specified, the global value is used.<br>**timeout**: (Optional) The time interval (in seconds) that the router waits for the radius server to reply before retransmitting. This setting overrides the global value of the radius-server timeout command. If no timeout value is specified, the global value is used. Enter a value in the range 1 to 1000. |
| **Example usage** | `switch_a(config)# radius-server host 10.10.10.40 auth-port 1812 timeout 5 retransmit 3 key authd` |

| radius-server key | |
|---|---|
| **Purpose** | Set the shared secret key between a Radius server and a client. |
| **Command Mode** | Global Configuration |
| **Syntax** | radius-server key KEY<br>no radius-server key |
| **Parameters** | **KEY**: The secret key shared among the radius server and the 802.1x client. |
| **Example usage** | `switch_a(config)# radius-server key ipi` |

| radius-server retransmit | |
|---|---|
| **Purpose** | Specify the number of times the router transmits each radius request to the server before giving up. |
| **Command Mode** | Global Configuration |
| **Syntax** | radius-server retransmit RETRIES<br>no radius-server retransmit |
| **Parameters** | **RETRIES**: The retransmit value from 1 to 100. If no retransmit value is specified, the global value is used. |
| **Example usage** | `switch_a(config)# radius-server retransmit 12` |

| radius-server timeout | |
|---|---|
| **Purpose** | Specify the number of seconds a router waits for a reply to a radius request before retransmitting the request.<br>Use the no parameter to use the default value. |
| **Command Mode** | Global Configuration |
| **Syntax** | radius-server timeout SEC<br>no radius-server timeout |
| **Parameters** | **SEC**: The number of seconds for a router to wait for a server host to reply before timing out. <1-1000> |
| **Example usage** | `switch_a(config)# radius-server timeout 20` |

# TACACS+

| login tacplus | |
|---|---|
| **Purpose** | Set login mode to TACACS+ (same as **aaa authentication tacplus**)" |
| **Command Mode** | Line Configuration |
| **Syntax** | login tacplus |
| **Parameters** | None |
| **Example usage** | `switch_a(config-line)# login tacplus` |

| tacplus-server | |
|---|---|
| **Purpose** | Configure tacacs server. At most 3 servers can be set at once. |
| **Command Mode** | Global Configuration |
| **Syntax** | tacplus-server host HOSTNAME <key STRING> (\|timeout <SEC>) (\|port <PORTNO>) (\|primary) (\|inactive)<br>no tacplus-server host HOSTNAME |
| **Parameters** | **HOSTNAME:** TACACS+ server (hostname or dotted IP notation)<br>**Inactive:** Set TACACS+ server to inactive<br>**Key:** Set TACACS+ server key<br>**port:** TACACS+ server port<br>**primary:** Set TACACS+ server as primary server<br>**timeout:** Set TACACS+ server timeout |
| **Example usage** | `switch_a(config)# tacplus-server host myhost inactive` |

| aaa authentication login tacplus | |
|---|---|
| **Purpose** | Set login mode to TACACS+. |
| **Command Mode** | Global Configuration |
| **Syntax** | aaa authentication login tacplus<br>no aaa authentication login tacplus |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# aaa authentication login tacplus` |

| aaa authorization command tacplus | |
|---|---|
| **Purpose** | Set command authorization to TACACS+ |
| **Command Mode** | Global Configuration |
| **Syntax** | aaa authorization command tacplus<br>no aaa authorization command tacplus |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# aaa authorization command tacplus` |

# 14 LLDP (Link Layer Discovery Protocol)

## LLDP Information

| show lldp | |
|---|---|
| **Purpose** | Show statistics, status, and information for current LLDP configuration. |
| **Command Mode** | Privileged exec |
| **Syntax** | show lldp entry WORD<br>show lldp statistics<br>show lldp statistics IFNAME<br>show lldp interface<br>show lldp interface IFNAME<br>show lldp neighbors<br>show lldp neighbors-org<br>show lldp neighbors IFNAME<br>show lldp neighbors detailed |
| **Parameters** | **IFNAME**: Interface name<br>**WORD**: System Name of LLDP neighbor entry |
| **Example usage** | `switch_a# show lldp statistics` |

## LLDP Configuration

| lldp enable | |
|---|---|
| **Purpose** | Enable lldp. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] lldp enable |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# lldp enable` |

| lldp holdtime multiplier | |
|---|---|
| **Purpose** | Set the holdtime multiplier value, which is multiplied by the transmit interval to calc Time To Live (TTL) that is advertised to neighbors |
| **Command Mode** | Global Configuration |
| **Syntax** | lldp holdtime multiplier <2-10><br>no lldp holdtime multiplier |
| **Parameters** | **<2-10>**: Multiplier factor |
| **Example usage** | `switch_a(config)# lldp holdtime multiplier 5` |

| lldp txinterval | |
|---|---|
| **Purpose** | Set interval at which LLDP frames are transmitted. |
| **Command Mode** | Global Configuration |
| **Syntax** | lldp txinterval <5-32768><br>no lldp txinterval |
| **Parameters** | **<5-32768>**: TxInterval, default is 30 sec |
| **Example usage** | `switch_a(config)# lldp txinterval 100` |

| lldp tlv-global | |
|---|---|
| **Purpose** | Configure the global TLV (Time – Length – Value) settings are advertised by the switch to other LLDP devices. |
| **Command Mode** | Global Configuration |
| **Syntax** | lldp tlv-global {all \| port-descr \| sys-name \| sys-descr \| sys-cap \| mgmt-addrs \| port-vlan-id \| mac-phy \| protocol-identity \| vlan-name \| port-and-protocol \| link-aggregation \| max-frame} |
| **Parameters** | **port-descr**: Port Description<br>**sys-name**: System Name TLV<br>**sys-descr** : System Description TLV<br>**sys-cap**: System Capabilities<br>**mgmt-addrs**: Management Address<br>**port-vlan-id**: Port VLAN ID<br>**mac-phy**: MAC/PHY Configuration/Status<br>**port-and-protocol**: Port And Protocol VLAN ID<br>**vlan-name**: VLAN Name<br>**protocol-identity**: Protocol Identity<br>**link-aggregation**: Link Aggregation<br>**max-frame**: Maximum Frame Size |
| **Example usage** | `switch_a(config)# lldp tlv-global sys-name` |

## LLDP Port Settings

| lldp tx-pkt | |
|---|---|
| **Purpose** | Enable LLDP transmit on a port. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] lldp tx-pkt |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# lldp tx-pkt` |

| lldp tx-rcv | |
|---|---|
| **Purpose** | Enable LLDP receive on a port. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] lldp tx-rcv |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# lldp tx-rcv` |

| lldp mgmt-ip vlan | |
|---|---|
| **Purpose** | Enable the transmission of the management IP address through a port. |
| **Command Mode** | Interface Configuration |
| **Syntax** | lldp mgmt-ip vlan <1-4094><br>no lldp mgmt-ip vlan |
| **Parameters** | **<1-4094>**: VLAN ID |
| **Example usage** | `switch_a(config-if)# lldp mgmt-ip vlan 200` |

| lldp notification | |
|---|---|
| **Purpose** | Enable LLDP notification |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] lldp notification |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# lldp notification` |

| lldp-agent | |
|---|---|
| **Purpose** | Configure lldp agents for customer-bridge and non-TPMR-bridge. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] lldp-agent customer-bridge<br>[no] lldp-agent non-tpmr-bridge |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# lldp-agent customer-bridge` |

| lldp tlv-global | |
|---|---|
| **Purpose** | Configure the global TLV (Time – Length – Value) settings are advertised by the switch to other LLDP devices. |
| **Command Mode** | Interface Configuration |
| **Syntax** | lldp tlv-global {all\|port-descr \| sys-name \| sys-descr \| sys-cap \| mgmt-addrs \| port-vlan-id \| mac-phy \| protocol-identity \| vlan-name \| port-and-protocol \| link-aggregation \| max-frame} |
| **Parameters** | **port-descr**: Port Description<br>**sys-name**: System Name TLV<br>**sys-descr** : System Description TLV<br>**sys-cap**: System Capabilities<br>**mgmt-addrs**: Management Address<br>**port-vlan-id**: Port VLAN ID<br>**mac-phy**: MAC/PHY Configuration/Status<br>**port-and-protocol**: Port And Protocol VLAN ID<br>**vlan-name**: VLAN Name<br>**protocol-identity**: Protocol Identity<br>**link-aggregation**: Link Aggregation<br>**max-frame**: Maximum Frame Size |
| **Example usage** | `switch_a(config-if)# lldp tlv-global sys-name` |

# 15 DHCP (Dynamic Host Configuration Protocol)

## DHCP Server

| show dhcp-client status | |
|---|---|
| **Purpose** | Display DHCP-client Current Status |
| **Command Mode** | Privileged exec |
| **Syntax** | show dhcp-client status |
| **Parameters** | None |
| **Example usage** | `switch_a# show dhcp-client status` |

| show running-config dhcp | |
|---|---|
| **Purpose** | Display DHCP-client Current Status |
| **Command Mode** | Global configuration |
| **Syntax** | show running-config dhcp |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# show running-config dhcp` |

| feature dhcp | |
|---|---|
| **Purpose** | Enable/disable dhcp on switch |
| **Command Mode** | Global configuration |
| **Syntax** | [no] feature dhcp |
| **Parameters** | none |
| **Example usage** | `switch_a(config)#feature dhcp` |

| ip address dhcp | |
|---|---|
| **Purpose** | Get an IP address from a DHCP server for this interface. Use the no form to disable the DHCP client for this interface. |
| **Command Mode** | Interface configuration |
| **Syntax** | [no] ip address dhcp |
| **Parameters** | none |
| **Example usage** | `switch_a(config-if)# ip address dhcp` |

| ip dhcp client request | |
|---|---|
| **Purpose** | Request a DNS nameserver or host name for DHCP client. |
| **Command Mode** | Interface configuration |
| **Syntax** | ip dhcp client request dns-nameserver<br>no ip dhcp client request dns-nameserver<br>ip dhcp client request host-name<br>no ip dhcp client request host-name |
| **Parameters** | **dns-nameserver**: List of DNS name servers<br>**host-name**: Name of the client |
| **Example usage** | `switch_a(config-if)# ip dhcp client request dns-nameserver` |

| ipv6 address dhcp | |
|---|---|
| **Purpose** | Set the IPv6 address by DHCP |
| **Command Mode** | Interface configuration |
| **Syntax** | [no] ipv6 address dhcp |
| **Parameters** | none |
| **Example usage** | `switch_a(config-if)# ipv6 address dhcp` |

| ipv6 dhcp client request | |
|---|---|
| **Purpose** | Request for IPv6 DNS Nameserver. |
| **Command Mode** | Interface configuration |
| **Syntax** | ipv6 dhcp client request dns-nameserver<br>no ipv6 dhcp client request dns-nameserver |
| **Parameters** | **dns-nameserver**: List of DNS name servers<br>**host-name**: Name of the client |
| **Example usage** | `switch_a(config-if)# ipv6 dhcp client request dns-nameserver` |

| dhcp-server enable | |
|---|---|
| **Purpose** | Enable DHCP Server. |
| **Command Mode** | Global configuration and Interface configuration |
| **Syntax** | dhcp-server enable<br>no dhcp-server enable |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# dhcp-server enable` |

| dhcp-server restart | |
|---|---|
| **Purpose** | Enable DHCP Server. |
| **Command Mode** | Global configuration |
| **Syntax** | dhcp-server restart |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# dhcp-server restart` |

| dhcp-server range | |
|---|---|
| **Purpose** | Set the default IP lease block for the DHCP server. |
| **Command Mode** | Interface configuration |
| **Syntax** | dhcp-server range <Start IP> <End IP><br>no dhcp-server range |
| **Parameters** | **<Start IP> <End IP>**: IP addess range |
| **Example usage** | `switch_a(config-if)# dhcp-server range 10.0.0.0 10.255.255.255` |

| dhcp-server lease-time | |
|---|---|
| **Purpose** | Set the the default lease time for the DHCP server. |
| **Command Mode** | Interface configuration |
| **Syntax** | dhcp-server lease-time <0-864000><br>no dhcp-server lease-time |
| **Parameters** | **<0-864000>**: Lease time in seconds |
| **Example usage** | `switch_a(config-if)# dhcp-server lease-time 86000` |

| dhcp-server subnet-mask | |
|---|---|
| **Purpose** | Set the default subnet mask for the DHCP server. |
| **Command Mode** | Interface configuration |
| **Syntax** | dhcp-server subnet-mask <A.B.C.D><br>no dhcp-server subnet-mask |
| **Parameters** | **<A.B.C.D>:**:Subnet mask |
| **Example usage** | `switch_a(config-if)# dhcp-server subnet-mask 255.255.0.0` |

| dhcp-server gateway | |
|---|---|
| **Purpose** | Set the default gateway for the DHCP server. |
| **Command Mode** | Interface configuration |
| **Syntax** | dhcp-server gateway <A.B.C.D><br>no dhcp-server gateway |
| **Parameters** | **<A.B.C.D>:**:Gateway address |
| **Example usage** | `switch_a(config-if)# dhcp-server gateway 10.10.10.10` |

| dhcp-server dns | |
|---|---|
| **Purpose** | Set the default dns for the DHCP server |
| **Command Mode** | Interface configuration |
| **Syntax** | dhcp-server dns <1 \| 2> <A.B.C.D><br>no dhcp-server dns <1 \| 2> |
| **Parameters** | **<A.B.C.D>:**:dns address |
| **Example usage** | `switch_a(config-if)# dhcp-server dns 1 10.10.10.10` |

## DHCP Relay

| dhcprelay enable | |
|---|---|
| **Purpose** | Enable gloablly |
| **Command Mode** | Global Configuration and Interface Configuration |
| **Syntax** | dhcprelay enable<br>no dhcprelay enable |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# dhcprelay enable` |

| dhcprelay serverip | |
|---|---|
| **Purpose** | Add DHCP server IP |
| **Command Mode** | Global Configuration |
| **Syntax** | dhcprelay serverip <A.B.C.D><br>no dhcprelay serverip <A.B.C.D> |
| **Parameters** | **<A.B.C.D>**: IP address of server |
| **Example usage** | `switch_a(config)# dhcprelay serverip 10.10.10.10` |

| dhcprelay information-option | |
|---|---|
| **Purpose** | Enable DHCP relay option 82 |
| **Command Mode** | Global Configuration |
| **Syntax** | dhcprelay information-option<br>no dhcprelay information-option |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# dhcprelay information-option` |

| dhcprelay restart | |
|---|---|
| **Purpose** | Restart dhcp relay. |
| **Command Mode** | Global Configuration |
| **Syntax** | dhcprelay restart |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# dhcprelay restart` |

## DHCP Snooping

| dhcp-snooping | |
|---|---|
| **Purpose** | Enable DHCP snooping gloablly |
| **Command Mode** | Global Configuration |
| **Syntax** | dhcp-snooping enable<br>no dhcp-snooping enable |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# dhcp-snooping enable` |

| dhcp-snooping binding | |
|---|---|
| **Purpose** | Create DHCP snooping binding table. |
| **Command Mode** | Global Configuration |
| **Syntax** | dhcp-snooping binding MAC vlan <1-4094> A.B.C.D interface IFNAME expiry <1-86400> |
| **Parameters** | **MAC:** MAC address in HHHH.HHHH.HHHH format<br>**<1-4094>:** VLAN ID<br>**<1-86400>:** IP lease time |
| **Example usage** | `switch_a(config)# dhcp-snooping binding mmmm.mmmm.mmmm vlan 1 10.10.10.10 interface ge5 expiry 1000` |

# 16 NTP (Network Time Protocol)

## NTP Configuration

| show system time | |
|---|---|
| **Purpose** | Display system time |
| **Command Mode** | Privileged Exec |
| **Syntax** | show system time |
| **Parameters** | none |
| **Example usage** | `switch_a# show system time` |

| show ntp associations | |
|---|---|
| **Purpose** | Display NTP associations |
| **Command Mode** | Privileged Exec |
| **Syntax** | show ntp associations |
| **Parameters** | none |
| **Example usage** | `switch_a# show ntp associations` |

| show ntp status | |
|---|---|
| **Purpose** | Display ntp status. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show ntp status |
| **Parameters** | none |
| **Example usage** | `switch_a# show ntp status` |

| set clock | |
|---|---|
| **Purpose** | Set time and date for the switch. |
| **Command Mode** | Privileged Exec |
| **Syntax** | set clock <2000-2037> <1-12> <1-31> <0-23> <0-59> <0-59> |
| **Parameters** | **<2000-2037>**: Year, **<1-12>**: Month, **<1-31>**: Date, **<0-23>**: Hour **<0-59>**: Minute , **<0-59>**: Second |
| **Example usage** | `switch_a# set clock 2017 3 27 17 24 30` |

| ntp enable | |
|---|---|
| **Purpose** | Enable ntp |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ntp enable |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# ntp enable` |

| ntp sync-time | |
|---|---|
| **Purpose** | Have the NTP client sync the clock immediately switch, |
| **Command Mode** | Global Configuration |
| **Syntax** | ntp sync-time |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# ntp sync-time` |

| clock | |
|---|---|
| **Purpose** | Set time zone for the switch |
| **Command Mode** | Global Configuration |
| **Syntax** | clock summer-time <name of time zone> date <start Day> <start Month> <start Hour> <start Minute> <end Day> <end Month> <end Hour> <end Minute> <offset in Minute> |
| **Parameters** | **ZONE**: Name of time zone (Examples: CST, MST, PST, UCT, EST, MST, RFT, IST, NAST, TTST, MET, NZST, UAEST)pst<br>**OFFSET**: Offset from Coordinated Universal Time (UTC), range is <0~24>:<0~59> |
| **Example usage** | `switch_a(config)# clock timezone pst 9:0` |

| clock summer time | |
|---|---|
| **Purpose** | Set time zone, system daylight saving day, and system daylight saving weekday mode |
| **Command Mode** | Global Configuration |
| **Syntax** | clock summer-time ZONE { date { date month year hh:mm date month year hh:mm \| month date year hh:mm month date year hh:mm } \| recurring week day month hh:mm week day month hh:mm } [1-480]<br>no clock summer-time |
| **Parameters** | **ZONE**: Name of the time zone (for example, PDT) displayed when summer time is in effect.<br>**date**: Indicates that summer time should start on the first specific date listed in the command and end on the second specific date in the command.<br>**date**: Date of the month.<br>**recurring**: Indicates that summer time should start and end on the corresponding specified days every year.<br>**week**: Week of the month <1-5><br>**[1-480]**: Number of minutes to add during summer time. |
| **Example usage** | `switch_a(config)# clock summer-time CDT weekday 2 Sun March 2 0 1 Sun November 2 0 60` |

| ntp server | |
|---|---|
| **Purpose** | Configure NTP server, server peer authentication key, peer preference, and NTP server version. |
| **Command Mode** | Global Configuration |
| **Syntax** | ntp server <WORD><br>ntp server <WORD> key <1-4294967295><br>ntp server <WORD> prefer<br>ntp server <WORD> version <1-4><br>no ntp server <WORD> |
| **Parameters** | **WORD**: IP address or host name of server |
| **Example usage** | `switch_a(config)# ntp server 10.10.10.10` |

## Static Route

| show ip route | |
|---|---|
| **Purpose** | Display the IP routing table for a protocol or from a particular table. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show ip route<br>show ip route <A.B.C.D><br>show ip route <A.B.C.D/M><br>show ip route database<br>show ip route static<br>show ip route summary |
| **Parameters** | **A.B.C.D**: Display network in the IP routing table.<br>**A.B.C.D/M**: Display IP prefix <network>/<length>, for example, 35.0.0.0/8.<br>**database**: Display IPv6 routing table database information.<br>**static**: Display static routes.<br>**summary**: Display a summary of all routes |
| **Example usage** | `switch_a# show ip route 10.10.10.5` |

| show routing | |
|---|---|
| **Purpose** | Display routing information, |
| **Command Mode** | Privileged Exec |
| **Syntax** | show routing<br>show routing <A.B.C.D><br>show routing <A.B.C.D/M><br>show routing database<br>show routing static<br>show routing summary |
| **Parameters** | **A.B.C.D**: Display network in the IP routing table.<br>**A.B.C.D/M**: Display IP prefix <network>/<length>, Example - 35.0.0.0/8.<br>**database**: Display IPv6 routing table database information.<br>**static**: Display static routes.<br>**summary**: Display a summary of all routes |
| **Example usage** | `switch_a# show routing 10.10.10.10/24` |

| ip route | |
|---|---|
| **Purpose** | Create an IPv4 static route. Use the no form to delete a static route. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ip route <A.B.C.D/M> <A.B.C.D><br>[no] ip route <A.B.C.D> <A.B.C.D> <A.B.C.D><br>[no] ip route <A.B.C.D/M> <A.B.C.D> <1-255><br>[no] ip route <A.B.C.D/M> <A.B.C.D> description <WORD><br>[no] ip route <A.B.C.D/M> <A.B.C.D> tag <1-4294967295><br>[no] ip route <A.B.C.D/M> <IFNAME><br>[no] ip route <A.B.C.D/M> <IFNAME> <A.B.C.D> |
| **Parameters** | **A.B.C.D/M**: Subnet IP destination prefix and mask <0-32><br>**A.B.C.D A.B.C.D**: Subnet: IP destination address and mask<br>**A.B.C.D**: Gateway nexthop IPv4 address<br>**<1-255>**: Administrative distance<br>**IFNAME**: Gateway nexthop interface name<br>**description**: Description of the static route<br>**tag**: Tag used as a “match” value to control redistribution<br>**<1-4294967295>**: Tag value |
| **Example usage** | `switch_a(config)# ip route 192.168.3.0 255.255.255.0 2.2.2.2 128` |

| max-static-routes | |
|---|---|
| **Purpose** | Set maximum static routes number. |
| **Command Mode** | Global Configuration |
| **Syntax** | max-static-routes <1-8192> |
| **Parameters** | **<1-8192>**: Allowed number of static routes |
| **Example usage** | `switch_a(config)# max-static-routes 100` |

| ip prefix-list | |
|---|---|
| **Purpose** | Create a prefix list. Prefixes are matched from the top of the prefix list, and matching stops whenever a match or deny occurs. For efficiency, use the seq parameter and place common matches or denials towards the top of the list. The sequence values are generated in the sequence of 5. The parameters GE and LE specify the range of the prefix length to be matched. When setting these parameters, set LE to be less than 32 and GE to be less than LE. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ip prefix-list WORD (deny \| permit) (A.B.C.D/M \| any)<br>[no] ip prefix-list WORD (deny \| permit) A.B.C.D/M ge <0-32><br>[no] ip prefix-list WORD (deny \| permit) A.B.C.D/M ge <0-32> le <0-32><br>[no] ip prefix-list WORD (deny \| permit) A.B.C.D/M le <0-32><br>[no] ip prefix-list WORD (deny \| permit) A.B.C.D/M le <0-32> ge <0-32><br>[no] ip prefix-list WORD seq <1-4294967295> (deny \| permit) (A.B.C.D/M \| any)<br>[no] ip prefix-list WORD seq <1-4294967295> (deny \| permit) A.B.C.D/M ge <0-32><br>[no] ip prefix-list WORD seq <1-4294967295> (deny \| permit) A.B.C.D/M ge <0-32> le <0-32><br>[no] ip prefix-list WORD seq <1-4294967295> (deny \| permit) A.B.C.D/M le <0-32><br>[no] ip prefix-list WORD seq <1-4294967295> (deny \| permit) A.B.C.D/M le <0-32> ge <0-32><br>[no] ip prefix-list sequence-number<br>[no] ip prefix-list WORD description LINE |
| **Parameters** | **WORD:** Specify the name of a prefix list.<br>**deny:** Specify that packets are to be rejected.<br>**Description**: Prefix-list specific description.<br>**LINE:** Up to 80 characters describing this prefix-list<br>**permit:** Specify that packets are to be accepted.<br>**A.B.C.D/M:** The IP address mask and length of the prefix list mask<br>**le:** Maximum prefix length to be matched <0-32>.<br>**ge:** Minimum prefix length to be matched <0-32>.<br>**seq:** The sequence number of the prefix list <1-429496725>.<br>**any:** Takes all packets of any length.<br>**sequence-number:** Sequence numbers in nonvolatile generation |
| **Example usage** | `switch_a(config)# ip prefix-list mylist seq 5 deny 76.2.2.0/24` |

## Route Table

| show route-table | |
|---|---|
| **Purpose** | Display the route table, which contains information about the topology of the surrounding network. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show route-table |
| **Parameters** | None |
| **Example usage** | `switch_a# show route-table` |

## Route Map

| show route-map | |
|---|---|
| **Purpose** | Display the IP routing table for a protocol or from a particular table. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show route map [WORD] |
| **Parameters** | **WORD:** Route map name |
| **Example usage** | `switch_a# show route map` |

| route-map | |
|---|---|
| **Purpose** | Enter route-map mode, and configure permit or deny match/set operations.<br><br>This command controls and modifies routing information to allow redistribution of routes. It has a list of **match** and **set** commands associated with it. The match commands specify the conditions under which redistribution is allowed, and the set commands specify the redistribution actions to be performed if the match criteria are met. Route allow for detailed control over route distribution between routing processes. Route maps also allow policy routing, and can route packets to a different route than the obvious shortest path. |
| **Command Mode** | Global configuration |
| **Syntax** | [no] route-map WORD (deny \| permit) <1-65535> |
| **Parameters** | **WORD**: Identify the route.<br><br>**deny**: Route map denies set operations. If the deny parameter is specified, and the match criteria are met, the route is not redistributed, and any other route maps with the same map tag are not examined.<br><br>**permit**: Route map permits set operations. If the permit parameter is specified, and the match criteria are met, the route is redistributed as specified by set actions. If the match criteria are not met, the next route map with the same tag is tested.<br><br>**<1-65535>**: Sequence to insert to or delete from an existing route-map entry |
| **Example usage** | `switch_a(config)# route-map permit 100`<br>`switch_a(config-route-map)#` |

| match interface | |
|---|---|
| **Purpose** | Define interface match criterion. Specifies the next-hop interface name of a route to be matched. |
| **Command Mode** | Route map |
| **Syntax** | match interface IFNAME<br>no match interface (IFNAME\|) |
| **Parameters** | **IFNAME**: Interface name. |
| **Example usage** | `switch_a#configure terminal`<br>`switch_a(config)#route-map exampleroute permit 10`<br>`switch_a(config-route-map)#match interface ge5` |

| match ip | |
|---|---|
| **Purpose** | Match address of a route, a prefix-list, a next-hop address, the next-hop IP address using the prefix-list, a peer IPv4 address of a route. |
| **Command Mode** | Route map |
| **Syntax** | [no] match ip address (<1-199> \| <1300-2699> \| WORD)<br>[no] match ip address prefix-list (WORD)<br>[no] match ip next-hop (<1-199> \| <1300-2699> \| WORD)<br>[no] match ip next-hop prefix-list (WORD)<br>[no] match ip peer (<1-199> \| <1300-2699> \| WORD) |
| **Parameters** | **WORD: IP access-list name**<br>**<1-199>: IP access-list number (standard range)**<br>**<1300-2699>: IP access-list number (expanded range)** |
| **Example usage** | `switch_a#configure terminal`<br>`switch_a(config)# route-map rmap1 permit 3`<br>`switch_a(config-route-map)# match ip address prefix-list mylist` |

| match metric | |
|---|---|
| **Purpose** | Match a metric of a route. The route specified by the policies might not be the same as specified by the routing protocols. Setting policies enable packets to take different routes depending on their length or content. Packet forwarding based on configured policies overrides packet forwarding specified in routing tables. |
| **Command Mode** | Route map |
| **Syntax** | match metric <0-4294967295><br>no match metric (<0-4294967295> \|) |
| **Parameters** | **<0-4261412864>: Metric value** |
| **Example usage** | `switch_a#configure terminal`<br>`switch_a(config)# route-map mapexample permit 3`<br>`switch_a(config-route-map)# match metric 223455` |
| **Note** | This command is valid for BGP, OSPF, RIP, and IS-IS only. |

| set ip next-hop | |
|---|---|
| **Purpose** | Set the specified next-hop value. |
| **Command Mode** | Route map |
| **Syntax** | set ip next-hop A.B.C.D (interface IFNAME \|) (primary \| secondary \|)<br>no set ip next-hop (A.B.C.D \|) (interface IFNAME \|) (primary \| secondary \|) |
| **Parameters** | **A.B.C.D**: IP address of the next-hop.<br>**Interface**: Interface name<br>**primary**: Specify the nexthop as primary.<br>**secondary**: Specify the nexthop as secondary. |
| **Example usage** | `switch_a(config)# route-map rmap1 permit 3`<br>`switch_a(config-route-map)# set next-hop 10.10.0.67` |
| **Note** | This command is valid for BGP, OSPF, and RIP only. |

| set metric | |
|---|---|
| **Purpose** | Set a metric value for a route and influence external neighbors about the preferred path into an Autonomous System (AS). The preferred path is the one with a lower metric value. A router compares metrics for paths from neighbors in the same ASs.<br>To use this command, you must first have a match clause. **Match** and **set** commands set conditions for redistributing routes from one routing protocol to another. |
| **Command Mode** | Route map |
| **Syntax** | [no] set metric (<0-4294967295>\|<+/-metric>\|) |
| **Parameters** | **<0-4294967295>**: Specify a metric value.<br>**<+/-metric>**: Adds or subtracts a metric. |
| **Example usage** | `switch_a(config)# route-map rmap1 permit 3`<br>`switch_a(config-route-map)# set metric 600` |

## Proxy ARP

| ip proxy-arp | |
|---|---|
| **Purpose** | Enable proxy ARP on an interface, allowing the switch to answer ARP queries for a network address that is not on that network. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip proxy-arp |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ip proxy arp` |

# 18 RIP (Routing Information Protocol)

## RIP Information and General Settings

| show ip rip | |
|---|---|
| **Purpose** | Display RIP configuration info. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show ip rip<br>show ip rip database<br>show ip rip interface<br>show ip rip interface <IFNAME><br>show ip rip statistics<br>show ip rip statistics <IFNAME> |
| **Parameters** | **IFNAME**: Interface name<br>**database**: IP RIP database |
| **Example usage** | `switch_a# show ip rip interface` |

| show ip protocols rip | |
|---|---|
| **Purpose** | Show the RIP process parameter and statistics information. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show ip protocols rip |
| **Parameters** | None |
| **Example usage** | `switch_a# show ip protocols rip` |

| clear ip rip route | |
|---|---|
| **Purpose** | Clear specific data from the RIP routing tables. Using this command with the all parameter clears the RIP table of all routes. To prevent the RIP from being deleted, use the **redistribute connected** command and make the RIP network a connected route.<br>To delete the RIP routes learned from neighbors and also keep the RIP network intact, use the **rip** parameter (**clear ip rip route rip**). |
| **Command Mode** | Privileged Exec |
| **Syntax** | clear ip rip route (A.B.C.D/M \| rip \| connected \| static \| ospf \| all) |
| **Parameters** | **A.B.C.D/M**: Removes entries which exactly match this destination address<br>**bgp**: Removes BGP routes from the RIP routing table.<br>connected: Removes entries for connected routes<br>**isis**: Removes IS-IS routes<br>**kernel**: Removes kernel entries.<br>**ospf**: Removes only OSPF routes.<br>**rip**: Removes only RIP routes.<br>**all**: Removes the entire RIP routing table. |
| **Example usage** | `switch_a# clear ip rip route 10.0.0.0/8` |

| clear ip rip statistics | |
|---|---|
| **Purpose** | Clear RIP statistics. |
| **Command Mode** | Privileged Exec |
| **Syntax** | clear ip rip statistics IFNAME |
| **Parameters** | **IFNAME**: Interface to clear |
| **Example usage** | `switch_a# clear ip rip statistics ge5` |

| router rip | |
|---|---|
| **Purpose** | Enable RIP routing. This command places the switch into Router Configuration Mode. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] router rip |
| **Parameters** | None |
| **Example usage** | `switch_a(config)#router rip`<br>`switch_a(config-router)#` |

| version | |
|---|---|
| **Purpose** | Specify a RIP version to be used globally. Options are version 1 or version 2. Version 2 has more features than version 1, including authentication. Once the rip version is set, rip packets of that version will be received and sent on all the rip-enabled interfaces.<br>Use the no parameter to restore the default version (version 2). |
| **Command Mode** | Router Configuration |
| **Syntax** | version <1-2> |
| **Parameters** | **<1-2>**: RIP version |
| **Example usage** | `switch_a(config-router)#version 1` |

| default-information originate | |
|---|---|
| **Purpose** | Distribute a default route, always advertise default route, create a route map reference. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] default-information originate<br>default-information originate always<br>default-information originate route-map <WORD><br>default-information originate always route-map <WORD> |
| **Parameters** | **always**: Always advertise default route<br>**route-map**: Route map reference<br>**WORD**: Pointer to route-map entries |
| **Example usage** | `switch_a(config-router)# default-information originate always` |

| cisco-metric-behavior | |
|---|---|
| **Purpose** | Enable metric updates consistent with Cisco. |
| **Command Mode** | Router Configuration |
| **Syntax** | cisco-metric-behavior <enable/disable> |
| **Parameters** | None |
| **Example usage** | `switch_a(config-router)# cisco-metric-behavior enable` |

| default-metric | |
|---|---|
| **Purpose** | Specify the metrics to be assigned to redistributed routers. This command is used in conjunction with the **redistribute** command to make the routing protocol use the specified metric value for all redistributed routes. A default metric is useful in redistributing routes with incompatible metrics. Default metric provides the standard to compare. All routes that are redistributed will use the default metric. |
| **Command Mode** | Router Configuration |
| **Syntax** | default-metric <1-16> |
| **Parameters** | **<1-16>**: default metric. |
| **Example usage** | `switch_a(config-router)# default-metric 10` |

| distribute-list | |
|---|---|
| **Purpose** | Filter incoming or outgoing route updates using an access list or a prefix list. Incoming or outgoing route updates can be filtered out using an access list or a prefix list. If no interface is specified, the filter will be applied to all the interfaces. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] distribute-list WORD (in \| out) (IFNAME \|)<br>[no] distribute-list prefix WORD (in \| out) (IFNAME \|) |
| **Parameters** | **WORD**: The IPv4 access-list number or name to use.<br>**prefix**: Filter prefixes in routing updates.<br>**WORD**: The name of the IPv4 prefix-list to use.<br>**in**: Filter incoming routing updates.<br>**out**: Filter outgoing routing updates.<br>**IFNAME**: The name of the interface on which distribute-list applies. |
| **Example usage** | `switch_a(config-router)# distribute-list prefix myfilter in ge10` |

| maximum-prefix | |
|---|---|
| **Purpose** | Set the maximum number of RIP routes, and the percentage of maximum routes created that will generate a warning (Default 75%). |
| **Command Mode** | Router Configuration |
| **Syntax** | maximum-prefix <1-65535><br>maximum-prefix <1-65535> (1-100)<br>no maximum-prefix |
| **Parameters** | **<1-65535>**: The maximum number of RIP routes allowed.<br>**<1-100>**: Percentage of maximum routes that will generate a warning. Default is 75%. |
| **Example usage** | `switch_a(config-router)# maximum-prefix 150` |

| timers basic | |
|---|---|
| **Purpose** | Adjusts the RIP timing parameters. Every 30 seconds, an update is sent out containing the complete routing table to every neighboring router. When the time specified by the timeout parameter expires, the route is no longer valid. However, it is retained in the routing table for a short time so that neighbors are notified that the route has been dropped. When the time specified by the garbage parameter expires, the route is finally removed from the routing table. Until the garbage time expires, the route is included in all updates sent by the router.<br><br>All routers in the network must have the same timers to allow RIP to execute distributed and asynchronous routing algorithms. The timers should not be synchronized as it might lead to unnecessary collisions on the network. |
| **Command Mode** | Router Configuration |
| **Syntax** | timers basic: <5-2147483647> <5-2147483647> <5-2147483647><br>no timers basic |
| **Parameters** | **<5-2147483647>**: The routing table update timer in seconds. Default is 30.<br>**<5-2147483647>**: The routing information timeout timer in seconds. Default is 180 seconds. After this interval has elapsed and no updates for a route are received, the route is declared invalid.<br>**<5-2147483647>**: The routing garbage collection timer in seconds. Default is 120 seconds. |
| **Example usage** | `switch_a(config-router)# timers basic 30 180 120` |

| recv-buffer-size | |
|---|---|
| **Purpose** | Configure the RIP UDP receive-buffer size. |
| **Command Mode** | Router Configuration |
| **Syntax** | recv-buffer-size <8192-2147483647><br>no recv-buffer-size (<8192-2147483647> \|) |
| **Parameters** | **<8192-2147483647>**: The RIP UDP receive buffer size value |
| **Example usage** | `switch_a(config-router)# recv-buffer-size 150000` |

## RIP Interface Settings

| ip rip authentication key-chain | |
|---|---|
| **Purpose** | Enable RIP version 2 authentication on an interface and specify the name of the key chain to be used. If no key chain is configured, then the result will be no authentication. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip rip authentication key-chain LINE<br>no ip rip authentication key-chain |
| **Parameters** | **LINE**: The name of the key chain. |
| **Example usage** | `switch_a(config-if)# ip rip authentication key-chain rufferto` |

| ip rip authentication mode | |
|---|---|
| **Purpose** | Specify the type of authentication mode used for RIP version 2 packets |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip rip authentication mode md5<br>ip rip authentication mode text<br>no ip rip authentication mode |
| **Parameters** | **md5**: Uses the keyed MD5 authentication algorithm.<br>**text**: The clear text or simple password authentication. |
| **Example usage** | `switch_a(config-if)# ip rip authentication mode md5` |

| ip rip authentication string | |
|---|---|
| **Purpose** | Specify the authentication string or password used by a key. You can choose to configuring authentication for single key or multiple keys at different times. Use this command to specify password for a single key on an interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip rip authentication string LINE<br>no ip rip authentication string |
| **Parameters** | **LINE**: The authentication string or password used by a key. |
| **Example usage** | `switch_a(config-if)# ip rip authentication string guest` |

| ip rip receive version | |
|---|---|
| **Purpose** | Receive specified version of RIP packets on an interface basis using version control, and override the setting of the version command. Use no form to set default (2). |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip rip receive version (1\|2)<br>ip rip receive version 1 2<br>ip rip receive version 2 1<br>no ip rip receive version |
| **Parameters** | **1**: Accept RIP version 1 packets on the interface.<br>**2**: Accept RIP version 2 packets on the interface.<br>**1 2**: Accept RIP version 1 and 2 packets on the interface.<br>**2 1**: Accept RIP version 2 and 1 packets on the interface. |
| **Example usage** | `switch_a(config-if)# ip rip receive version 1 2` |

| ip rip receive-packet | |
|---|---|
| **Purpose** | Configure the interface to enable the reception of RIP packets. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip rip receive-packet |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ip rip receive-packet` |

| ip rip send version | |
|---|---|
| **Purpose** | Interface version control. In addition to version 1 & 2, compatible version packets can be specified. The parameter **1-compatible** lets a version 2 RIP interface broadcast packets instead of multicasting. This command overrides version specified by the **version** command. Use no parameter for global RIP version rules. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip rip send version (1 \| 2 \|1-compatible)<br>ip rip send version 1 2<br>ip rip send version 2 1 |
| **Parameters** | 1: Send RIP version 1 packets out of an interface.<br>2: Send RIP version 2 packets out of an interface.<br>1-compatible: Send RIP version 1 compatible packets from a version 2 RIP interface. |
| **Example usage** | `switch_a(config-if)# ip rip send version 1 2` |

| ip rip send-packet | |
|---|---|
| **Purpose** | Enable the sending of RIP packets through the current interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip rip send-packet |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ip rip send-packet` |

| ip rip split-horizon | |
|---|---|
| **Purpose** | Perform the split-horizon action on the interface. This command helps avoid including routes in updates sent to the same gateway from which they were learned. Using the split horizon command omits routes learned from one neighbor, in updates sent to that neighbor. Using the **poisoned** parameter includes such routes in updates, but sets their metrics to infinity (effectively advertising that these routes are unreachable). |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip rip split-horizon<br>ip rip split-horizon poisoned<br>no ip rip split-horizon |
| **Parameters** | **poisoned**: Performs split-horizon with poisoned reverse. |
| **Example usage** | `switch_a(config-if)# ip rip split-horizon poisoned` |

## RIP Route

| offset-list | |
|---|---|
| **Purpose** | Add an offset to in and out metrics to routes learned through RIP. This command specifies the offset value that is added to the routing metric. When the networks match the access list the offset is applied to the metrics. No change occurs if the offset value is zero. |
| **Command Mode** | Router Configuration |
| **Syntax** | offset-list WORD (in \| out) <0-16> (IFNAME \|)<br>no offset-list WORD (in \| out) <0-16> (IFNAME \|) |
| **Parameters** | **WORD**: The access-list number or names to apply.<br>**in**: Access list will be used for metrics of incoming advertised routes.<br>**out**: Access list will be used for metrics of outgoing advertised routes.<br>**<0-16>**: Offset used for metrics of networks matching the access list.<br>**IFNAME**: The interface to match. |
| **Example usage** | Set the router to examine the RIP updates being sent out from interface ge1 and add 16 hops to routes matching the ip addresses specified in the access list **accesslist1**. |
| | `switch_a(config-router)# offset-list accesslist1 in 16 ge1` |

| route | |
|---|---|
| **Purpose** | Configure static RIP routes. This command is used most often for debugging purposes and does not show up in the kernel routing table. After adding the RIP route, it can be checked in the RIP routing table. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] route A.B.C.D/M |
| **Parameters** | **A.B.C.D/M**: The IP address prefix and length. |
| **Example usage** | `switch_a(config-router)# route 10.10.10.0/24` |

## RIP Network

| network | |
|---|---|
| **Purpose** | Specify a network as one that runs RIP. This command specifies the networks to which routing updates will be sent and received. If a network is not specified, the interfaces in that network will not be advertised in any RIP update. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] network A.B.C.D/M<br>[no] network IFNAME |
| **Parameters** | **A.B.C.D/M**: The IP address prefix and length of this IP network.<br>**IFNAME**: Alphanumeric string that defines the interface name. |
| **Example usage** | `switch_a(config-router)# network 10.0.0.0/8` |

## RIP Neighbor

| neighbor | |
|---|---|
| **Purpose** | Specify a neighbor router. It is used for each connected point-to-point link. This command to exchanges non-broadcast routing information. It can be used multiple times for additional neighbors. The **passive-interface** command disables sending routing updates on an interface. Use the neighbor command in conjunction with the passive-interface command to send routing updates to specific neighbors. |
| **Command Mode** | Router Configuration |
| **Syntax** | neighbor <A.B.C.D><br>neighbor <A.B.C.D> fail-over<br>no neighbor A.B.C.D |
| **Parameters** | **A.B.C.D**: IP address of a neighboring router with which the routing information will be exchanged.<br>**fall-over**: Fall-over detection |
| **Example usage** | `switch_a(config-router)# neighbor 20.20.20.20` |

## RIP Passive

| passive-interface | |
|---|---|
| **Purpose** | Block RIP broadcast on the interface. |
| **Command Mode** | Router Configuration |
| **Syntax** | passive-interface IFNAME<br>no passive-interface IFNAME |
| **Parameters** | **IFNAME**: Interface name. |
| **Example usage** | `switch_a(config-router)# passive-interface ge5` |

## RIP Redistribute

| redistribute | |
|---|---|
| **Purpose** | Redistribute information from other routing protocols |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] redistribute (kernel \| connected \| static \| ospf \| isis \| bgp)<br>[no] redistribute (kernel \| connected \| static \| ospf \| isis \| bgp) metric <0-16><br>[no] redistribute (kernel \| connected \| static \| ospf \| isis \| bgp) route-map WORD<br>[no] redistribute (kernel \| connected \| static \| ospf \| isis \| bgp) metric <0-16> route-map WORD |
| **Parameters** | **bgp**: Redistribute from BGP routes<br>**connected**: Redistribute from connected routes<br>**isis**: Redistribute from ISO IS-IS routes<br>**kernel**: Redistribute from kernel routes<br>**ospf6**: Redistribute from OSPF routes (version 3)<br>**static**: Redistribute from static routes<br>**metric**: Set metric value<br>**<0–16>**: Metric value<br>**route-map**: Route map reference<br>**WORD**: Name of the route-map |
| **Example usage** | `switch_a(config-router)# redistribute static metric 8` |

# 19 RIPng (Routing Information Protocol Next Generation)

## RIPng Information and General Settings

| show ip rip | |
|---|---|
| **Purpose** | Display RIPng process parameters and statistics. Show RIPng routes. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show ipv6 rip<br>show ipv6 rip database<br>show ipv6 rip interface<br>show ipv6 rip interface <IFNAME><br>show ipv6 protocols rip<br>show ipv6 route rip |
| **Parameters** | **database**: IPv6 RIP database |
| **Example usage** | `switch_a# show ipv6 protocols rip` |

| clear ipv6 rip route | |
|---|---|
| **Purpose** | Clear specific data from the RIPng routing tables. |
| **Command Mode** | Privileged Exec |
| **Syntax** | clear ipv6 rip route (X:X::X:X/M \| rip \| kernel \| connected \| static \| ospf6 \| isis \| bgp \| all) |
| **Parameters** | **X:X::X:X/M**: Removes entries which exactly match this destination address<br>**bgp**: Removes BGP routes from the RIP routing table.<br>connected: Removes entries for connected routes<br>**isis**: Removes IS-IS routes<br>**kernel**: Removes kernel entries.<br>**ospf**: Removes only OSPF routes.<br>**rip**: Removes only RIP routes.<br>**static**: Removes static entries.<br>**all**: Removes the entire RIP routing table. |
| **Example usage** | `switch_a# clear ipv6 rip route 3ffe:ffff::/16` |

| router ipv6 rip | |
|---|---|
| **Purpose** | Enable RIPng routing. This command places the switch into Router Configuration Mode. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] router ipv6 rip |
| **Parameters** | None |
| **Example usage** | `switch_a(config)#router ipv6 rip`<br>`switch_a(config-router)#` |

| default-information originate | |
|---|---|
| **Purpose** | Generate a default route into the RIPng. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] default-information originate |
| **Parameters** | None |
| **Example usage** | `switch_a(config-router)# default-information originate` |

| cisco-metric-behavior | |
|---|---|
| **Purpose** | Enable or disable the metric update as Cisco. |
| **Command Mode** | Router Configuration |
| **Syntax** | cisco-metric-behavior <enable/disable> |
| **Parameters** | None |
| **Example usage** | `switch_a(config-router)# cisco-metric-behavior enable` |

| default-metric | |
|---|---|
| **Purpose** | Specify the metrics to be assigned to redistributed routers. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] default-metric <1-16> |
| **Parameters** | **<1-16>**: default metric. |
| **Example usage** | `switch_a(config-router)# default-metric 10` |

| distribute-list | |
|---|---|
| **Purpose** | Filter incoming or outgoing route updates using an access list or a prefix list. Incoming or outgoing route updates can be filtered out using an access list or a prefix list. If no interface is specified, the filter will be applied to all the interfaces. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] distribute-list WORD (in \| out) (IFNAME \|)<br>[no] distribute-list prefix WORD (in \| out) (IFNAME \|) |
| **Parameters** | **WORD**: The IPv6 access-list number or name to use.<br>**prefix**: Filter prefixes in routing updates.<br>**WORD**: The name of the IPv6 prefix-list to use.<br>**in**: Filter incoming routing updates.<br>**out**: Filter outgoing routing updates.<br>**IFNAME**: The name of the interface on which distribute-list applies. |
| **Example usage** | `switch_a(config-router)# distribute-list prefix myfilter in ge10` |

| timers basic | |
|---|---|
| **Purpose** | Adjust routing network timers. |
| **Command Mode** | Router Configuration |
| **Syntax** | timers basic: <5-2147483647> <5-2147483647> <5-2147483647><br>no timers basic |
| **Parameters** | **<5-2147483647>**: The routing table update timer in seconds. Default is 30.<br>**<5-2147483647>**: The routing information timeout timer in seconds. Default is 180 seconds. After this interval has elapsed and no updates for a route are received, the route is declared invalid.<br>**<5-2147483647>**: The routing garbage collection timer in seconds. Default is 120 seconds. |
| **Example usage** | `switch_a(config-router)# timers basic 30 180 120` |

| recv-buffer-size | |
|---|---|
| **Purpose** | Configure the RIPng UDP receive-buffer size. |
| **Command Mode** | Router Configuration |
| **Syntax** | recv-buffer-size <8192-2147483647><br>no recv-buffer-size (<8192-2147483647> \|) |
| **Parameters** | **<8192-2147483647>**: The RIPng UDP receive buffer size value |
| **Example usage** | `switch_a(config-router)# recv-buffer-size 150000` |
| **Note** | The **no** parameter will return the recv-buffer return to the default value (8192). |

## RIPng Neighbors

| neighbor | |
|---|---|
| **Purpose** | Specify neighbor router. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] neighbor <X:X::X:X> <IFNAME> |
| **Parameters** | **IFNAME**: Interface name<br>**<X:X::X:X>**: IPv6 link-local address |
| **Example usage** | `switch_a(config-router)# neighbor 80::1 eth0` |

## RIPng Passive

| passive-interface | |
|---|---|
| **Purpose** | Block RIP broadcast on the interface. |
| **Command Mode** | Router Configuration |
| **Syntax** | passive-interface IFNAME<br>no passive-interface IFNAME |
| **Parameters** | **IFNAME**: Interface name. |
| **Example usage** | `switch_a(config-router)# passive-interface ge5` |

## RIPng Interface Settings

| Ipv6 rip split-horizon | |
|---|---|
| **Purpose** | Perform the split-horizon action on the interface. This command helps avoid including routes in updates sent to the same gateway from which they were learned. Using the split horizon command omits routes learned from one neighbor, in updates sent to that neighbor. Using the **poisoned** parameter includes such routes in updates, but sets their metrics to infinity (effectively advertising that these routes are unreachable). |
| **Command Mode** | Interface Configuration |
| **Syntax** | Ipv6 rip split-horizon<br>Ipv6 rip split-horizon poisoned<br>no ipv6 rip split-horizon |
| **Parameters** | **poisoned**: Performs split-horizon with poisoned reverse. |
| **Example usage** | `switch_a(config-if)# ipv6 rip split-horizon poisoned` |

| Ipv6 rip metric-offset | |
|---|---|
| **Purpose** | Set a RIPng metric offset. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ipv6 rip metric-offset <1-16> |
| **Parameters** | **<1-16>**: Metric value |
| **Example usage** | `switch_a(config-if)# ip rip split-horizon poisoned` |

## RIPng Route

| offset-list | |
|---|---|
| **Purpose** | Add an offset to in and out metrics to routes learned through RIPng. |
| **Command Mode** | Router Configuration |
| **Syntax** | offset-list WORD (in \| out) <0-16> (IFNAME\|)<br>no offset-list WORD (in \| out) <0-16> (IFNAME\|) |
| **Parameters** | **WORD**: The access-list number or names to apply.<br>**in**: Access list will be used for metrics of incoming advertised routes.<br>**out**: Access list will be used for metrics of outgoing advertised routes.<br>**<0-16>**: Offset used for metrics of networks matching the access list.<br>**IFNAME**: The interface to match. |
| **Example usage** | Set the router to examine the RIP updates being sent out from interface ge1 and add 16 hops to routes matching the ip addresses specified in the access list **accesslist1**. |
| | `switch_a(config-router)# offset-list accesslist1 in 16 eth0` |

| route | |
|---|---|
| **Purpose** | Configure static RIPng routes. Used mostly for debugging. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] route X:X::X:X/M |
| **Parameters** | **X:X::X:X/M**: The IPv6 address prefix and length. |
| **Example usage** | `switch_a(config-router)# route 3ffe:1234:5678::1/64` |

| Route-map | |
|---|---|
| **Purpose** | Set a route map for input or output filtering on a specified interface. |
| **Command Mode** | Router Configuration |
| **Syntax** | route-map <WORD> <in \| out> <IFNAME> |
| **Parameters** | **WORD:** Route map name<br>**in:** Input filtering<br>**out:** Output filtering<br>**IFNAME:** Interface name to which to associate the route map |
| **Example usage** | `switch_a(config-router)# route-map routemap10 in ge5` |

| aggregate-address | |
|---|---|
| **Purpose** | Set an aggregate RIPng route announcement. |
| **Command Mode** | Router Configuration |
| **Syntax** | aggregate-address X:X::X:X/M<br>no aggregate-address X:X::X:X/M |
| **Parameters** | **X:X::X:X/M:** Specify an aggregate network (IPv6 address prefix and length). |
| **Example usage** | `switch_a(config-router)# aggregate-address 3ffe:8088::/32` |

## RIPng Redistribute

| redistribute | |
|---|---|
| **Purpose** | Redistribute information from other routing protocols |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] redistribute (connected \| static \| ospf6)<br>[no] redistribute (connected \| static \| ospf6) metric <0-16><br>[no] redistribute (connected \| static \| ospf6) route-map WORD<br>[no] redistribute (connected \| static \| ospf6) metric <0-16> route-map WORD |
| **Parameters** | **connected**: Redistribute from connected routes<br>**ospf6**: Redistribute from OSPF routes (version 3)<br>**static**: Redistribute from static routes<br>**metric**: Set metric value<br>**<0–16>**: Metric value<br>**route-map**: Route map reference<br>**WORD**: Name of the route-map |
| **Example usage** | `switch_a(config-router)# redistribute static metric 8` |

# 20 OSPF (Open Shortest Path First)

## OSPF Information

| show ip ospf | |
|---|---|
| **Purpose** | Display OSPF information, border and boundary router Information, details and summary of the OSPF database, interfaces, and multi-area adjacencies. View neighbor list, OSPF routing table, and virtual link information. |
| **Command Mode** | Privileged exec |
| **Syntax** | show ip ospf (<0-65535> \|)<br>show ip ospf (<0-65535> \|) border-routers<br>show ip ospf <0-65535> database(self-originate \| max-age \| adv-router A.B.C.D \|)<br>show ip ospf <0-65535> database (asbr-summary \| external \| network \| router \| summary \| nssa-external \| opaque-link \| opaque-area \| opaque-as) A.B.C.D (self-originate \| adv-router A.B.C.D \|)<br>show ip ospf interface (IFNAME \|)<br>show ip ospf (<0-65535> \|) multi-area-adjacencies<br>show ip ospf (<0-65535> \|) {neighbor \| neighbor all \| neighbor interface A.B.C.D \| neighbor A.B.C.D \| neighbor A.B.C.D detail \| neighbor detail \| neighbor detail all}<br>show ip ospf (<0-65535> \|) route ( A.B.C.D \| A.B.C.D/M \| summary \|)<br>show ip ospf (<0-65535> \|) virtual-links |
| **Parameters** | **<0-65535>**: The ID of the router process for which information will be displayed.<br>**self-originate**: Self-originated link states.<br>**max-age**: LSAs which have reached the max-age (3600 seconds).<br>**adv-router**: Advertising router link states.<br>**asbr-summary**: Autonomous System Boundary Router (ASBR) summary LSAs.<br>**external**: External LSAs.<br>**network**: Network LSAs.<br>**router**: Router LSAs.<br>**summary**: LSA summary information.<br>**nssa-external**: NSSA external LSAs.<br>**opaque-link**: Type 9 LSAs which are not flooded beyond the local network.<br>**opaque-area**: Type 10 LSAs which are not flooded beyond the borders of their area.<br>**opaque-as**: Type 11 LSAs which are flooded throughout the Autonomous System (AS). |
| **Example usage** | `switch_a# show ip ospf 500 database asbr-summary` |

| show ip protocols | |
|---|---|
| **Purpose** | Display OSPF process parameters and statistics. |
| **Command Mode** | Privileged exec |
| **Syntax** | show ip protocols [ospf] |
| **Parameters** | None |
| **Example usage** | `switch_a# show ip protocols ospf` |

## OSPF Configuration

| router ospf | |
|---|---|
| **Purpose** | Enter router mode to configure an OSPF routing process. Specify the process ID to configure multiple instances of OSPF. A process ID is not needed of running a single OSPF instance. |
| **Command Mode** | Global Configuration |
| **Syntax** | router ospf<br>router ospf <1-65535> |
| **Parameters** | **<1-65535>**: Process ID; unique for each routing process. |
| **Example usage** | `switch_a(config)# router ospf 100`<br>`switch_a(config-router)#` |

| area authentication | |
|---|---|
| **Purpose** | Enable authentication for an OSPF area. Setting up a Type 1 authentication configures a 64-bit field for that particular network. All packets sent on this network must have this configured value in their OSPF header. This allows only routers that have the same passwords to join the routing domain. Use the **ip ospf authentication-key** command to specify a simple text password. Use the **ip ospf message-digest-key** to specify MD5 password. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] area (A.B.C.D \| <0-4294967295>) authentication<br>area (A.B.C.D \| <0-4294967295>) authentication message-digest |
| **Parameters** | **A.B.C.D**: OSPF Area ID in IPv4 address format.<br>**<0-4294967295>**: OSPF Area ID as 4-octet unsigned integer value.<br>**message-digest**: Enable MD5 authentication in specified area ID. |
| **Example usage** | `switch_a(config-router)# area 1 authentication message-digest` |

| area default-cost | |
|---|---|
| **Purpose** | Specify a cost for the default summary route sent into a stub or NSSA area. This command provides the metric for the summary default route, generated by the area border router, into the NSSA or stub area. Use this option only on an area border router that is attached to the NSSA (Not-so-stubby area) or stub area. |
| **Command Mode** | Router Configuration |
| **Syntax** | area (A.B.C.D \| <0-4294967295>) default-cost <0-16777215><br>no area (A.B.C.D \| <0-4294967295>) default-cost |
| **Parameters** | **A.B.C.D**: OSPF Area ID in IPv4 address format.<br>**<0-4294967295>**: OSPF Area ID as a decimal value.<br>**default-cost**: Indicates the cost for the default summary route used for a stub or NSSA area.<br>**<0-16777215>**: Stub's advertised default summary cost. Default is 1. |
| **Example usage** | `switch_a(config-router)# area 1 default-cost 10` |

| area filter-list | |
|---|---|
| **Purpose** | Configure a filter to advertise summary routes on an Area Border Router (ABR). This command suppresses incoming and outgoing summary routes between this area and other areas. You use this command in conjunction with the **prefix-list** and **access-list** commands. |
| **Command Mode** | Router Configuration |
| **Syntax** | area (A.B.C.D \| <0-4294967295>) filter-list prefix WORD (in \| out)<br>area (A.B.C.D \| <0-4294967295>) filter-list access WORD (in \| out)<br>no area (A.B.C.D \| <0-4294967295>) filter-list prefix WORD (in \| out)<br>no area (A.B.C.D \| <0-4294967295>) filter-list access WORD (in \| out) |
| **Parameters** | **A.B.C.D**: OSPF area ID as an IPv4 address.<br>**<0-4294967295>**: OSPF area ID as a decimal value.<br>**prefix**: Use prefix list to filter summary.<br>**WORD**: Name of the prefix or access list.<br>**access**: Use access list to filter summary.<br>**in**: Filter routes from other areas into this area.<br>**out**: Filter routes from this area into other areas. |
| **Example usage** | `switch_a(config)#access-list 1 deny 172.22.0.0/8`<br>`switch_a(config)#router ospf 100`<br>`switch_a(config-router)#area 1 filter-list access 1 in` |

| area multi-area-adjacency | |
|---|---|
| **Purpose** | Enable multi-area adjacency on the specified interface. Multi-area adjacency establishes adjacency between the Area Border Routers (ABRs). The specified interface of the ABR is associated with multiple areas. Multiple OSPF interfaces must be created for multiple areas. |
| **Command Mode** | Router Configuration |
| **Syntax** | area (A.B.C.D \| <0-4294967295>) multi-area-adjacency IFNAME neighbor A.B.C.D<br>no area (A.B.C.D \| <0-4294967295>) multi-area-adjacency IFNAME (neighbor A.B.C.D \|) |
| **Parameters** | **IFNAME**: An alphanumeric string that is the interface name.<br>neighbor: Set the neighbor.<br>**A.B.C.D**: IP address of neighbor. |
| **Example usage** | `switch_a(config)#router ospf 1`<br>`switch_a(config)#router-id 10.10.10.10`<br>`switch_a(config-router)#area 1`<br>`multi-area-adjacency ge20 neighbor 20.20.20.10` |

| area range | |
|---|---|
| **Purpose** | Summarize OSPF routes at an area boundary. A single summary route is then advertised to other areas by the Area Border Routers (ABRs). Routing information is condensed at area boundaries and outside the area.<br>If the network numbers in an area are assigned in a way such that they are contiguous, the ABRs can be configured to advertise a summary route that covers all the individual networks within the area that fall into the specified range. |
| **Command Mode** | Router Configuration |
| **Syntax** | area (A.B.C.D \| <0-4294967295>) range A.B.C.D/M<br>area (A.B.C.D \| <0-4294967295>) range A.B.C.D/M advertise<br>area (A.B.C.D \| <0-4294967295>) range A.B.C.D/M not-advertise<br>no area (A.B.C.D \| <0-4294967295>) range A.B.C.D/M<br>no area (A.B.C.D \| <0-4294967295>) range A.B.C.D/M (advertise \| not-advertise) |
| **Parameters** | **A.B.C.D**: OSPF Area ID in IPv4 address format.<br>**<0-4294967295>**: OSPF Area ID as a decimal value.<br>**A.B.C.D/M**: Area range prefix and length.<br>**advertise**: Advertise this range.<br>**not-advertise**: Do not advertise this range. |
| **Example usage** | `switch_a(config-router)# area 1 range 192.16.0.0/24` |

| area nssa | |
|---|---|
| **Purpose** | Set an area as a Not-So-Stubby-Area (NSSA). There are no external routes in an OSPF stub area, so you cannot redistribute from another protocol into a stub area. An NSSA allows external routes to be flooded within the area. These routes are then leaked into other areas. However, the external routes from other areas still do not enter the NSSA. You can configure an area to be a stub area or an NSSA, but not both.<br><br>This command simplifies administration when connecting a central site using OSPF to a remote site that is using a different routing protocol. You can extend OSPF to cover the remote connection by defining the area between the central router and the remote router as a NSSA. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] area (A.B.C.D \| <0-4294967295>) nssa<br>area (A.B.C.D \| <0-4294967295>) nssa (translate-candidate \| translate-always)<br>area (A.B.C.D \| <0-4294967295>) nssa {translator-role (candidate \| always) \| stability-interval <0-2147483647> \| no-redistribution \| default-information-originate (metric <0-16777214> \| metric-type <1-2> \| metric <0-16777214> metric-type <1-2> \| metric-type <1-2> metric <0-16777214> \|) \| no-summary}<br>no area (A.B.C.D \| <0-4294967295>) nssa {translator-role \| no-redistribution \| default-information-originate \| no-summary} |
| **Parameters** | **A.B.C.D**: OSPF Area ID in IPv4 address format.<br>**<0-4294967295>**: OSPF Area ID as a decimal value.<br>**translator-role**: NSSA-ABR translator role<br>**candidate**: Translate NSSA-LSA to Type-5 LSA if router is elected.<br>**always**: Always translate NSSA-LSA to Type-5 LSA.<br>**stability-interval**: Stability timer for a NSSA area. If an elected translator determines its services are no longer required, it continues to perform its duties for this time interval. This minimizes excess flushing of translated Type-7 LSAs and provides a more stable translator transition.<br>**<0-2147483647>:** Stability interval in seconds.<br>**no-redistribution**: Do not redistribute into the NSSA.<br>**default-information-originate**: Originate Type-7 default LSA into the NSSA.<br>**metric**: Set metric for default routes.<br>**<0-16777214>:** Metric value. |
| **Example usage** | `switch_a(config-router)# area 3 nssa translator-role candidate noredistribution default-information-originate metric 34 metric-type 2` |

| area shortcut | |
|---|---|
| **Purpose** | Configure the short-cutting mode of an area. An area shortcut enables traffic to go through the non-backbone area with a lower metric whether or not an ABR router is attached to the backbone area. |
| **Command Mode** | Router Configuration |
| **Syntax** | area (A.B.C.D \| <0-4294967295>) shortcut (default \| enable \| disable)<br>no area (A.B.C.D \| <0-4294967295>) shortcut<br>no area (A.B.C.D \| <0-4294967295>) shortcut (enable \| disable) |
| **Parameters** | **A.B.C.D**: OSPF Area ID in IPv4 address format.<br>**<0-4294967295>**: OSPF Area ID as a decimal value.<br>**default**: Sets default short-cutting behavior.<br>**enable**: Forces short-cutting through the area.<br>**disable**: Disables short-cutting through the area. |
| **Example usage** | `switch_a(config-router)# area 1 shortcut default` |

| area stub | |
|---|---|
| **Purpose** | Define an area as a stub area. There are two stub area router configuration commands: the **stub** and **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 area border router (ABR) attached to the stub area, use the **area default-cost** command.<br><br>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 need to learn about summary LSAs from other areas. |
| **Command Mode** | Router Configuration |
| **Syntax** | area (A.B.C.D \| <0-4294967295>) stub<br>area (A.B.C.D \| <0-4294967295>) stub no-summary<br>no area (A.B.C.D \| <0-4294967295>) stub<br>no area (A.B.C.D \| <0-4294967295>) stub no-summary |
| **Parameters** | **A.B.C.D**: OSPF Area ID in IPv4 address format.<br>**<0-4294967295>**: OSPF Area ID as a decimal value.<br>**no-summary**: Stops an ABR from sending summary link advertisements into the stub area. |
| **Example usage** | `switch_a(config-router)# area 1 stub no-summary` |

| area virtual-link | |
|---|---|
| **Purpose** | Configure a link between two backbone areas that are physically separated through other nonbackbone area. 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 increases routing traffic. 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. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] area (A.B.C.D \| <0-4294967295>) virtual-link A.B.C.D<br>area (A.B.C.D \| <0-4294967295>) virtual-link A.B.C.D {authentication (messagedigest \| null\|) \| authentication-key LINE \| message-digest-key <1-255> md5 LINE \| deadinterval <1-65535> \| hello-interval <1-65535> \| retransmit-interval <1-3600> \| transmit-delay <1-3600>}<br>[no] area (A.B.C.D \| <0-4294967295>) virtual-link A.B.C.D {fall-over}<br>no area (A.B.C.D \|<0-4294967295>) virtual-link A.B.C.D {dead-interval \| hellointerval \| retransmit-interval \| transmit-delay \| authentication \| authenticationkey \| message-digest-key <1-255>} |
| **Parameters** | **A.B.C.D**: OSPF Area ID in IPv4 address format.<br>**<0-4294967295>**: OSPF Area ID as a decimal value.<br>**A.B.C.D**: IP address of the virtual link neighbor.<br>**message-digest**: Cryptographic authentication.<br>**null**: Null authentication.<br>**authentication-key:** Set authentication key.<br>**LINE**: Authentication key ID of 8 characters.<br>**<1-255>**: Message digest key.<br>**md5**: Set the MD5 key - **LINE**: MD5 key.<br>**dead-interval**: Interval during which no packets are received and after which the router acknowledges a neighboring router as off-line.<br>**<1-65535>:** The interval in seconds. Default is 40.<br>**hello-interval**: Interval the router waits before it sends hello packet. <1-65535> in seconds. Default is 10 seconds.<br>**retransmit-interval**: Interval router waits before it retransmits a packet. <1-3600> in seconds. Default is 5 seconds.<br>**transmit-delay**: Interval router waits before it transmits a packet. <1-3600> in seconds. Default is 1 second.<br>**fall-over**: Specify fall-over detection. |
| **Example usage** | `switch_a(config-router)# area 1 virtual-link 10.10.11.50 hello 5 dead 10` |

| auto-cost reference bandwidth | |
|---|---|
| **Purpose** | Control how OSPF calculates the default metric for the interface.<br>By default, OSPF calculates the OSPF metric for an interface by dividing the reference bandwidth by the interface bandwidth. The default value for the reference bandwidth is 100Mbps. The auto-cost command is used to differentiate high bandwidth links. For multiple links with high bandwidth, specify a larger reference bandwidth value to differentiate cost on those links. |
| **Command Mode** | Router Configuration |
| **Syntax** | auto-cost reference-bandwidth <1-4294967><br>no auto-cost reference-bandwidth |
| **Parameters** | **<1-4294967>**: Reference bandwidth in Mbps. Default is 100 Mbps. |
| **Example usage** | `switch_a(config-router)# auto-cost reference-bandwidth 50` |

| capability opaque | |
|---|---|
| **Purpose** | Enable opaque-LSAs which are Type 9, 10 and 11 LSAs that deliver information used by external applications. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] capability opaque |
| **Parameters** | None |
| **Example usage** | `switch_a(config-router)# compatibility opaque` |

| capability restart | |
|---|---|
| **Purpose** | Enable OSPF graceful restart or restart signaling. If a router is not restart-enabled, it cannot enter graceful restart mode and act as a helper. |
| **Command Mode** | Router Configuration |
| **Syntax** | capability restart (graceful \| signaling)<br>no capability restart |
| **Parameters** | None |
| **Example usage** | `switch_a(config-router)# capability restart graceful` |

| compatible rfc1583 | |
|---|---|
| **Purpose** | Restore the method used to calculate summary route costs per RFC. RFC 1583 specifies a method for calculating the metrics for summary routes based on the minimum metric of the component paths available. RFC 2328 specifies a method for calculating metrics based on maximum cost. With this change, it is possible that all of the ABRs in an area might not be upgraded to the new code at the same time. This command addresses this issue and allows the selective disabling of RFC 2328 compatibility. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] compatible rfc1583 |
| **Parameters** | None |
| **Example usage** | `switch_a(config-router)# compatible rfc1583` |

| default-information originate | |
|---|---|
| **Purpose** | Create a default external route into an OSPF routing domain.<br>The system acts like an Autonomous System Boundary Router (ASBR) when you use the **default-information originate** command to redistribute routes into an OSPF routing domain. An ASBR does not by default generate a default route into the OSPF routing domain. When you give the **default-information originate** command, also specify a **route-map** to avoid a dependency on the default network in the routing table. |
| **Command Mode** | Router Configuration |
| **Syntax** | default-information originate<br>default-information originate {metric <0-16777214> \| metric-type (1 \| |

| | |
|---|---|
| | 2) \| {route-map WORD \| always}<br>no default-information originate<br>no default-information originate {metric \| metric-type \| {route-map \| always} |
| **Parameters** | **always**: Used to advertise the default route regardless of whether there is a default route.<br>**metric**: Sets the OSPF metric used in creating the default route.<br>**<0-16777214>**: Sets the OSPF metric used in creating the default route. Default metric value is 10.<br>**metric-type**: The external link type associated with the default route advertised into the OSPF routing domain (see RFC 3101).<br>**1**: Sets OSPF External Type 1 metric.<br>**2**: Sets OSPF External Type 2 metric (default).<br>**route-map**: Route map.<br>**WORD**: Name of route map. |
| **Example usage** | `switch_a(config-router)# default-information originate always metric 23 metrictype 2 route-map myinfo` |

| **default-metric** | |
|---|---|
| **Purpose** | Set a default metric for OSPF. A default metric facilitates redistributing routes with incompatible metrics. If the metrics do not convert, the default metric provides an alternative. Use this command to use the same metric value for all redistributed routes. Use this command in conjunction with **redistribute**. |
| **Command Mode** | Router Configuration |
| **Syntax** | default-metric <1-16777214><br>no default-metric |
| **Parameters** | **<1-16777214>**: Metric value |
| **Example usage** | `switch_a(config-router)# default-metric 100` |
| **distance** | |
| **Purpose** | Set OSPF administrative distances. The administrative distance rates the trustworthiness of a routing information source. A higher distance value means a lower trust rating. Use the no form to restore the default value (110). |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] distance <1-255><br>[no] distance <1-255> A.B.C.D/M (WORD \|)<br>distance ospf {intra-area <1-255> \| inter-area <1-255> \| external <1-255>}<br>no distance ospf |
| **Parameters** | **<1-255>**: Default administrative distance to be used. |

| | |
|---|---|
| | **intra-area:** Routes within an area,<br>**<1-255>**: Distance for all routes within an area<br>**inter-area**: Routes from one area to another area.<br>**<1-255>**: Distance for all routes from one area to another area.<br>**external**: Routes from other domains learned by redistribution.<br>**<1-255>**: Distance from other domains learned by redistribution.<br>**A.B.C.D/M**: Distance for routes to prefixes whose nexthop matches this address.<br>**WORD**: Name of access list to apply to route updates. |
| **Example usage** | `switch_a(config-router)# distance ospf inter-area 20 intra-area 10 external 40` |

| **distribute-list** | |
|---|---|
| **Purpose** | Filter networks in routing updates. This command redistributes other routing protocols into the OSPF routing table. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] distribute-list WORD out (kernel \| connected \| static \| rip \| bgp \| isis \| ospf (<1-65535> \|))<br>[no] distribute-list WORD in |
| **Parameters** | **WORD**: Name of the access list.<br>**in, out**: Filter incoming and outgoing routing updates.<br>**kernel**: Specify kernel routes.<br>**connected**: Specify connected routes.<br>**<1-65535>**: OSPF process ID. If not specified, this command redistributes all running OSPF processes. |
| **Example usage** | `switch_a(config)#access-list list1 permit 172.10.0.0/16`<br>`switch_a(config)#router ospf 100`<br>`switch_a(config-router)#distribute-list list1 out bgp` |

| **enable db-summary-opt** | |
|---|---|
| **Purpose** | Enable the database summary list optimization for OSPFv2.<br>When enabled, the database exchange process is optimized by removing the LSA from the database summary list for the neighbor, if the LSA instance in database summary list is the same as or less recent than the listed LSA in the database description packet received from the neighbor. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] enable db-summary-opt |
| **Parameters** | None |

| | |
|---|---|
| **Example usage** | `switch_a(config-router)# enable db-summary-opt` |

| **host area** | |
|---|---|
| **Purpose** | Configure a stub host entry belonging to a particular area.<br>Using this command, you can advertise specific host routes in the router-LSA as stub link. Since stub host belongs to the specified router, specifying cost is not important. |
| **Command Mode** | Router Configuration |
| **Syntax** | host A.B.C.D area (A.B.C.D \| <0-4294967295>)<br>host A.B.C.D area (A.B.C.D \| <0-4294967295>) cost <0-65535><br>no host A.B.C.D area (A.B.C.D \| <0-4294967295>)<br>no host A.B.C.D area (A.B.C.D \| <0-4294967295>) cost (<0-65535> \|) |
| **Parameters** | **A.B.C.D**: IP address of the host.<br>**area**: Set the OSPF area ID<br>**A.B.C.D**: OSPF Area ID in IPv4 address format.<br>**<0-4294967295>**: OSPF Area ID as a decimal value.<br>**cost**: Specify cost for stub host entry.<br>**<0-65535>**: Cost for stub host entry. |
| **Example usage** | `switch_a(config-router)# host 172.16.10.101 area 2 cost 10` |

| **max-concurrent-dd** | |
|---|---|
| **Purpose** | Limit the number of Database Descriptors (DD) that can be processed concurrently. This command limits the maximum number of DD exchanges that can occur concurrently per OSPF instance, thus allowing for all of the adjacencies to come up. |
| **Command Mode** | Router Configuration |
| **Syntax** | max-concurrent-dd <1-65535><br>no max-concurrent-dd |
| **Parameters** | **<1-65535>**: Number of DD processes. |
| **Example usage** | `switch_a(config-router)# max-concurrent-dd 4` |

| maximum-area | |
|---|---|
| **Purpose** | Configure the maximum number of OSPF areas. |
| **Command Mode** | Router Configuration |
| **Syntax** | maximum-area <1-4294967294><br>no maximum-area |
| **Parameters** | **<1-4294967294>**: Maximum number of OSPF areas. |
| **Example usage** | `switch_a(config-router)# maximum-area 5000` |

| neighbor | |
|---|---|
| **Purpose** | Configure OSPF routers interconnecting to NBMA (Non-Broadcast Multi-Access) networks. Include one neighbor entry for each known non-broadcast network neighbor. Configure the neighbor address on the primary address of the interface. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] neighbor A.B.C.D<br>[no] neighbor A.B.C.D (priority <0-255> \| poll-interval <1-2147483647> \| cost <1-65535>)<br>[no] neighbor A.B.C.D (cost <1-65535>) |
| **Parameters** | **priority**: Router priority of the non-broadcast neighbor associated with the specified IP address - <0-255>, default is 0.<br>**poll-interval**: Rate at which routers send hello packets when neighboring router inactive, <1-2147483647> in seconds. Set this value much larger than hello interval. Default is 120.<br>**cost**: Link-state metric to this neighbor, <1-65535>. |
| **Example usage** | `switch_a(config-router)# neighbor 1.2.3.4 priority 1 poll-interval 90` |
| **network** | |
| **Purpose** | Enable OSPF routing with a specified area ID (and optionally an instance ID) on interfaces with IP addresses that match the specified network address.<br>OSPF routing is enabled per IPv4 subnet basis. You define the network address using the prefix length or a subnet mask.<br>Use the no parameter with this command to disable OSPF routing on the interfaces. |
| **Command Mode** | Router Configuration |
| **Syntax** | **Network address defined using the prefix length:**<br>network A.B.C.D/M area (A.B.C.D \| <0-4294967295>) (instance-id <0-255> \| ) |

| | |
|---|---|
| | no network A.B.C.D/M area (A.B.C.D \| <0-4294967295>) (instance-id <0-255>\|)<br><br>**Network address defined using subnet mask:**<br>network A.B.C.D A.B.C.D area (A.B.C.D \| <0-4294967295>) (instance-id <0-255> \|)<br>no network A.B.C.D A.B.C.D area (A.B.C.D \|<0-4294967295>) (instance-id <0-255> \|) |
| **Parameters** | **A.B.C.D/M**: IPv4 network address with prefix length.<br>**A.B.C.D**: IPv4 network address.<br>**A.B.C.D**: Subnet mask where the bits on left side are set to 1 to represent the network part and the bits on the right side are set to 0 to represent the host part.<br>**area**: Set the OSPF area ID<br>**A.B.C.D**: OSPF area ID in IPv4 address format.<br>**<0-4294967295>:** OSPF area ID as a decimal value.<br>instance-id: Instance ID.<br>**<0-255>:** Instance ID. The default is 0. |
| **Example usage** | `switch_a(config-router)# network 10.0.0.0/8 area 1.1.1.1` |

| **ospf abr-type** | |
|---|---|
| **Purpose** | Set an OSPF Area Border Router (ABR) type.<br><br>Use the no parameter to revert the ABR type to the default setting (Cisco).<br><br>Specifying the ABR type allows better functioning in a multi-vendor environment. The ABR types are:<br><br>• Cisco (RFC 3509): A router is considered an ABR if it has more than one area actively attached and one of them is the backbone area.<br><br>• IBM (RFC 3509): A router is considered an ABR if it has more than one area actively attached and the backbone area is configured. In this case the configured backbone need not be actively connected.<br><br>• Standard (RFC 2328): A router is considered an ABR if it has more |

| | |
|---|---|
| | than one area actively attached to it.<br>• Shortcut (draft-ietf-ospf-shortcut-abr-02): This improves the standard ABR by modifying the calculation of interarea routes which are installed in non-backbone areas if the non-backbone path is better, thus providing a “shortcut” through these areas. To prevent routing loops, the inter-area routes are re-advertised only if they are associated with the backbone area. |
| **Command Mode** | Router Configuration |
| **Syntax** | ospf abr-type (cisco \| ibm \| standard \| shortcut)<br>no ospf abr-type (cisco \| ibm \| standard \| shortcut \|) |
| **Parameters** | **cisco**: Alternative ABR using Cisco implementation. This is the default ABR type.<br>**ibm**: SAlternative ABR using IBM implementation.<br>**standard**: Standard ABR.<br>**shortcut**: Shortcut ABR. |
| **Example usage** | `switch_a(config-router)# ospf abr-type ibm` |

| **ospf flood-reduction** | |
|---|---|
| **Purpose** | Enable/disable flood reduction, which reduces unnecessary refreshing and flooding of already known and unchanged information. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] ospf flood-reduction |
| **Parameters** | None |
| **Example usage** | `switch_a(config-router)# ospf flood-reduction` |
| **ospf router-id** | |
| **Purpose** | Specify a router ID for the OSPF process. Configure each router with a unique router ID. In an OSPF router process which has active neighbors, a new router ID is used at the next reload or when you start the OSPF manually. Use the no parameter to force OSPF to use the previous router ID. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] ospf router-id A.B.C.D |
| **Parameters** | **A.B.C.D**: The router ID in IPv4 address format. |
| **Example usage** | `switch_a(config-router)# ospf router-id 2.3.4.5` |

| overflow database | |
|---|---|
| **Purpose** | Limit the maximum number of LSAs that can be supported by the OSPF instance. Use no parameter for an unlimited number of LSAs. |
| **Command Mode** | Router Configuration |
| **Syntax** | overflow database <0-4294967294> (hard \| soft \|)<br>no overflow database |
| **Parameters** | **<0-4294967294>**: Maximum number of LSAs<br>**hard**: Shutdown occurs if the number of LSAs exceeds the specified value.<br>**soft**: Warning message appears if the number of LSAs exceeds the specified value. |
| **Example usage** | `switch_a(config-router)# overflow database 100 hard` |

| overflow database external | |
|---|---|
| **Purpose** | Limit the number of AS-external-LSAs a router can receive once it is in the wait state. |
| **Command Mode** | Router Configuration |
| **Syntax** | overflow database external <0-2147483647> <0-65535><br>no overflow database external |
| **Parameters** | **<0-2147483647>**: Maximum number of LSAs. This value should be the same on all routers in the AS.<br>**<0-65535>**: Number of seconds the router waits before trying to exit the database overflow state. If this parameter is 0, the router exits the overflow state only after an explicit administrator command. |
| **Example usage** | `switch_a(config-router)# overflow database external 5 30` |

| passive-interface | |
|---|---|
| **Purpose** | Suppress sending Hello packets on all interfaces or on a specified interface. This command configures OSPF on simplex Ethernet interfaces. Since a simplex interface represents only one network segment between two devices, configure the transmitting interface as a passive interface. This ensures that OSPF does not send hello packets for the transmitting interface. Both the devices can see each other via the hello packet generated for the receiving interface. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] passive-interface IFNAME<br>[no] passive-interface (IFNAME \| A.B.C.D) |
| **Parameters** | **IFNAME**: The name of the interface.<br>**A.B.C.D**: IP address of the interface. |

| | |
|---|---|
| **Example usage** | `switch_a(config-router)# passive-interface ge10` |

| **redistribute** | |
|---|---|
| **Purpose** | Redistribute routes from a routing protocol, static route, and kernel route into an OSPF routing table. |
| **Command Mode** | Router Configuration |
| **Syntax** | redistribute (kernel \| connected \| static \| rip \| bgp \| isis \| ospf (<1-65535> \|)) {metric <0-16777214> \| metric-type (1 \| 2) \| route-map WORD \| tag <0-4294967295>}<br>no redistribute (kernel \| connected \| static \| rip \| bgp \| isis \| ospf (<1-65535> \|)) {metric \| metric-type \| route-map \| tag} |
| **Parameters** | **kernel**: Kernel routes.<br>**connected**: Connected routes.<br>**ospf**: OSPF instance to redistribute a particular OSPF instance into another OSPF instance.<br>**<1-65535>**: OSPF process ID<br>**metric**: Specify the external metric, <0-16777214><br>**metric-type**: External metric-type<br>**1**: OSPF External Type 1 metrics.<br>**2**: OSPF External Type 2 metrics.<br>**route-map**: Specify a route map reference.<br>**WORD**: Name of the route-map.<br>**tag**: Tag value to use as a “match” value for controlling redistribution via route maps<br>**<0-4294967295>**: Route tag. |
| **Example usage** | `switch_a(config-router)# redistribute bgp metric 12` |

| **router-id** | |
|---|---|
| **Purpose** | Specify a router ID for the OSPFv3 process. Configure each router with a unique router-id. In an OSPFv3 router process that has active neighbors, a new router-id is used at the next reload or when you start the OSPFv3 manually. Use the no form to force OSPFv3 to stop routing functionality |
| **Command Mode** | Router Configuration |
| **Syntax** | router-id A.B.C.D<br>no router-id (A.B.C.D \|) |
| **Parameters** | **A.B.C.D:** The router ID in IPv4 address format. |
| **Example usage** | `switch_a(config-router)# router-id 32.53.4.5` |

| summary-address | |
|---|---|
| **Purpose** | Summarize or suppress external routes with the specified address range. An address range is a pairing of a starting address and a mask that is almost the same as IP network number.<br><br>Redistributing routes from other protocols into OSPF requires the router to advertise each route individually in an external LSA. Use this command to advertise one summary route for all redistributed routes covered by a specified network address and mask. This minimizes the size of the OSPF link state database. |
| **Command Mode** | Router Configuration |
| **Syntax** | summary-address X:X::X:X/M (not-advertise \| tag <0-4294967295>\|)<br>summary-address A.B.C.D/M (not-advertise \| tag <0-4294967295>\|)<br>no summary-address X:X::X:X/M<br>no summary-address A.B.C.D/M<br>no summary-address X:X::X:X/M (not-advertise \| tag (<0-4294967295> \|))<br>no summary-address A.B.C.D/M (not-advertise \| tag (<0-4294967295> \|)) |
| **Parameters** | **X:X::X:X/M**: The range of addresses given as IPv6 starting address and a mask.<br>**A.B.C.D/M**: The range of addresses given as IPv4 starting address and a mask.<br>**not-advertise**: Suppress routes that match the range.<br>**tag**: Tag value to use as a “match” value for controlling redistribution via route maps.<br>**<0-4294967295>**: Tag value. The default is 0. |
| **Example usage** | `switch_a(config-router)# summary-address 10.10.10.0/24 not-advertise` |
| **timers lsa arrival** | |
| **Purpose** | Set the minimum interval to accept the same link-state advertisement (LSA) from OSPF neighbors.<br><br>Use the no form to restore the default value (1000 milliseconds). |
| **Command Mode** | Router Configuration |
| **Syntax** | timers lsa arrival <0-600000><br>no timers lsa arrival |
| **Parameters** | **<0-600000>**: Minimum delay in milliseconds between accepting the same LSA from neighbors. |
| **Example usage** | `switch_a(config-router)# timers lsa arrival 10000` |

| timers throttle lsa | |
|---|---|
| **Purpose** | Sets the rate-limiting intervals for OSPF link-state advertisement (LSA) generation.<br>Use the no form to restore default values. |
| **Command Mode** | Router Configuration |
| **Syntax** | timers throttle lsa all <0-600000> <1-600000> <1-600000><br>no timers throttle lsa all |
| **Parameters** | **<0-600000>: Start interval** - The minimum delay in milliseconds for the generation of LSAs. The first instance of LSA is always generated immediately upon a local OSPF topology change. The generation of the next LSA is not before the start interval.<br>**<0-600000>: Hold interval** - The hold time in milliseconds. This value is used to calculate the subsequent rate limiting times for LSA generation.<br>**<0-600000>: Maximum interval** - The maximum wait time in milliseconds between generation of the same LSA. |
| **Example usage** | `switch_a(config-router)# timers throttle lsa all 200 10000 45000` |
| **Note** | Default values:<br>Start interval: 0 milliseconds<br>Hold interval: 5000 milliseconds<br>Maximum interval: 5000 milliseconds |

| timers spf | |
|---|---|
| **Purpose** | Adjust route-calculation timers. This command configures the delay time between the receipt of a topology change and the calculation of the Shortest Path First (SPF). This command also configures the hold time between two consecutive SPF calculations. |
| **Command Mode** | Router Configuration |
| **Syntax** | timers spf exp <0-2147483647> <0-2147483647><br>no timers spf exp |
| **Parameters** | **<0-2147483647>**: Minimum delay between receiving a change to SPF calculation (in milliseconds).<br>**<0-2147483647>**: Maximum delay between receiving a change to SPF calculation (in milliseconds). |
| **Example usage** | `switch_a(config-router)# timers spf exp 10000 25000` |

## OSPF Interface Commands

| ip ospf authentication | |
|---|---|
| **Purpose** | Send and receive OSPF packets with the specified authentication method on the current interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf authentication (null \| message-digest \|)<br>ip ospf A.B.C.D authentication (null \| message-digest \|)<br>no ip ospf (A.B.C.D \|) authentication |
| **Parameters** | **A.B.C.D**: The IP address of the interface.<br>**null**: Use no authentication.<br>**message-digest**: Message digest authentication. |
| **Example usage** | `switch_a(config-if)# ip ospf authentication null` |

| ip ospf authentication-key | |
|---|---|
| **Purpose** | Specify an OSPF authentication password for neighboring routers.<br>This command creates a password (key) that is inserted into the OSPF header when the switch software originates packets. Assign a separate password to each network for different interfaces. All neighboring routers on the same network with the same password exchange OSPF routing data.<br>The key can be used only when authentication is enabled for an area with the area authentication command. Simple password authentication allows a password to be configured for each area. Configure the routers in the same routing domain with the same password. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf (A.B.C.D\|) authentication-key LINE<br>no ip ospf (A.B.C.D\|) authentication-key |
| **Parameters** | **A.B.C.D**: The IP address of the interface.<br>**LINE**: Authentication password. |

| | |
|---|---|
| **Example usage** | Create an authentication key **testkey** on interface ge24 in area 0. |
| | `switch_a#configure terminal`<br>`switch_a(config)#router ospf 100`<br>`switch_a(config-router)#network 10.10.10.0/24 area 0`<br>`switch_a(config-router)#area 0 authentication`<br>`switch_a(config-router)#exit`<br>`switch_a(config)#interface ge24`<br>`switch_a(config-if)#ip ospf 12.10.10.2 authentication-key testkey` |

| **ip ospf cost** | |
|---|---|
| **Purpose** | Specify the cost of the link-state metric in a router-LSA. The interface cost indicates the overhead required to send packets across an interface. This cost is stated in the Router-LSA's link. The cost is inversely proportional to the bandwidth of an interface. By default, the cost of an interface is calculated based on the bandwidth (108/ bandwidth). Use this command to set the cost manually.<br>Use the no parameter to reset the cost to its default value. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf (A.B.C.D \|) cost <1-65535><br>no ip ospf (A.B.C.D \|) cost |
| **Parameters** | <1-65535>: The link-state metric. Default value is 10. |
| **Example usage** | `switch_a(config-if)# ip ospf 10.10.12.12 cost 200` |

| **ip ospf database-filter** | |
|---|---|
| **Purpose** | Turn on the LSA database-filter for a particular interface.<br>By default, OSPF floods new LSAs over all interfaces in an area, except the interface on which the LSA was received. Too much flooding wastes bandwidth and can lead to excessive link and CPU usage in certain topologies. To avoid this, you can block flooding of LSAs over specified interfaces. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf (A.B.C.D \|) database-filter all out<br>no ip ospf (A.B.C.D \|) database-filter |
| **Parameters** | **A.B.C.D**: IP address of the interface. |
| **Example usage** | `switch_a(config-if)# ip ospf database-filter all out` |

| ip ospf dead-interval | |
|---|---|
| **Purpose** | Set the interval during which 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. This value must be a multiple of **hello-interval** and be the same for all routers on the network. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip ospf (A.B.C.D \|) dead-interval <1-65535> |
| **Parameters** | **<1-65535>**: Interval in seconds. Default is 40 seconds. |
| **Example usage** | `switch_a(config-if)# ip ospf dead-interval 100` |

| ip ospf disable | |
|---|---|
| **Purpose** | Disable OSPF packet processing on an interface. This command overrides the **network area** command. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf disable all<br>no ip ospf disable all |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ip ospf disable all` |

| ip ospf flood-reduction | |
|---|---|
| **Purpose** | Enable/disable flood reduction on an interface. This reduces unnecessary refreshing and flooding of known and unchanged information. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip ospf flood-reduction |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ip ospf flood-reduction` |

| ip ospf hello-interval | |
|---|---|
| **Purpose** | Set the interval between hello packets. Configure the same hello-interval for all routers on a network. A shorter hello interval ensures faster detection of topological changes but results in more |

| | |
|---|---|
| | routing traffic. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf (A.B.C.D \|) hello-interval <1-65535><br>no ip ospf (A.B.C.D \|) hello-interval |
| **Parameters** | **<1-65535>**: Interval in seconds. Default is 10 seconds. |
| **Example usage** | `switch_a(config-if)# ip ospf hello-interval 10` |

| **ip ospf message-digest-key** | |
|---|---|
| **Purpose** | Register an MD5 key for OSPF authentication. Use the no parameter to remove an MD5 key.<br><br>Message Digest Authentication is cryptographic authentication. A key (password) and key-id are configured on each router. The router uses an algorithm based on the OSPF packet, the key, and the key-id to generate a message digest that is appended to the packet.<br><br>Use this command for uninterrupted transitions between passwords. This is helpful for administrators who want to change the OSPF password without disrupting communication. The system begins a rollover process until all the neighbors have adopted the new password. This allows neighboring routers to continue communication while they are being updated with the new password. The router will stop sending duplicate packets once it detects that all neighbors have adopted the new password.<br><br>Maintain only one password per interface, removing the old password when you add a new one. This prevents the local system from continuing to communicate with the system that is using the old password. Removing the old password also reduces overhead during rollover. All neighboring routers on the same network must have the same password value to enable exchange of OSPF routing data. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf (A.B.C.D \|) message-digest-key <1-255> md5 LINE<br>no ip ospf (A.B.C.D \|) message-digest-key <1-255> |
| **Parameters** | **A.B.C.D**: IPv4 address of the interface.<br>**message-digest-key**: Specify a key ID.<br>**<1-255>**: Key ID.<br>**md5**: Specify a key (password).<br>**LINE**: The OSPF password (1-16 characters). |

| | |
|---|---|
| **Example usage** | `switch_a(config-if)#ip ospf authentication message-digest`<br>`switch_a(config-if)#ip ospf message-digest-key 1 md5 passwordsample` |

| **ip ospf mtu** | |
|---|---|
| **Purpose** | Set MTU size for OSPF to construct packets based on this value. Whenever OSPF constructs packets, it uses interface MTU size as Maximum IP packet size. This command forces OSPF to use the specified value overriding the actual interface MTU size.<br>This command does not configure the MTU settings in the kernel. OSPF does not recognize MTU size changes made in the kernel until the MTU size is updated through this command. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf mtu <576-65535><br>no ip ospf mtu |
| **Parameters** | **<576-65535>**: MTU size. |
| **Example usage** | `switch_a(config-if)# ip ospf mtu 10000` |

| **ip ospf mtu-ignore** | |
|---|---|
| **Purpose** | Configure OSPF so that it does not check the MTU size during DD (Database Description) exchange. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf (A.B.C.D\|) mtu-ignore<br>no ip ospf (A.B.C.D\|) mtu-ignore |
| **Parameters** | **A.B.C.D**: IP address of the interface. |
| **Example usage** | `switch_a(config-if)# ip ospf mtu-ignore` |

| **ip ospf network** |
|---|

| | |
|---|---|
| **Purpose** | Set the OSPF network type. Use the no parameter to return to the default value (Broadcast). |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf network (broadcast \| non-broadcast \| point-to-multipoint \| point-to-point)<br>ip ospf network point-to-multipoint non-broadcast<br>no ip ospf network |
| **Parameters** | **broadcast**: Set the network type to broadcast.<br>**non-broadcast**: Set the network type to NBMA.<br>**point-to-multipoint**: Set the network type to point-to-multipoint.<br>**point-to-point**: Set the network type to point-to-point. |
| **Example usage** | `switch_a(config-if)# ip ospf network point-to-point` |
| **ip ospf priority** | |
| **Purpose** | Set the router priority to determine the designated router (DR) for the network. A router with the higher router priority becomes the DR. If the priority is the same for two routers, the router with the higher router ID takes precedence. The default priority is 1. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf (A.B.C.D\|) priority <0-255><br>no ip ospf (A.B.C.D\|) priority |
| **Parameters** | **A.B.C.D**: IP address of the interface.<br>**priority**: Specify the router priority of the interface.<br>**<0-255>**: Router priority of the interface. |
| **Example usage** | `switch_a(config-if)# ip ospf priority 20` |

| | |
|---|---|
| **ip ospf resync-timeout** | |
| **Purpose** | Set the interval after which adjacency is reset if out-of-band re-synchronization has not occurred. The interval period starts from the time a restart signal is received from a neighbor. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf (A.B.C.D \|) resync-timeout <1-65535><br>no ip ospf (A.B.C.D \|) resync-timeout |
| **Parameters** | **A.B.C.D**: IP address of the interface.<br>**<1-65535>:** The re-synchronization timeout value of the interface in seconds. |
| **Example usage** | `switch_a(config-if)# ip ospf resync-timeout 65` |

| |
|---|
| **ip ospf retransmit-interval** |

| | |
|---|---|
| **Purpose** | Specify the time between link-state advertisement (LSA) retransmissions for adjacencies belonging to the interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf (A.B.C.D \|) retransmit-interval <5-65535><br>no ip ospf (A.B.C.D \|) retransmit-interval |
| **Parameters** | **A.B.C.D**: IP address of the interface.<br>**<5-65535>**: Interval in seconds. Default is 5 seconds. |
| **Example usage** | `switch_a(config-if)# ip ospf retransmit-interval 20` |

| **ip ospf transmit-delay** | |
|---|---|
| **Purpose** | Set the estimated time it takes to transmit a link-state-update packet on the interface. The transmit delay value adds a specified time to the age field of an update. If the delay is not added, the time in which the LSA transmits over the link is not considered. This command is especially useful for low speed links. Add transmission and propagation delays when setting the transmit delay value.<br>Use the no parameter to return to the default value 1 second). |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip ospf (A.B.C.D \|) transmit-delay <1-65535><br>no ip ospf (A.B.C.D \|) transmit-delay |
| **Parameters** | **A.B.C.D**: IP address of the interface.<br>**<1-65535>**: Time in seconds to transmit a link-state update |
| **Example usage** | `switch_a(config-if)# ip ospf transmit-delay 5` |

# 21 OSPFv3

## OSPFv3 Information

| show ip ospf | |
|---|---|
| **Purpose** | Display OSPFv3 information, border and boundary router Information, details and summary of the OSPFv3 database, interfaces, and multi-area adjacencies. View neighbor list, OSPFv3 routing table, and virtual link information. |
| **Command Mode** | Privileged exec |
| **Syntax** | show ipv6 ospf (word \|)<br>show ipv6 ospf (word \|)border-routers<br>show ipv6 ospf (word \|) database(self-originate\|max-age\|adv-router A.B.C.D\|)<br>show ipv6 ospf (word \|) database (asbr-summary \| external \| network \| router \| summary \| nssa-external \| opaque-link \| opaque-area \| opaque-as) A.B.C.D (self-originate \| adv-router A.B.C.D \|)<br>show ipv6 ospf interface (IFNAME \|)<br>show ipv6 ospf (word \|) topology (area <0-4294967295 \| A.B.C.D>)<br>show ipv6 ospf (word \|) {neighbor \| neighbor all \| neighbor interface A.B.C.D \| neighbor A.B.C.D \| neighbor A.B.C.D detail \| neighbor detail \| neighbor detail all}<br>show ipv6 ospf (word \|) route ( A.B.C.D \|A.B.C.D/M \|summary \|)<br>show ipv6 ospf (word \|) virtual-links<br>show ip protocols ospf |
| **Parameters** | **WORD:** Tag value to use as a “match” value for controlling redistribution via route maps.<br>**self-originate**: Self-originated link states.<br>**max-age**: LSAs which have reached the max-age (3600 seconds).<br>**adv-router**: Advertising router link states.<br>**asbr-summary**: Autonomous System Boundary Router (ASBR) summary LSAs.<br>**external**: External LSAs.<br>**network**: Network LSAs.<br>**router**: Router LSAs.<br>**summary**: LSA summary information.<br>**nssa-external**: NSSA external LSAs.<br>**opaque-link**: Type 9 LSAs which are not flooded beyond the local network.<br>**opaque-area**: Type 10 LSAs which are not flooded beyond the borders of their area.<br>**opaque-as**: Type 11 LSAs which are flooded throughout the Autonomous System (AS). |
| **Example usage** | `switch_a# show ipv6 ospf` |

## OSPFv3 Configuration

| router ipv6 ospf | |
|---|---|
| **Purpose** | Initiate OSPFv3 routing process and enter Router mode to configure OSPFv3 routing process. For making the OSPFv3 routing process functional, you must specify OSPFv3 process tag in router mode and enable OSPFv3 on at least one interface. OSPFv3 is only enabled on interfaces where OSPFv3 process tag matches the tag specified using **ipv6 router ospf area** command in Interface mode. |
| **Command Mode** | Global Configuration |
| **Syntax** | router ipv6 ospf<br>router ipv6 ospf WORD<br>no router ipv6 ospf<br>no router ipv6 ospf WORD |
| **Parameters** | **WORD:** Tag value to use as a “match” value for controlling redistribution via route maps. |
| **Example usage** | `switch_a(config)# router ipv6 ospf IPI` |

| area default-cost | |
|---|---|
| **Purpose** | Specify a cost for the default summary route sent into a stub or NSSA area. This command provides the metric for the summary default route, generated by the area border router, into the NSSA or stub area. Use this option only on an area border router that is attached to the NSSA (Not-so-stubby area) or stub area. |
| **Command Mode** | Router Configuration |
| **Syntax** | area (A.B.C.D \| <0-4294967295>) default-cost <0-16777215><br>no area (A.B.C.D \| <0-4294967295>) default-cost |
| **Parameters** | **A.B.C.D**: OSPF Area ID in IPv4 address format.<br>**<0-4294967295>**: OSPF Area ID as a decimal value.<br>**default-cost**: Indicates the cost for the default summary route used for a stub or NSSA area.<br>**<0-16777215>**: Stub's advertised default summary cost. Default is 1. |
| **Example usage** | `switch_a(config-router)# area 1 default-cost 10` |

| area nssa | |
|---|---|
| **Purpose** | Set an area as a Not-So-Stubby-Area (NSSA). There are no external routes in an OSPF stub area, so you cannot redistribute from another protocol into a stub area. An NSSA allows external routes to be flooded within the area. These routes are then leaked into other areas. However, the external routes from other areas still do not enter the NSSA. You can configure an area to be a stub area or an NSSA, but not both.<br><br>This command simplifies administration when connecting a central site using OSPF to a remote site that is using a different routing protocol. You can extend OSPF to cover the remote connection by defining the area between the central router and the remote router as a NSSA. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] area (A.B.C.D \| <0-4294967295>) nssa<br>area (A.B.C.D \| <0-4294967295>) nssa (translate-candidate \| translate-always)<br>area (A.B.C.D \| <0-4294967295>) nssa {translator-role (candidate \| always) \| stability-interval <0-2147483647> \| no-redistribution \| default-information-originate (metric <0-16777214> \| metric-type <1-2> \| metric <0-16777214> metric-type <1-2> \| metric-type <1-2> metric <0-16777214> \|) \| no-summary}<br>no area (A.B.C.D \| <0-4294967295>) nssa {translator-role \| no-redistribution \| default-information-originate \| no-summary} |
| **Parameters** | **A.B.C.D**: OSPF Area ID in IPv4 address format.<br>**<0-4294967295>**: OSPF Area ID as a decimal value.<br>**translator-role**: NSSA-ABR translator role<br>**candidate**: Translate NSSA-LSA to Type-5 LSA if router is elected.<br>**always**: Always translate NSSA-LSA to Type-5 LSA.<br>**stability-interval**: Stability timer for a NSSA area. If an elected translator determines its services are no longer required, it continues to perform its duties for this time interval. This minimizes excess flushing of translated Type-7 LSAs and provides a more stable translator transition.<br>**<0-2147483647>:** Stability interval in seconds.<br>**no-redistribution**: Do not redistribute into the NSSA.<br>**default-information-originate**: Originate Type-7 default LSA into the NSSA.<br>**metric**: Set metric for default routes.<br>**<0-16777214>:** Metric value. |
| **Example usage** | `switch_a(config-router)# area 3 nssa translator-role candidate noredistribution default-information-originate metric 34 metric-type 2` |

| area range | |
|---|---|
| **Purpose** | Configure the OSPF address range. This command summarizes intra-area routes for an area. The single summary route is then advertised to other areas by the Area Border Routers (ABRs). Routing information is condensed at area boundaries and outside the area. If the network numbers in an area are assigned in a way such that they are contiguous, the ABRs can be configured to advertise a summary route that covers all the individual networks within the area that fall into the specified range. |
| **Command Mode** | Router Configuration |
| **Syntax** | area (A.B.C.D \| <0-4294967295>) range A.B.C.D/M<br>area (A.B.C.D \| <0-4294967295>) range A.B.C.D/M advertise<br>area (A.B.C.D \| <0-4294967295>) range A.B.C.D/M not-advertise<br>no area (A.B.C.D \| <0-4294967295>) range A.B.C.D/M<br>no area (A.B.C.D \| <0-4294967295>) range A.B.C.D/M (advertise \| not-advertise) |
| **Parameters** | **A.B.C.D**: OSPF Area ID in IPv4 address format.<br>**<0-4294967295>**: OSPF Area ID as a decimal value.<br>**A.B.C.D/M**: Area range prefix and length.<br>**advertise**: Advertise this range.<br>**not-advertise**: Do not advertise this range. |
| **Example usage** | `switch_a(config-router)# area 1 range 192.16.0.0/24` |

| area stub | |
|---|---|
| **Purpose** | Define an area as a stub area on all routers. There are two stub area router configuration commands: the stub and commands. In all routers attached to the stub area, configure the area by using the **stub** option of the area command. For an area border router (ABR) attached to the stub area, use the **area** command. |
| **Command Mode** | Router Configuration |
| **Syntax** | area (A.B.C.D \| <0-4294967295>) stub<br>area (A.B.C.D \| <0-4294967295>) stub no-summary<br>no area (A.B.C.D \| <0-4294967295>) stub<br>no area (A.B.C.D \| <0-4294967295>) stub no-summary |
| **Parameters** | **A.B.C.D**: OSPF Area ID in IPv4 address format.<br>**<0-4294967295>**: OSPF Area ID as a decimal value.<br>**no-summary**: Stops an ABR from sending summary link advertisements into the stub area. |
| **Example usage** | `switch_a(config-router)# area 1 stub no-summary` |

| area virtual-link | |
|---|---|
| **Purpose** | Configure a link between two backbone areas that are physically separated through other nonbackbone areas.<br><br>In OSPFv3, 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 unnumbered point-to-point network.<br><br>Configure the **hello-interval** to be the same for all routers attached to a common network. If the hello-interval is short, the router detects topological changes faster, but more routing traffic follows.<br><br>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.<br><br>The transmit-delay is the time taken to transmit a link state update packet on the interface. Before transmission, the link state advertisements in the update packet are increased by this amount. Set the transmit-delay to be greater than zero. Also, take into account the transmission and propagation delays for the interface. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] area (A.B.C.D \| <0-4294967295>) virtual-link A.B.C.D<br>[no] area (A.B.C.D \| <0-4294967295>) virtual-link A.B.C.D (dead-interval \| hello-interval \| retransmit-interval \| transmit-delay) <1-65535><br>[no] area (A.B.C.D \| <0-4294967295>) virtual-link A.B.C.D instance-id <0-255> |
| **Parameters** | **A.B.C.D:** OSPF Area ID in IP address format.<br>**<0-4294967295>:** OSPF Area ID as a decimal value.<br>**A.B.C.D:** Router ID associated with a virtual link neighbor.<br>**dead-interval:** The interval in seconds during which no packets are received and after which the router acknowledges a neighboring router as off-line. The default is 40 seconds.<br>**hello-interval:** The interval in seconds the router waits before it sends a hello packet. The default is 10 seconds.<br>**retransmit-interval:** The interval in seconds the router waits before it retransmits a packet. The default is 5 seconds.<br>**transmit-delay:** The interval in seconds the router waits before it transmits a packet. The default value is 1 second.<br>**<1-65535>:** The timer interval.<br>instance-id: The OSPFv3 instance.<br>**<0-255>:** The OSPFv3 instance ID. |
| **Example usage** | `switch_a(config-router)# area 1 virtual-link 10.10.11.50 hello 5 dead 10` |

| auto-cost reference bandwidth | |
|---|---|
| **Purpose** | Control how OSPFv3 calculates the default metric for the interface. By default, OSPFv3 calculates the OSPFv3 metric for an interface by dividing the reference bandwidth by the interface bandwidth. The default value for the reference bandwidth is 100Mbps. The auto-cost command is used to differentiate high bandwidth links. For multiple links with high bandwidth, specify a larger reference bandwidth value to differentiate cost on those links. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] auto-cost reference-bandwidth <1-4294967> |
| **Parameters** | **<1-4294967>**: Reference bandwidth in Mbps. Default is 100 Mbps. |
| **Example usage** | `switch_a(config-router)# auto-cost reference-bandwidth 1000` |

| default-information originate | |
|---|---|
| **Purpose** | Create a default external route into an OSPF routing domain. The system acts like an Autonomous System Boundary Router (ASBR) when you use the **default-information originate** command to redistribute routes into an OSPF routing domain. An ASBR does not by default generate a default route into the OSPF routing domain. When you give the **default-information originate** command, also specify a **route-map** to avoid a dependency on the default network in the routing table. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] default-information originate<br>default-information originate {metric <0-16777214> \| metric-type (1 \| 2) \| {route-map WORD \| always}<br>no default-information originate {metric \| metric-type \| {route-map \| always} |
| **Parameters** | **always**: Used to advertise the default route regardless of whether there is a default route.<br>**metric**: Sets the OSPF metric used in creating the default route.<br>**<0-16777214>**: Sets the OSPF metric used in creating the default route. Default metric value is 10.<br>**metric-type**: The external link type associated with the default route advertised into the OSPF routing domain (see RFC 3101).<br>**1**: Sets OSPF External Type 1 metric.<br>**2**: Sets OSPF External Type 2 metric (default).<br>**WORD**: Name of route map. |
| **Example usage** | `switch_a(config-router)# default-information originate always metric 23 metrictype 2 route-map myinfo` |

| default-metric | |
|---|---|
| **Purpose** | Set a default metric for OSPF. A default metric facilitates redistributing routes with incompatible metrics. If the metrics do not convert, the default metric provides an alternative. Use this command to use the same metric value for all redistributed routes. Use this command in conjunction with **redistribute**. |
| **Command Mode** | Router Configuration |
| **Syntax** | default-metric <1-16777214><br>no default-metric |
| **Parameters** | **<1-16777214>**: Metric value |
| **Example usage** | `switch_a(config-router)# default-metric 100` |

| distance | |
|---|---|
| **Purpose** | Define OSPFv3 route administrative distances based on route type. This command sets the distance for an entire group of routes rather than a specific route that passes an access list.<br><br>The administrative distance rates the trustworthiness of a routing information source. A higher distance value means a lower trust rating. For example, an administrative distance of 254 means that the routing information source cannot be trusted and should be ignored. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] distance <1-254><br>[no] distance <1-254> A.B.C.D/M (WORD \|)<br>distance ospf {intra-area <1-254> \| inter-area <1-254> \| external <1-255>}<br>no distance ospfv3 |
| **Parameters** | **<1-254>**: Default administrative distance to be used.<br>**intra-area:** Routes within an area,<br>**<1-254>**: Distance for all routes within an area<br>**inter-area**: Routes from one area to another area.<br>**<1-254>**: Distance for all routes from one area to another area.<br>**external**: Routes from other domains learned by redistribution.<br>**<1-254>**: Distance from other domains learned by redistribution. |
| **Example usage** | `switch_a(config-router)# distance ospf inter-area 20 intra-area 10 external 40` |

| distribute-list | |
|---|---|
| **Purpose** | Filter networks in routing updates. This command redistributes other routing protocols into the OSPF routing table. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] distribute-list WORD out (connected \| static \| rip \|ospf (<1-65535> \| WORD))<br>[no] distribute-list WORD in |
| **Parameters** | **WORD**: Name of the access list.<br>**in, out**: Filter incoming and outgoing routing updates.<br>**kernel**: Specify kernel routes.<br>**connected**: Specify connected routes.<br>**<1-65535>**: OSPF process ID. If not specified, this command redistributes all running OSPF processes. |
| **Example usage** | `switch_a(config)#access-list list1 permit 172.10.0.0/16`<br>`switch_a(config)#router ipv6 ospf 100`<br>`switch_a(config-router)#distribute-list list1 out rip` |

| enable db-summary-opt | |
|---|---|
| **Purpose** | Enable the database summary list optimization for OSPFv3.<br>When enabled, the database exchange process is optimized by removing the LSA from the database summary list for the neighbor, if the LSA instance in database summary list is the same as or less recent than the listed LSA in the database description packet received from the neighbor. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] enable db-summary-opt |
| **Parameters** | None |
| **Example usage** | `switch_a(config-router)# enable db-summary-opt` |

| max-concurrent-dd | |
|---|---|
| **Purpose** | Limit the number of Database Descriptors (DD) that can be processed concurrently. This command limits the maximum number of DD exchanges that can occur concurrently per OSPF instance, thus allowing for all of the adjacencies to come up. |
| **Command Mode** | Router Configuration |
| **Syntax** | max-concurrent-dd <1-65535><br>no max-concurrent-dd |
| **Parameters** | **<1-65535>**: Number of DD processes. |
| **Example usage** | `switch_a(config-router)# max-concurrent-dd 4` |

| abr-type | |
|---|---|
| **Purpose** | Set an OSPF Area Border Router (ABR) type.<br>Use the no parameter to revert the ABR type to the default setting (Cisco).<br>Specifying the ABR type allows better functioning in a multi-vendor environment. The ABR types are:<br>• Cisco (RFC 3509): A router is considered an ABR if it has more than one area actively attached and one of them is the backbone area.<br>• IBM (RFC 3509): A router is considered an ABR if it has more than one area actively attached and the backbone area is configured. In this case the configured backbone need not be actively connected.<br>• Standard (RFC 2328): A router is considered an ABR if it has more than one area actively attached to it. |
| **Command Mode** | Router Configuration |
| **Syntax** | abr-type (cisco \| ibm \| standard)<br>no abr-type (cisco \| ibm \| standard \|) |
| **Parameters** | **cisco**: Alternative ABR using Cisco implementation. This is the default ABR type.<br>**ibm**: SAlternative ABR using IBM implementation.<br>**standard**: Standard ABR. |
| **Example usage** | `switch_a(config-router)# abr-type ibm` |

| passive-interface | |
|---|---|
| **Purpose** | Suppress sending Hello packets on all interfaces or on a specified interface. This command configures OSPFv3 on simplex Ethernet interfaces. Since a simplex interface represents only one network segment between two devices, configure the transmitting interface as a passive interface. This ensures that OSPFv3 does not send hello packets for the transmitting interface. Both the devices can see each other via the hello packet generated for the receiving interface. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] passive-interface IFNAME |
| **Parameters** | **IFNAME**: The name of the interface. |
| **Example usage** | `switch_a(config-router)# passive-interface ge10` |

| redistribute | |
|---|---|
| **Purpose** | Import routes from other routing protocols, or from another OSPF instance, into OSPFv3 AS-external-LSAs.<br><br>OSPFv3 advertises routes learned from other routing protocols or from other OSPF instances, including static or connected routes. Each injected prefix is put into the AS-external-LSA with a specified metric and metric-type. |
| **Command Mode** | Router Configuration |
| **Syntax** | redistribute (connected \| static \| rip \| ospf (<1-65535> \|)) {metric <0-16777214> \| metric-type (1 \| 2) \| route-map WORD \| tag <0-4294967295>}<br>no redistribute (connected \| static \| rip \| ospf (<1-65535> \|)) {metric \| metric-type \| route-map \| tag} |
| **Parameters** | **connected**: Connected routes.<br>**ospf**: OSPF instance to redistribute a particular OSPF instance into another OSPF instance.<br>**<1-65535>**: OSPF process ID<br>**metric**: Specify the external metric, <0-16777214><br>**metric-type**: External metric-type<br>**1**: OSPF External Type 1 metrics.<br>**2**: OSPF External Type 2 metrics.<br>**route-map**: Specify a route map reference.<br>**WORD**: Name of the route-map.<br>**tag**: Tag value to use as a “match” value for controlling redistribution via route maps<br>**<0-4294967295>**: Route tag. |
| **Example usage** | `switch_a(config-router)# redistribute rip metric 12` |

| router-id | |
|---|---|
| **Purpose** | Specify a router ID for the OSPFv3 process. Configure each router with a unique router ID. In an OSPFv3 router process which has active neighbors, a new router ID is used at the next reload or when you start the OSPFv3 manually. Use the no parameter to force OSPF to use the previous router ID. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] router-id A.B.C.D |
| **Parameters** | **A.B.C.D**: The router ID in IPv4 address format. |
| **Example usage** | `switch_a(config-router)# router-id 2.3.4.5` |

| summary-address | |
|---|---|
| **Purpose** | Summarize or suppress external routes with the specified address range. An address range is a pairing of a starting address and a mask that is almost the same as IP network number. For example:<br>• If the specified IPV6 address range is 2020:100:100:2000::/53, it matches 2020:100:100:2222::/64, 2020:100:100:2666::/64 and so on.<br>• If the specified IPV4 address range is 192.168.0.0/255.255.240.0, it matches 192.168.1.0/24, 192.168.4.0/22, 192.168.8.128/25 and so on.<br>Redistributing routes from other protocols into OSPF requires the router to advertise each route individually in an external LSA. Use this command to advertise one summary route for all redistributed routes covered by a specified network address and mask. |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] summary-address X:X::X:X/M (not-advertise \| tag <0-4294967295> \|)<br>[no] summary-address A.B.C.D/M (not-advertise \| tag <0-4294967295> \|) |
| **Parameters** | **X:X::X:X/M**: The range of addresses given as IPv6 starting address and a mask.<br>**A.B.C.D/M**: The range of addresses given as IPv4 starting address and a mask.<br>**not-advertise**: Suppress routes that match the range.<br>**tag**: Tag value to use as a “match” value for controlling redistribution via route maps.<br>**<0-4294967295>**: Tag value. The default is 0. |
| **Example usage** | `switch_a(config-router)# summary-address 2020:100:100:2000::/53 tag 3` |

| timers lsa arrival | |
|---|---|
| **Purpose** | Set the minimum interval to accept the same link-state advertisement (LSA) from OSPF neighbors.<br>Use the no form to restore the default value (1000 milliseconds). |
| **Command Mode** | Router Configuration |
| **Syntax** | timers lsa arrival <0-600000><br>no timers lsa arrival |
| **Parameters** | **<0-600000>**: Minimum delay in milliseconds between accepting the same LSA from neighbors. |
| **Example usage** | `switch_a(config-router)# timers lsa arrival 10000` |

| timers spf | |
|---|---|
| **Purpose** | Adjust route-calculation timers. This command configures the delay time between the receipt of a topology change and the calculation of the Shortest Path First (SPF). This command also configures the hold time between two consecutive SPF calculations. |
| **Command Mode** | Router Configuration |
| **Syntax** | timers spf exp <0-2147483647> <0-2147483647><br>no timers spf exp |
| **Parameters** | **<0-2147483647>**: Minimum delay between receiving a change to SPF calculation (in milliseconds).<br>**<0-2147483647>**: Maximum delay between receiving a change to SPF calculation (in milliseconds). |
| **Example usage** | `switch_a(config-router)# timers spf exp 10000 25000` |

## OSPFv3 Interface Commands

| ipv6 router ospf | |
|---|---|
| **Purpose** | Enable OSPFv3 routing on an interface. Specify the process ID to configure multiple instances of OSPFv3. When running a single instance of OSPFv3, you do not need to specify a instance ID.<br>When OSPFv3 receives a packet, it checks if the instance ID in the packet matches the instance ID of the receiving interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ipv6 router ospf area (A.B.C.D \| <0-4294967295>)<br>[no] ipv6 router ospf area (A.B.C.D \| <0-4294967295>) instance-id <0-255><br>[no] ipv6 router ospf area (A.B.C.D \| <0-4294967295>) tag WORD<br>[no] ipv6 router ospf area (A.B.C.D \| <0-4294967295>) tag WORD instance-id <0-255><br>[no] ipv6 router ospf tag WORD area (A.B.C.D \| <0-4294967295>)<br>[no] ipv6 router ospf tag WORD area (A.B.C.D \| <0-4294967295>) instance-id <0-255> |
| **Parameters** | **area:** OSPF Area ID in IPv4 address format.<br>**A.B.C.D:** OSPF area ID in IP address format.<br>**<0-4294967295>:** OSPF area ID as a decimal value.<br>**instance-id:** Instance.<br>**<0-255>:** Instance ID.<br>**tag:** Tag value to use as a “match” value for controlling redistribution via route maps.<br>**WORD:** The tag value. |
| **Example usage** | `switch_a(config-if)# ipv6 router ospf area 1 tag IPI instance-id 1` |

| Ipv6 ospf cost | |
|---|---|
| **Purpose** | Specify the link-cost described in LSAs.<br>The cost (or metric) of an interface in OSPF indicates the overhead required to send packets across a certain interface. The value is taken to describe Link State information, and used for route calculation.<br>Use the no parameter to reset the cost to its default value. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 ospf cost <1-65535><br>ipv6 ospf cost <1-65535> instance-id <0-255><br>no ipv6 ospf cost<br>no ipv6 ospf cost instance-id <0-255> |
| **Parameters** | **<1-65535>:** The link-state metric. Default value is 10.<br>**<0-255>:** Instance ID |
| **Example usage** | `switch_a(config-if)# ipv6 ospf cost 20 instance-id 1` |

| Ipv6 ospf dead-interval | |
|---|---|
| **Purpose** | Set the amount of time that the router waits to receive an OSPF hello packet from the neighbor before declaring the neighbor down.<br>The dead interval is advertised in hello packets. OSPF compares the dead interval in a received packet to the dead interval configured for the receiving interface. If the intervals do not match, the hello packet is discarded. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 ospf dead-interval <1-65535><br>ipv6 ospf dead-interval <1-65535> instance-id <0-255><br>no ipv6 ospf dead-interval<br>no ipv6 ospf dead-interval instance-id <0-255> |
| **Parameters** | **<1-65535>**: Interval in seconds. Default is 40 seconds.<br>**<0-255>:** Instance ID |
| **Example usage** | `switch_a(config-if)# ipv6 ospf dead-interval 100` |

| Ipv6 ospf hello-interval | |
|---|---|
| **Purpose** | Specify the interval between hello packets. The hello interval is advertised in the hello packets. An OSPF router compares the hello interval in a received packet to the interval configured for the receiving interface. If this interval does not match, the hello packet is discarded. A shorter hello interval ensures faster detection of topological changes, but results in more routing traffic. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 ospf hello-interval <1-65535><br>ipv6 ospf hello-interval <1-65535> instance-id <0-255><br>no ipv6 ospf hello-interval<br>no ipv6 ospf hello-interval instance-id <0-255> |
| **Parameters** | **<1-65535>**: Interval in seconds. Default is 10 seconds.<br>**<0-255>:** Instance ID |
| **Example usage** | `switch_a(config-if)# ipv6 ospf hello-interval 100` |

| Ipv6 ospf mtu-ignore | |
|---|---|
| **Purpose** | Configure OSPFv3 so that it does not check the MTU size during DD (Database Description) exchange. |
| **Command Mode** | Interface Configuration |
| **Syntax** | Ipv6 ospf mtu-ignore<br>no ipv6 ospf mtu-ignore |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ipv6 ospf mtu-ignore` |

| Ipv6 ospf network | |
|---|---|
| **Purpose** | Set the OSPFv3 network type. |
| **Command Mode** | Interface Configuration |
| **Syntax** | Ipv6 ospf network (broadcast \| non-broadcast \| point-to-multipoint \| point-to-point)<br>Ipv6 ospf network point-to-multipoint non-broadcast<br>no ip ospf network |
| **Parameters** | **broadcast**: Set the network type to broadcast.<br>**non-broadcast**: Set the network type to NBMA.<br>**point-to-multipoint**: Set the network type to point-to-multipoint.<br>**point-to-point**: Set the network type to point-to-point. |
| **Example usage** | `switch_a(config-if)# ipv6 ospf network point-to-point` |

| Ipv6 ospf priority | |
|---|---|
| **Purpose** | Set the router priority for determining the designated router (DR) for the network. A router with the higher router priority becomes the DR. If the priority is the same for two routers, the router with the higher router ID takes precedence. Only routers with a nonzero priority value are eligible to become the designated or backup designated router. Configure router priority for broadcast or NBMA networks only and not for point-to-point networks. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 ospf priority <0-255><br>ipv6 ospf priority <0-255> instance-id <0-255><br>no ipv6 ospf (A.B.C.D) priority<br>no ipv6 ospf priority instance-id <0-255> |
| **Parameters** | **priority**: Specify the router priority of the interface.<br>**<0-255>**: Router priority of the interface.<br>**Instance-id**: Specify the instance<br>**<0-255>**: instance ID. |
| **Example usage** | `switch_a(config-if)# ipv6 ospf priority 20` |

| Ipv6 ospf retransmit-interval | |
|---|---|
| **Purpose** | Set the interval between retransmission of Link State Update packets. This interval is also used to retransmit DD packets and Link State Request packets.<br>After sending an LSA to a neighbor, the router keeps the LSA on the LS-retransmission list until it receives an acknowledgement. If the router does not receive an acknowledgment from the neighbor during the retransmit interval, it sends the LSA to the neighbor again. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 ospf retransmit-interval <1-65535><br>ipv6 ospf retransmit-interval <1-65535> instance-id <0-255><br>no ipv6 ospf retransmit-interval<br>no ipv6 ospf retransmit-interval instance-id <0-255> |
| **Parameters** | **<1-65535>**: Interval in seconds. Default is 5 seconds.<br>**Instance-id**: Specify the instance<br>**<0-255>**: instance ID. |
| **Example usage** | `switch_a(config-if)# ipv6 ospf retransmit-interval 20` |

| Ipv6 ospf transmit-delay | |
|---|---|
| **Purpose** | Set the estimated time it takes to transmit a Link State Update packet over the interface. The transmit-delay value is added to the LS age of LSAs and is advertised through this interface whenever the LSAs are transmitted. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 ospf transmit-delay <1-65535><br>ipv6 ospf transmit-delay <1-65535> instance-id <0-255><br>no ipv6 ospf transmit-delay<br>no ipv6 ospf transmit-delay instance-id <0-255> |
| **Parameters** | **<1-65535>**: Time in seconds to transmit a link-state update<br>**Instance-id**: Specify the instance<br>**<0-255>**: instance ID. |
| **Example usage** | `switch_a(config-if)# ipv6 ospf transmit-delay 5` |

| Ipv6 ospf link-lsa-suppression | |
|---|---|
| **Purpose** | Enable or disable link LSA (type 8) suppression. A type 8 LSA gives information about link-local addresses and a list of IPv6 addresses on the link.<br>If enabled and the interface type is not broadcast or NBMA, the router does not send type 8 link LSAs. This implies that other routers on the link determine the router's next-hop address using a mechanism other than the type 8 link LSA. This feature is implicitly disabled if the interface type is broadcast or NBMA. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 ospf link-lsa-suppression (enable\|disable)<br>ipv6 ospf link-lsa-suppression (enable\|disable) instance-id <0-255> |
| **Parameters** | **<0-255>**: interface instance ID. |
| **Example usage** | `switch_a(config-if)# ipv6 ospf transmit-delay 5` |

# 22 VRRP (Virtual Router Redundancy Protocol)

## VRRP Information

| show vrrp | |
|---|---|
| **Purpose** | Show VRRP configuration data and statistics. VRRP provides for automatic assignment of available IP routers to participating hosts. This increases the availability and reliability of routing paths via automatic default gateway selections on an IP subnetwork. |
| **Command Mode** | Privileged exec |
| **Syntax** | show vrrp <1-255> <IFNAME><br>show vrrp statistics <1-255> <IFNAME> |
| **Parameters** | **<1-255>**: VRRP IPv4 router identifier<br>**<IFNAME>**: Interface name |
| **Example usage** | `switch_a# show vrrp 10 ge1` |

## VRRP Configuration

| router vrrp | |
|---|---|
| **Purpose** | Enter router mode to configure an OSPF routing process. VRRP sessions cannot be enabled on L2 interfaces. |
| **Command Mode** | Global Configuration |
| **Syntax** | router vrrp <1-255> <IFNAME> |
| **Parameters** | **<1-255>**: Virtual router identifier<br>**IFNAME**: Interface name |
| **Example usage** | `switch_a(config)# router vrrp 1 ge23`<br>`switch_a(config-router)#` |

| vrrp vmac | |
|---|---|
| **Purpose** | Enable or disable Virtual MAC (VMAC). This command affects all VRRP groups in a router. On a single network segment, multiple VRRP groups can be configured, each using a different VMAC. The use of VMAC addressing allows for faster switchover when a backup router assumes the master role. |
| **Command Mode** | Global Configuration |
| **Syntax** | vrrp vmac (enable \| disable) |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# vrrp vmac enable` |

| vrrp compatible-v2 | |
|---|---|
| **Purpose** | Enable backward-compatibility feature. When enabled, recommendation for VRRPv3 and VRRPv2 Inter-operation are supported. |
| **Command Mode** | Global Configuration |
| **Syntax** | vrrp compatible-v2 (enable \| disable) |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# vrrp compatible-v2 enable` |

| accept-mode | |
|---|---|
| **Purpose** | Set accept mode for the session. Default is no accept-mode true. |
| **Command Mode** | Router Configuration |
| **Syntax** | accept-mode [true \| false] |
| **Parameters** | None |
| **Example usage** | `switch_a(config-router)# accept-mode true` |

| advertisement-interval | |
|---|---|
| **Purpose** | Configure the advertisement interval of a virtual router. This is the length of time in seconds between each advertisement sent from the master to its backup(s). The master virtual router sends VRRP advertisements to other VRRP routers in the same group. The advertisements communicate the priority and state of the master virtual router. |
| **Command Mode** | Router Configuration |
| **Syntax** | advertisement-interval <1-255><br>no advertisement-interval |
| **Parameters** | **<1-255>**: Interval in seconds. Default is 1 second. |
| **Example usage** | `switch_a(config-router)# advertisement-interval 50` |
| **Note** | VRRP Master router and backup routers should be configured with the same advertisement interval. If there is a mismatch in the configuration, VRRP goes to the INIT state. |

| circuit-failover | |
|---|---|
| **Purpose** | Enable the VRRP circuit failover feature. If an electrical connection fails, the failover event will cause a reduction in VRRP priority by the configured delta in this command |
| **Command Mode** | Router Configuration |
| **Syntax** | [no] circuit-failover IFNAME <1-253><br>no circuit-failover (IFNAME \|) |
| **Parameters** | **IFNAME**: Interface of the router that is monitored by the virtual router, usually an upstream interface. If the interface goes down, a router configured as backup may take over as a master.<br>**<1-253>**: Delta value. The value by which the virtual router decrements its priority value during a circuit failover event. Configure this value to be greater than the difference of priorities between the master and backup routers. |
| **Example usage** | `switch_a(config-router)# circuit-failover ge10 200` |

| disable | |
|---|---|
| **Purpose** | Disable a VRRP session on the router. This command will cause a backup router to assume the role of master. |
| **Command Mode** | Router Configuration |
| **Syntax** | disable |
| **Parameters** | None |
| **Example usage** | `switch_a(config-router)# disable` |

| enable | |
|---|---|
| **Purpose** | Enable a VRRP session on the router. To make changes to the VRRP configuration, first disable the Router from participating in Virtual Routing using the **disable** command. |
| **Command Mode** | Router Configuration |
| **Syntax** | enable |
| **Parameters** | None |
| **Example usage** | `switch_a(config-router)# disable` |
| **Note** | Configure the virtual IP address and define an interface for the VRRP session (using the virtual-ip and interface commands) before enabling VRRP on a router. |

| preempt-mode | |
|---|---|
| **Purpose** | Configure preempt mode. When enabled (True), the highest priority backup is always the master when the default master is unavailable. If disabled (False), a higher priority backup will not preempt a lower priority backup that is acting as master.<br>If the master router fails, the backup routers come online in priority order — highest to lowest. Preempt mode will cause a higher priority backup router to relieve a lower priority backup.<br>By default, a preemptive scheme is enabled whereby a higher priority backup virtual router that becomes available takes over for the backup virtual router that was elected to become master virtual router. This preemptive scheme can be disabled using the preempt-mode false command. If preemption is disabled, the backup virtual router that is currently elected as Master does not transition to backup again when the alternate backup router with higher priority becomes available. |
| **Command Mode** | Router Configuration |
| **Syntax** | preempt-mode true<br>preempt-mode false |
| **Parameters** | None. |
| **Example usage** | `switch_a(config-router)# preempt-mode false` |

| priority | |
|---|---|
| **Purpose** | Configure the VRRP router priority within the virtual router. Priority determines the role that each VRRP router plays and what happens if the master virtual router fails. If a VRRP router owns the IP address of the virtual router and the IP address of the physical interface, this router functions as the master virtual router.<br>Priority also determines whether a VRRP router functions as a backup virtual router and the order of ascendancy to becoming a master virtual router if the master virtual router fails. Configure the priority of each backup virtual router with a value of 1 through 254 using the priority command. |
| **Command Mode** | Router Configuration |
| **Syntax** | priority <1-255><br>no priority |
| **Parameters** | **<1-255>:** Priority value. Set this to 255 for the master router. |
| **Example usage** | `switch_a(config-router)# priority 255` |

| switch-back delay | |
|---|---|
| **Purpose** | Set a switch-back delay timer for the master VRRP router. This feature prevents the original master VRRP router from transitioning back to the master state after coming back online until the configured delay timer has expired. |
| **Command Mode** | Router Configuration |
| **Syntax** | switch-back-delay <1-500000><br>no switch-back-delay |
| **Parameters** | **<1-500000>:** Delay in milliseconds. Default is 0. |
| **Example usage** | `switch_a(config-router)# switch-back-delay 7000` |

| virtual ip | |
|---|---|
| **Purpose** | Set the virtual IP address for the VRRP virtual router either as VRRP Master or Backup. This is the IP address used by end hosts to address their default gateway.<br>The VRRP Master (and Owner) of the Virtual IP address only responds to packets destined to the Virtual IP address (for example, ICMP packets destined to the Virtual IP address). VRRP Master (and Not Owner) of the Virtual IP address does not respond to packets destined to the Virtual IP address, but forwards packets with a VMAC as the destination address. |
| **Command Mode** | Router Configuration |
| **Syntax** | virtual-ip [A.B.C.D] (master \| backup \| owner)<br>no virtual-ip |
| **Parameters** | **A.B.C.D**: Specify the virtual IP address of the interface that participates in virtual routing.<br>**master**: Specify the default state of the VRRP router within the Virtual Router as master. For master, the router must own the Virtual IP address. The owner is the router that has the virtual router address as its physical interface address.<br>**backup**: Specify the default state of the VRRP router within the Virtual Router as backup.<br>**owner**: Specify the IP address as the owner. |
| **Example usage** | `switch_a(config-router)# virtual-ip 10.10.20.30 master` |

# 23 GVRP (Generic VLAN Registration Protocol)

## GVRP Information

| show gvrp | |
|---|---|
| **Purpose** | Show GVRP configuration, statistics, timer, and finite state machine. |
| **Command Mode** | Privileged exec |
| **Syntax** | show gvrp configuration<br>show gvrp machine<br>show gvrp statistics<br>show gvrp timer |
| **Parameters** | None |
| **Example usage** | `switch_a# show gvrp statistics` |

| clear gvrp | |
|---|---|
| **Purpose** | Clear GVRP statistics |
| **Command Mode** | Privileged exec |
| **Syntax** | clear gvrp statistics<br>clear gvrp statistics all<br>clear gvrp statistics bridge BRIDGE_NAME<br>clear gvrp statistics IFNAME |
| **Parameters** | **BRIDGE_NAME**: Bridge name<br>**IFNAME**: Interface name |
| **Example usage** | `switch_a# clear gvrp statistics` |

# GVRP Configuration

| set gvrp | |
|---|---|
| **Purpose** | Enable (set) and disable (reset) GVRP globally for the default bridge instance. This command does not enable or disable GVRP in all ports of the bridge. After enabling GVRP globally, use the **set port gvrp** command to enable GVRP on individual ports of the bridge.. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gvrp <enable \| disable> bridge BRIDGE_NAME |
| **Parameters** | **BRIDGE_NAME**: Name of bridge. |
| **Example usage** | `switch_a(config)# set gvrp enable bridge 10` |

| set gvrp dynamic-vlan-creation | |
|---|---|
| **Purpose** | Enable and disable dynamic VLAN creation for a specific bridge instance. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gvrp dynamic-vlan-creation <enable \| disable> bridge BRIDGE_NAME |
| **Parameters** | **BRIDGE_NAME**: Name of bridge. |
| **Example usage** | `switch_a(config)# set dynamic-vlan-creation gvrp enable bridge 10` |

| set gvrp applicant state | |
|---|---|
| **Purpose** | Set the GVRP applicant state to normal or active.. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gvrp applicant state [active \| normal] IFNAME |
| **Parameters** | **active**: Active state<br>**normal**: Normal state<br>**IFNAME**: Name of the interface. |
| **Example usage** | `switch_a(config)# set gvrp applicant state active ge1` |

| set gvrp timer | |
|---|---|
| **Purpose** | Set GVMRP timers for a specific interface. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gvrp timer [join \| leave \| leaveall] TIMER_VALUE IF_NAME |
| **Parameters** | **join**: Timer for joining the group.<br>**leave**: Timer for leaving a group.<br>**leaveall**: Timer for leaving all groups.<br>**TIMER_VALUE** : Timer value in hundredths of a second <1-65535><br>**IF_NAME**: Name of the interface |
| **Example usage** | `switch_a(config)# set gvrp timer leave 245 ge1` |

| set port gvrp | |
|---|---|
| **Purpose** | Enable and disable GVRP on a port or all ports in a bridge. |
| **Command Mode** | Global Configuration |
| **Syntax** | set port gvrp <enable \| disable> <IF_NAME \| all> |
| **Parameters** | **all**: All ports added to recently configured bridge.<br>**IFNAME**: Interface name |
| **Example usage** | `switch_a(config)# set port gvrp enable all` |

# 24 GMRP (Generic Multiple Registration Protocol)

## GMRP Information

| show gmrp | |
|---|---|
| **Purpose** | Show GMRP configuration, statistics, timer, and finite state machine. |
| **Command Mode** | Privileged exec |
| **Syntax** | show gmrp configuration<br>show gmrp machine<br>show gmrp statistics<br>show gmrp timer |
| **Parameters** | None |
| **Example usage** | `switch_a# show gmrp statistics` |

| clear gmrp | |
|---|---|
| **Purpose** | Clear GMRP statistics |
| **Command Mode** | Privileged exec |
| **Syntax** | clear gmrp statistics all<br>clear gmrp statistics all bridge BRIDGE_NAME<br>clear gmrp statistics vlanid <1-4094><br>clear gmrp statistics vlanid <1-4094> bridge <1-32><br>clear gmrp dynamic-entry bridge BRIDGE_NAME |
| **Parameters** | **BRIDGE_NAME**: Bridge name<br>**<1-4094>**: VLAN ID<br>**<1-32>**: Bridge ID |
| **Example usage** | `switch_a# clear gmrp statistics all` |

## GMRP Configuration

| set gmrp | |
|---|---|
| **Purpose** | Enable (set) and disable (reset) GMRP globally for the default bridge instance. This command does not enable or disable GMRP in all ports of the bridge. After enabling GMRP globally, use **the set port gmrp** command to enable GMRP on individual ports of the bridge. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gmrp <enable \| disable> bridge <1-32> |
| **Parameters** | **<1-32>**: Bridge group ID |
| **Example usage** | `switch_a(config)# set gvrp enable bridge 10` |

| set gmrp extended-filtering bridge | |
|---|---|
| **Purpose** | Enable or disable extended filtering on a bridge as per Table 8-7 of IEEE802.1Q-2003. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gmrp extended-filtering <enable \| disable> bridge BRIDGE NAME |
| **Parameters** | **BRIDGE_NAME**: Bridge name. |
| **Example usage** | `switch_a(config)# set gmrp extended-filtering enable bridge 1` |

| set gmrp fwdall | |
|---|---|
| **Purpose** | Set the GMRP forward all option for an interface. If this command is not used, the default setting is GMRP disabled |
| **Command Mode** | Global Configuration |
| **Syntax** | set gmrp fwdall <enable \| disable> IF_NAME |
| **Parameters** | **IF_NAME**: Interface name |
| **Example usage** | `switch_a(config)# set gmrp fwdall enable ge7` |

| set gmrp registration | |
|---|---|
| **Purpose** | Set GMRP registration type for all ports for a given bridge. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gmrp registration < normal \| fixed \| forbidden \| restricted> IFNAME |
| **Parameters** | **normal**: Dynamic GMRP multicast registration and deregistration on the port.<br>**fixed**: Multicast groups currently registered on the switch are applied to the port, but any subsequent registrations or deregistrations do not affect the port. Any registered multicast groups on the port are not deregistered based on the GARP timers.<br>**forbidden**: All GMRP multicasts are deregistered, and prevent any further GMRP multicast registration on the port.<br>**restricted**: Restricted registration |
| **Example usage** | `switch_a(config)# set gmrp registration normal ge1` |

| set gmrp timer | |
|---|---|
| **Purpose** | Set the values for the GMRP Join, Leave, and Leaveall timers for a specified bridge. |
| **Command Mode** | Global Configuration |
| **Syntax** | set gvrp timer [join \| leave \| leaveall] TIMER_VALUE IF_NAME |
| **Parameters** | **join**: Timer for joining the group.<br>**leave**: Timer for leaving a group.<br>**leaveall**: Timer for leaving all groups.<br>**TIMER_VALUE**: Timer value in hundredths of a second <1-65535><br>**IF_NAME**: Name of the interface |
| **Example usage** | `switch_a(config)# set gmrp timer leave 245 ge1` |

| set port gmrp | |
|---|---|
| **Purpose** | Enable/disable GMRP on a particular port in all VLANs or all ports in a bridge. GMRP on a port cannot be enabled for all VLANs if GMRP has already been configured for a particular VLAN for the port. |
| **Command Mode** | Global Configuration |
| **Syntax** | set port gmrp <enable \| disable> <IF_NAME \| all> vlan VLANID |
| **Parameters** | all: All ports added to recently configured bridge.<br>IFNAME: Interface name |
| **Example usage** | `switch_a(config)# set port gmrp enable all` |

# 25 PIM (Protocol Independent Multicast)

## PIM Information

| show ip pim | |
|---|---|
| **Purpose** | Display PIM configuration and settings data. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show ip pim interface<br>show ip pim neighbor<br>show ip pim nexthop<br>show ip pim mroute<br>show ip pim local-members<br>show ip pim bsr-router |
| **Parameters** | None |

## PIM Configuration

| ip pim accept-register | |
|---|---|
| **Purpose** | Configure the ability to filter out multicast sources specified by the given access-list at the rendezvous point (RP), so that the RP will accept/refuse to perform the Register mechanism for the packets sent by the specified sources. By default, the RP accepts Register packets from all multicast sources. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip pim accept-register list (<100-199> \| <2000-2699> \| WORD)<br>no ip pim accept-register |
| **Parameters** | **<100-199>**: IP extended access-list value<br>**<2000-2699>**: IP extended access-list value in the expanded range<br>**WORD**: Name of a standard access list |
| **Example usage** | `switch_a(config)# ip pim accept-register list 121` |

| ip pim anycast-rp | |
|---|---|
| **Purpose** | Configure the Anycast RP in the RP set. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip pim anycast-rp A.B.C.D A.B.C.D<br>no ip pim anycast-rp A.B.C.D<br>no ip pim anycast-rp A.B.C.D A.B.C.D |
| **Parameters** | **A.B.C.D**: Unicast IP address of the Anycast RP set. An Anycast RP set is a collection of RPs in the same domain.<br>**A.B.C.D**: Destination IP address where Register messages |
| **Example usage** | `switch_a(config)# ip pim anycast-rp 1.1.1.1 10.10.10.10` |

| ip pim bsr-candidate | |
|---|---|
| **Purpose** | Give the router the candidate BSR status using the specified IP address of the interface. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip pim bsr-candidate IFNAME<br>ip pim bsr-candidate IFNAME <0-32><br>ip pim bsr-candidate IFNAME <0-32> <0-255><br>no ip pim bsr-candidate (IFNAME \|) |
| **Parameters** | **IFNAME** Specify the name of the interface<br>**<0-32>**: Hash mask length for RP selection<br>**<0-255>**: Priority for a BSR candidate |
| **Example usage** | `switch_a(config)# ip pim bsr-candidate ge24 20 30` |

| ip pim cisco-register-checksum | |
|---|---|
| **Purpose** | Configure the option to calculate the register checksum over the whole packet. Use for inter-operation with older Cisco IOS versions. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip pim cisco-register-checksum<br>ip pim cisco-register-checksum group-list (<1-99> \| <1300-1999> \| WORD)<br>no ip pim cisco-register-checksum<br>no ip pim cisco-register-checksum group-list (<1-99> \| <1300-1999> \| WORD) |
| **Parameters** | **group-list**: Use this parameter to configure the option to calculate the register checksum over the whole packet on multicast groups specified by the access-list.<br>**<1-99>**: IP standard access-list.<br>**<1300-1999>**: IP access-list (expanded range).<br>**WORD**: IP named standard access list. |
| **Example usage** | `switch_a(config)# ip pim cisco-register-checksum group-list 34` |

| ip pim crp-cisco-prefix | |
|---|---|
| **Purpose** | Use this command to interoperate with Cisco devices that conform to an earlierdraft standard. Some Cisco devices might not accept candidate RPs with a groupprefix number of zero. Note that the latest BSR specification prohibits sending RPadvertisements with prefix 0. RP advertisements for the default IPv4 multicastgroup range 224/4 are sent with a prefix of 1. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ip pim crp-cisco-prefix |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# ip pim crp-cisco-prefix` |

| ip pim ignore-rp-set-priority | |
|---|---|
| **Purpose** | This command is used to inter-operate with older Cisco IOS versions. It allows the RP-SET priority value to be ignored, and only the hashing mechanism for RP selection used. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip pim ignore-rp-set-priority<br>no ip pim ignore-rp-set-priority |
| **Parameters** | |
| **Example usage** | `switch_a(config)# ip pim ignore-rp-set-priority` |

| ip pim jp-timer | |
|---|---|
| **Purpose** | Set a PIM join/prune timer. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ip pim jp-timer <1-65535><br>no ip pim jp-timer |
| **Parameters** | **<1-65535>**: Value of the Join/Prune timer, in seconds |
| **Example usage** | `switch_a(config)# ip pim jp-timer 234` |

| ip pim register-rate-limit | |
|---|---|
| **Purpose** | Configure the rate of Register packets sent by this designated router (DR), in number of packets per second. The configured rate is per (S,G) state, and is not a system-wide rate. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip pim register-rate-limit <1-65535><br>no ip pim register-rate-limit |
| **Parameters** | **<1-65535>**: Number of packets sent per second |
| **Example usage** | `switch_a(config)# ip pim register-rate-limit 20000` |

| ip pim register-rp-reachability | |
|---|---|
| **Purpose** | Enable the RP reachability check for PIM Registers at the designated router. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip pim register-rp-reachability<br>no ip pim register-rp-reachability |
| **Parameters** | |
| **Example usage** | `switch_a(config)# ip pim register-rp-reachability` |

| ip pim register-source | |
|---|---|
| **Purpose** | Configure the source address of Register packets sent by this DR, overriding the default source address, which is the address of the RPF interface toward the source host.<br>Use the no option to remove the source address of register packets sent by this DR, and reset it to use the default source address, that is, the address of the RPF interface toward the source host.<br>The configured address must be a reachable address so the RP can send corresponding Register-Stop messages in response. This address is usually the loopback interface address, but can also be other physical addresses. The address must be advertised by unicast routing protocols on the DR. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip pim register-source A.B.C.D<br>ip pim register-source IFNAME<br>no ip pim register-source |
| **Parameters** | **A.B.C.D**: The IP address to use as the source of the register packets<br>**IFNAME**: The name of the interface to use as the source of the register packets |
| **Example usage** | `switch_a(config)# ip pim register-source 3.3.3.2` |
| **Note** | The interface configured does not require PIM to be enabled. |

| ip pim register-suppression | |
|---|---|
| **Purpose** | Configure the register-suppression time, in seconds. Configuring this value modifies register-suppression time at the designated router; configuring this value at the rendezvous point modifies the RPkeepalive-period value if the ip pim rp-register-kat command is not used.<br>Default value of register-suppression time is 60 seconds. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip pim register-suppression <1-65535><br>no ip pim register-suppression |
| **Parameters** | **<1-65535>**: Register suppression time in seconds |
| **Example usage** | `switch_a(config)# ip pim register-suppression 180` |

| ip pim rp-candidate | |
|---|---|
| **Purpose** | Give the router a candidate RP status using the IP address of the specified interface. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip pim rp-candidate IFNAME<br>no ip pim rp-candidate (IFNAME \|) |
| **Parameters** | **IFNAME**: Interface name |
| **Example usage** | `switch_a(config)# ip pim rp-candidate ge10` |

| ip pim rp-address | |
|---|---|
| **Purpose** | Configure static RP address for multicast groups. PIM supports multiple static RPs. It also supports usage of static-RP and BSR mechanism, simultaneously.<br>• If RP-address configured through BSR and RP-address configured statically are both available for a group range, the RP-address configured through BSR is chosen.<br>• One static-RP can be configured for multiple group ranges using Access Lists. However, configuring multiple static RPs (using ip pim rp-address command) with the same RP address is not allowed. The static-RP can either be configured for the whole multicast group range 224/4 (without ACL) or for specific group ranges (using ACL).<br>• If multiple static-RPs are available for a group range, then one with the highest IP address is chosen.<br>• Only Permit filters in ACL are considered as valid group ranges. The default Permit filter 0.0.0.0/0 is converted to default multicast filter 224/4.<br>• After configuration, the RP-address is inserted into static-RP group tree based on the configured group ranges. For each group range multiple static-RPs are maintained in a linked list, sorted by IP addresses. When selecting static-RPs for a group range, the first element, which is the static-RP with highest IP address, is chosen.<br>• Deletion of RP-address is handled by removing the static-RP from all the existing group ranges and recomputing the RPs for existing TIB states if required.<br>• Group mode and RP address mappings learned through BSR take precedence over mappings statistically defined by the ip pim rp-address command without the override keyword. Commands with the override keyword take precedence over dynamically learned mappings. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ip pim rp-address A.B.C.D (override \|)<br>[no] ip pim rp-address A.B.C.D (<1-99> \| <1300-1999> \| WORD) (override \|)<br>\| WORD) (override \|) |
| **Parameters** | **<1-99>**: IP Standard access-list<br>**<1300-1999>**: IP Standard access-list (expanded range)<br>**WORD**: Access-list name<br>**override**: Static RP overrides dynamically-learned RP |
| **Example usage** | `switch_a(config)# ip pim rp-address 3.3.3.3 4` |

| ip pim rp-register-kat | |
|---|---|
| **Purpose** | Configure a Keepalive Timer (KAT) value for (S,G) states at RP to monitor PIM register packets, overriding the generic KAT timer value. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip pim rp-register-kat <1-65535><br>no ip pim rp-register-kat |
| **Parameters** | **<1-65535>**: Keepalive timer in seconds |
| **Example usage** | `switch_a(config)# ip pim rp-register-kat 3454` |

| ip pim spt-threshold | |
|---|---|
| **Purpose** | Turn on the ability of the last-hop PIM router to switch to shortest-path tree (SPT).<br>This option is binary, meaning that the switching to SPT happens either at the receiving of the first data packet or not at all. It is not rate-based. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip pim spt-threshold<br>ip pim spt-threshold group-list (<1-99> \| <1300-1999> \| WORD) |
| **Parameters** | **group-list**: Enable the ability for the last-hop PIM router to switch to SPT for multicast group addresses indicated by the given access-list<br>**<1-99>**: IP Standard access-list<br>**<1300-1999>**: IP Standard access-list (expanded range)<br>**WORD**: Standard access list name |
| **Example usage** | `switch_a(config)# ip pim spt-threshold group-list LIST1` |

| ip pim ssm | |
|---|---|
| **Purpose** | Configure Source Specific Multicast (SSM), and define the range of multicast addresses. To define the SSM range to be other than the default, define an access-list. When an SSM range of IP multicast addresses is defined with the **ip pim ssm** command, the no (*,G) or (S,G,rpt) state is initiated for groups in the SSM range. The messages corresponding to these states are no accepted or originated in the SSM range. |
| **Command Mode** | Global Configuration |
| **Syntax** | ip pim ssm default<br>ip pim ssm range (<1-99> \| WORD)<br>no ip pim ssm |
| **Parameters** | **default**: This keyword defines the 232/8 group range for SSM<br>**range**: Define an access-list for group range to use for SSM<br>**<1-99>**: Value for a standard access-list<br>**WORD**: Standard access list name |
| **Example usage** | `switch_a(config)# access-list 10 permit 225.1.1.1` |

## PIM Interface Commands

| ip pim bsr-border | |
|---|---|
| **Purpose** | Prevent bootstrap router (BSR) messages from being sent or received through an interface. Use this command to configure an interface bordering another PIM domain to avoid the exchange of BSR messages between the two domains. This prevents routers in one domain from electing rendezvous points (RPs) in the other domain, resulting in a protocol malfunction or loss of isolation between the domains. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip pim bsr-border |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ip pim bsr-border` |
| **Note** | This command does not set up multicast boundaries. It only sets up a PIM domain BSR message border. |

| ip pim | |
|---|---|
| **Purpose** | Enable PIM dense-mode or sparse-mode on the current interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip pim (dense-mode \| sparse-mode) |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ip pim dense-mode` |

| ip pim dr-priority | |
|---|---|
| **Purpose** | Set the designated router's priority value. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip pim dr-priority (<0-4294967294> \|) |
| **Parameters** | **<0-4294967294>**: Designated router priority. A higher value means a higher preference. |
| **Example usage** | `switch_a(config-if)# ip pim dr-priority 314159` |

| ip pim exclude-genid | |
|---|---|
| **Purpose** | Exclude the GenID (generated ID) option from Hello packets sent by the PIM module on an interface. This command is used to inter-operate with older Cisco IOS versions. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip pim exclude-genid |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ip pim exclude-genid` |

| ip pim hello-holdtime | |
|---|---|
| **Purpose** | Configure a hello holdtime other than the default (3.5 * hello_interval seconds). If the configured value is less than the current **hello_interval**, it is refused. When removing a configured hello_holdtime, the value is reset to default. Every time the **hello_interval** is updated, the **hello-holdtime** is checked. If it is less than the current **hello_interval** value, then it reverts to default. Otherwise, the configured value is maintained. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip pim hello-holdtime <1-65535><br>no ip pim hello-holdtime |
| **Parameters** | **<1-65535>:** Hello holdtime in seconds |
| **Example usage** | `switch_a(config-if)# ip pim hello-holdtime 20000` |

| ip pim hello-interval | |
|---|---|
| **Purpose** | Configure a hello interval value other than the default. When a hello-interval is configured and **hello-holdtime** is not configured, or when the **hello-holdtime** value configured is less than the new hello-interval value, the holdtime value is modified to (3.5 * hello_interval). Otherwise, the **hello-holdtime** value is the configured value. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip pim hello-interval <1-65535><br>no ip pim hello-interval |
| **Parameters** | **<1-65535>**: Hello interval in seconds. Default is 30 seconds. |
| **Example usage** | `switch_a(config-if)# ip pim hello-interval 300` |

| ip pim neighbor-filter | |
|---|---|
| **Purpose** | Enable filtering of neighbors on the interface. When configuring a neighbor filter, PIM will either not establish adjacency with neighbor or terminates adjacency with existing neighbors, when denied by filtering access list. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip pim neighbor-filter (<1-99> \| WORD) |
| **Parameters** | **<1-99>**: IP standard access-list number<br>**WORD**: IP standard access list name |
| **Example usage** | `switch_a(config-if)# ip pim neighbor-filter 14` |

| ip pim propagation-delay | |
|---|---|
| **Purpose** | Configure a propagation delay value for PIM in mlliseconds. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip pim propagation-delay <1000-5000><br>no ip pim propagation-delay |
| **Parameters** | **<1000-5000>**: Propogation delay in milliseconds. Default is 500. |
| **Example usage** | `switch_a(config-if)# pim propagation-delay 1000` |

| ip pim state-refresh origination-interval | |
|---|---|
| **Purpose** | Configure a PIM-DM State-Refresh origination interval. This is the number of seconds between PIM-DM State Refresh control messages. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ip pim state-refresh origination-interval <1-100><br>no ip pim state-refresh origination-interval |
| **Parameters** | **<1-100>**: Interval in seconds. Default is 60 seconds. |
| **Example usage** | `switch_a(config-if)# ip pim state-refresh origination-interval 72` |

| ip pim unicast-bsm | |
|---|---|
| **Purpose** | Enable support for sending and receiving unicast Bootstrap Messages (BSM) on an interface. This command supports backward-compatibility with older versions of the Bootstrap Router specification, which specifies unicast BSM to refresh the state of new or restarting neighbors. |
| **Command Mode** | Interface Configuration |
| **Syntax** | [no] ip pim unicast-bsm |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ip pim unicast-bsm` |

## IPv6 Access List

| ip6-access-list | |
|---|---|
| **Purpose** | Create an IPv6 standard or extended access list. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ip6-access-list (<1-99> \| <1300-1999>) (deny \| permit) (X:X::X:X/M \| host X:X::X:X \| any)<br>[no] ip6-access-list (<100-199> \| <2000-2699>) (deny \| permit) (ip \| udp \| tcp \| gre \| igmp \| pim \| rsvp \| ospf \| vrrp \| ipcomp \| any \| <0-255>) (X:X::X:X/M \| host X:X::X:X \| any) (X:X::X:X/M \| host X:X::X:X \| any)<br>[no] ip6-access-list extended (NAME) (deny \| permit) (ip \| udp \| tcp \| gre \| igmp \| pim \| rsvp \| ospf \| vrrp \| ipcomp \| any \| <0-255>) (X:X::X:X/M \| host X:X::X:X \| any) (X:X::X:X/M \| host X:X::X:X \| any)<br>[no] ip6-access-list standard (NAME) (deny \| permit) (X:X::X:X/M \| host X:X::X:X \| any) |
| **Parameters** | **<1-99>**: IP standard access list<br>**<1300-1999>**: IP standard access list (expanded range).<br>**deny**: Route to reject.<br>**permit**: Route to permit.<br>**Ip:** Any IPv4 encapsulation packet<br>**udp:** UDP packet<br>**tcp:** TCP packet<br>**gre:** GRE packet<br>**igmp:** IGMP packet<br>**pim:** PIM packet<br>**rsvp:** RSVP packet<br>**ospf:** OSPF packet<br>**vrrp:** VRRP packet<br>**ipcomp:** IP Payload Compression packet<br>**any:** Any protocol packet<br>**<0-255>:** IANA-assigned protocol number<br>**X:X::X:X/M**: IPv6 address |
| **Example usage** | `switch_a(config)# ip6-access-list 99 permit db8:1::ab9:C0A8:102/92` |

| ipv6 access-list | |
|---|---|
| **Purpose** | Configure an IPv6 access list for filtering frames. Use access lists to control the transmission of packets on an interface, and restrict contents of routing updates. The switch stops checking the access list after a match occurs. |
| **Command Mode** | Global Configuration |
| **Syntax** | ipv6 access-list WORD (deny \| permit) X:X::X:X/M<br>ipv6 access-list WORD (deny \| permit) X:X::X:X/M exact-match<br>ipv6 access-list WORD (deny \| permit) any<br>ipv6 access-list WORD (deny \| permit) (ip \| gre \| igmp \| pim \| rsvp \| ospf \| vrrp \| ipcomp \| any \| <0-255>) (X:X::X:X/M\|X:X::X:X X:X::X:X \| any) (X:X::X:X/M \| X:X::X:X X:X::X:X \| any)<br>ipv6 access-list WORD (deny \| permit) (tcp) (X:X::X:X/M \| X:X::X:X X:X::X:X \| any) ((eq \| gt \| lt \|neq) <0-65535> \| range <0-65535> <0-65535> \|) (X:X::X:X/M \| X:X::X:X X:X::X:X \| any) ((eq \| gt \| lt \|neq) (ftp \| ssh \| telnet \| www \| <0-65535>) \| range <0-65535> <0 -65535> \|)<br>ipv6 access-list WORD (deny \| permit) (udp) (X:X::X:X/M \| X:X::X:X X:X::X:X \| any) ((eq \| gt \| lt \| neq) <0-65535> \| range <0-65535> <0-65535>\|) (X:X::X:X/M \| X:X::X:X X:X::X:X \| any) ((eq \| gt \| lt \| neq) (tftp \| bootp \| <0-65535>) \| range <0-65535> <0-65535> \|)<br>ipv6 access-list WORD remark LINE |
| **Parameters** | **WORD:** Access-list name.<br>**Deny:** Specify route to deny.<br>**Permit:** Specify route to permit.<br>**<0-255>:** Specify a number to identify a protocol, instead of a named protocol (as listed below).<br>**Any:** Specify any protocol packet.<br>**gre:** Specify Generic Routing Encapsulation packet.<br>**igmp:** Specify Internet Group Management Protocol packet.<br>**ip:** Specify IP packet.<br>**ipcomp:** Specify IP payload compression packet.<br>**ospf:** Specify Open Shortest Path First packet.<br>**pim:** Specify Protocol Independent Multicast packet.<br>**rsvp:** Specify Resource Reservation Protocol packet.<br>**vrrp:** Specify Virtual Router Redundancy Protocol packet.<br>**X:X::X:X:** Source IPv6 address.<br>**X:X::X:X/M:** Source IPv6 address and mask.<br>**any:** Source any local address.<br>**X:X::X:X:** Destination IPv6 address.<br>**X:X::X:X/M:** Destination IPv6 address and mask.<br>**any:** Destination any local address.<br>**eq:** Packet size equal to the specified value.<br>**gt:** Packet size less than or greater than specified value.<br>**lt:** Packet size less than or greater than specified value. |
| **Example usage** | `switch_a(config)# ipv6 access-list list1 permit db8:1::ab9:C0A8:102/92` |

# IPv6 General Configuration

| show ipv6 | |
|---|---|
| **Purpose** | Turn IPv6 forwarding on or off. |
| **Command Mode** | Privileged Exec |
| **Syntax** | show ipv6 forwarding<br>show ipv6 interface IFNAME brief<br>show ipv6 neighbors<br>show ipv6 route (database \|)<br>show ipv6 route (database \|) (connected \| kernel \| ospf \| rip \| static)<br>show ipv6 route X:X::X:X<br>show ipv6 route X:X::X:X/M<br>show ipv6 route summary<br>show ipv6 prefix-list WORD<br>show ipv6 prefix-list WORD seq <1-4294967295><br>show ipv6 prefix-list WORD X:X::X:X/M<br>show ipv6 prefix-list WORD X:X::X:X/M longer<br>show ipv6 prefix-list WORD X:X::X:X/M first-match<br>show ipv6 prefix-list summary<br>show ipv6 prefix-list summary WORD<br>show ipv6 prefix-list detail<br>show ipv6 prefix-list detail WORD |
| **Parameters** | **None** |
| **Example usage** | `switch_a(config)#` show `ipv6 forwarding` |

| ipv6 forwarding | |
|---|---|
| **Purpose** | Turn IPv6 forwarding on or off. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 forwarding |
| **Parameters** | |
| **Example usage** | `switch_a(config)# ipv6 forwarding` |

| ipv6 neighbor | |
|---|---|
| **Purpose** | Add/remove an IPv6 neighbor entry. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 neighbor X:X::X:X IFNAME MAC |
| **Parameters** | **X:X::X:X**: The neighbor's IPv6 address.<br>**IFNAME**: The name of the interface.<br>**MAC**: The MAC hardware address <HHHH.HHHH.HHHH> |
| **Example usage** | `switch_a(config)# ipv6 neighbor 1:1::1:1 eth1 1111.1111.1111` |

| Ipv6 route | |
|---|---|
| **Purpose** | Configure static IPv6 routes. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 route X:X::X:X/M (X:X::X:X \| IFNAME)<br>[no] ipv6 route X:X::X:X/M (X:X::X:X \| IFNAME) <1-255><br>[no] ipv6 route X:X::X:X/M X:X::X:X IFNAME<br>[no] ipv6 route X:X::X:X/M X:X::X:X IFNAME <1-255> |
| **Parameters** | **IFNAME:** Interface name<br>**X:X::X:X**: IPv6 Default route<br>**X:X::X:X/M**: Address of next hop router<br>**<1-255>**: IPv6 hop limit |
| **Example usage** | `switch_a(config)# ipv6 route 3030::1/128 2000::2` |

| Clear ipv6 mroute | |
|---|---|
| **Purpose** | Delete multicast route table entries. |
| **Command Mode** | Privileged Exec |
| **Syntax** | mand Syntax<br>clear ipv6 mroute *<br>clear ipv6 mroute * pim (dense-mode \| sparse-mode)<br>clear ipv6 mroute X:X::X:X<br>clear ipv6 mroute X:X::X:X X:X::X:X<br>clear ipv6 mroute X:X::X:X X:X::X:X pim (dense-mode \| sparse-mode)<br>clear ipv6 mroute X:X::X:X pim sparse-mode<br>clear ipv6 mroute statistics *<br>clear ipv6 mroute statistics X:X::X:X<br>clear ipv6 mroute statistics X:X::X:X X:X::X:X |
| **Parameters** | **NAME:** The name of the VPN routing/forwarding instance<br>*****: Delete all multicast routes<br>**dense-mode:** Clear multicast rout table for PIM dense-mode<br>**sparse-mode:** Clear multicast route table for PIM sparse mode |
| **Example usage** | `switch_a# clear ipv6 mroute 3ffe::24:3 ff00::3 pim sparse-mode` |

## IPv6 Neighbor Discovery

| ipv6 nd other-config-flag | |
|---|---|
| **Purpose** | Suppress/enable IPv6 Router Advertisement (RA) transmission for the current interface. |
| **Command Mode** | Global Configuration |
| **Syntax** | ipv6 nd suppress-ra<br>no ipv6 nd suppress-ra |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ipv6 nd suppress-ra` |

| ipv6 nd managed-config-flag | |
|---|---|
| **Purpose** | Set the managed address configuration flag in the Router Advertisement to be used for the IPv6 address auto-configuration. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 nd managed-config-flag<br>no ipv6 nd managed-config-flag |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ipv6 nd managed-config-flag` |

| ipv6 nd other-config-flag | |
|---|---|
| **Purpose** | Set the other stateful configuration flag in Router Advertisement to be used for IPv6 address autoconfiguration |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 nd other-config-flag<br>no ipv6 nd other-config-flag |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ipv6 nd other-config-flag` |

| ipv6 nd ra-interval | |
|---|---|
| **Purpose** | Specify the interval between IPv6 Router Advertisements (RA). |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 nd ra-interval <4-1800><br>no ipv6 nd ra-interval |
| **Parameters** | **<4-1800>**: The RA interval in milliseconds. |
| **Example usage** | `switch_a(config-if)# ipv6 nd ra-interval 1000` |

| ipv6 nd minimum-ra-interval | |
|---|---|
| **Purpose** | Set a minimum Router Advertisement (RA) interval for the interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 nd minimum-ra-interval <3-1350><br>no ipv6 nd minimum-ra-interval |
| **Parameters** | **<3-1350>**: Minimum router advertisement interval (in seconds). |
| **Example usage** | `switch_a(config-if)# ipv6 nd minimum-ra-interval 1000` |

| ipv6 nd ra-lifetime | |
|---|---|
| **Purpose** | Specify the Router Advertisement (RA) lifetime of this router enabling it to act as a default gateway for the network. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 nd ra-lifetime <0-9000><br>no ipv6 nd ra-lifetime |
| **Parameters** | **<0-9000>**: The RA lifetime duration in milliseconds. |
| **Example usage** | `switch_a(config-if)# ipv6 nd ra-lifetime 5000` |

| ipv6 nd current-hoplimit | |
|---|---|
| **Purpose** | Set an ND (Neighbor Discovery) advertised hop limit for an interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 nd current-hoplimit <0-255><br>no ipv6 nd current-hoplimit |
| **Parameters** | **<0-255>:** Hop limit |
| **Example usage** | `switch_a(config-if)# ipv6 nd current-hoplimit 50` |

| ipv6 nd link-mtu | |
|---|---|
| **Purpose** | Set an advertised MTU option. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 nd link-mtu<br>no ipv6 nd link-mtu |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ipv6 nd link-mtu` |

| ipv6 nd reachable-time | |
|---|---|
| **Purpose** | Specify the reachable time in the Router Advertisement to be used for detecting unreachability of the IPv6 neighbor" |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 nd reachable-time <0-3600000><br>no ipv6 nd reachable-time |
| **Parameters** | **<0-3600000>**: The reachable time in milliseconds. |
| **Example usage** | `switch_a(config-if)# ipv6 nd reachable-time 100000` |

| ipv6 nd retransmission-time | |
|---|---|
| **Purpose** | Establish an IPv6 advertised retransmission time for the current interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 nd retransmission-time <1000-3600000><br>no ipv6 nd retransmission-time |
| **Parameters** | **<1000-3600000>**: The retransmission time in milliseconds |
| **Example usage** | `switch_a(config-if)# ipv6 nd retransmission-time 100000` |

## MLD (Multicast Listener Discovery)

| show ipv6 mld | |
|---|---|
| **Purpose** | Display the multicast groups with receivers directly connected to the router, and learned through MLD.<br>Display the state of MLD, MLD Proxy service, and MLD Snooping for a specified interface, or allinterfaces.<br>Display MLD SSM (source-specific-multicast) mapping.<br>Display the contents of the MRIB VIF table.<br>Display the contents of the IPv6 multicast routing (mroute) table.<br>Display RPF information for the specified source address. |
| **Command Mode** | Privilged exec |
| **Syntax** | show ipv6 mld groups (detail \|)<br>show ipv6 mld groups IFNAME (detail \|)<br>show ipv6 mld groups IFNAME X:X::X:X (detail \|)<br>show ipv6 mld groups X:X::X:X (detail \|)<br>show ipv6 mld interface (IFNAME \|)<br>show ipv6 mld ssm-map<br>show ipv6 mld ssm-map X:X::X:X<br>show ipv6 mif<br>show ipv6 mif IFNAME<br>show ipv6 mroute (dense \| sparse \|) (count \| summary \|)<br>show ipv6 mroute X:X::X:X (dense \| sparse\|) (count \| summary \|)<br>show ipv6 mroute X:X::X:X X:X::X:X (dense \| sparse \|) (count \| summary \|)<br>show ipv6 rpf X:X::X:X |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# show ipv6 mld groups` |

| clear ipv6 | |
|---|---|
| **Purpose** | Delete entries from the IPv6 multicast routing table. When this command is used, the MRIB clears the multicast route entries in its multicast route table, and removes the entries from the multicast forwarder. The MRIB sends a clear message to the multicast protocols." |
| **Command Mode** | Privilged exec |
| **Syntax** | clear ipv6 mroute *<br>clear ipv6 mroute statistics *<br>clear ipv6 mroute statistics X:X::X:X<br>clear ipv6 mroute statistics X:X::X:X X:X::X:X<br>clear ipv6 mroute X:X::X:X<br>clear ipv6 mroute X:X::X:X X:X::X:X"<br>clear ipv6 mld<br>clear ipv6 mld group *<br>clear ipv6 mld group X:X::X:X<br>clear ipv6 mld group X:X::X:X IFNAME<br>clear ipv6 mld interface IFNAME" |
| **Parameters** | None |
| **Example usage** | `switch_a(config)# clear ipv6 mroute` |

| ipv6 mroute | |
|---|---|
| **Purpose** | Create a multicast static route. Multicast static routes are unicast routes that allow multicast and unicast topologies to be incongruous. These routes are used by multicast routing protocols to perform RPF checks. |
| **Command Mode** | Global Configuration |
| **Syntax** | ipv6 mroute X:X::X:X/M (static \| rip \| ospf \| bgp \| isis \|) (X:X::X:X \| IFNAME)<br>ipv6 mroute X:X::X:X/M (static \| rip \| ospf \| bgp \| isis \|) (X:X::X:X \| IFNAME) <1-255><br>ipv6 mroute X:X::X:X/M (static \| rip \| ospf \| bgp \| isis \|) X:X::X:X IFNAME<br>ipv6 mroute X:X::X:X/M (static \| rip \| ospf \| bgp \| isis \|) X:X::X:X IFNAME <1-255> |
| **Parameters** | **X:X::X:X/M**: Specify multicast source IP address and mask<br>**X:X::X:X:** RPF address for the multicast route. Host IP address can be a directly connected system or a remote system. For remote systems, a recursive lookup is done from the unicast routing table to find a directly connected system. Recursive lookup is done up one level.<br>**INTERFACE**: Incoming interface name. Can only be specified for non-broadcast interfaces.<br>**bgp:** Specify the border gateway protocol (BGP).<br>**isis:** Specify the Intermediate system to intermediate system (IS-IS) protocol.<br>**ospf:** Specify the open shortest patch first (OSPF) protocol.<br>**rip:** Specify the routing information protocol (RIP) protocol.<br>**static:** Specify Static routes.<br>**X:X::X:X:** Specify Reverse path forwarding (RPF) neighbor address or route.<br>**INTERFACE:** Specify Reverse path forwarding (RPF) interface or pseudo interface.<br>**<1-255>:** Specify whether a unicast route or multicast static route is used for the RPF lookup. Lower distances have preference. If the multicast static route has the same distance as the other RPF sources, the multicast static route takes precedence. Default is 0. |
| **Example usage** | `switch_a(config)# ipv6 mroute 10:10::10:50/1 255.255.255.0 1` |

| ipv6 multicast-routing | |
|---|---|
| **Purpose** | Enable multicast routing. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 multicast-routing |
| **Parameters** | |
| **Example usage** | `switch_a(config)# ipv6 multicast-routing` |

| ipv6 multicast route-limit | |
|---|---|
| **Purpose** | Set a maximum number of multicast routes. |
| **Command Mode** | Global Configuration |
| **Syntax** | ipv6 multicast route-limit <1-2147483647><br>ipv6 multicast route-limit <1-2147483647> <1-2147483647><br>no ipv6 multicast route-limit |
| **Parameters** | **<1-2147483647>:** Number of routes<br>**<1-2147483647>:** Threshold at which to generate warning message |
| **Example usage** | `switch_a(config)# ipv6 multicast route-limit 1000 2000000g` |

| ipv6 mld | |
|---|---|
| **Purpose** | Enable and configure Multicast Listener Discovery. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 mld limit <1-2097152> (except WORD \|)<br>[no] ipv6 mld ssm-map enable<br>[no] ipv6 mld ssm-map static WORD X:X::X:X |
| **Parameters** | |
| **Example usage** | `switch_a(config)# ipv6 mld ssm-map enable` |

| ipv6 mld version | |
|---|---|
| **Purpose** | Set the current MLD protocol version on an interface |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 mld version <1-2><br>no ipv6 mld version |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ipv6 mld version 1` |

| ipv6 mld proxy-service | |
|---|---|
| **Purpose** | Designate an interface to be the MLD proxy-service (upstream host-side) interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 mld proxy-service<br>no ipv6 mld proxy-service |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ipv6 mld proxy-service` |

| ipv6 mld immediate-leave | |
|---|---|
| **Purpose** | Minimize the leave latency of MLD memberships. This command applies to interfaces configured for MLD Layer-3 multicast protocols, MLD Snooping, or MLD Proxy" |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 mld immediate-leave group-list WORD<br>no ipv6 mld immediate-leave |
| **Parameters** | **WORD:** IPv6 Named Standard Access list |
| **Example usage** | `switch_a(config-if)# ipv6 mld immediate-leave group-list 1000` |

| ipv6 mld limit | |
|---|---|
| **Purpose** | Configure the limit on the maximum number of group membership states at either the router level,or for the specified interface. Once the specified number of group memberships is reached, all further localmemberships will be ignored. Optionally, an exception access-list can be configured to specify the group-address(es) to be excluded from being subject to the limit. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 mld limit <1-2097152> (except WORD \|)<br>no ipv6 mld limit |
| **Parameters** | **<1-2097152>:** Max Allowed State on this interface (Default: 0)<br>**WORD:** IPv6 Named Standard Access list |
| **Example usage** | `switch_a(config-if)# ipv6 mld limit 1000 except mylist` |

| ipv6 mld access-group | |
|---|---|
| **Purpose** | Control the multicast local-membership groups learnt on an interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 mld access-group WORD<br>no ipv6 mld access-group |
| **Parameters** | **WORD:** IPv6 Named Standard Access list |
| **Example usage** | `switch_a(config-if)# ipv6 mld access-group mylist` |

| ipv6 mld last-member | |
|---|---|
| **Purpose** | Set/unset the last-member query-count value.<br>Configure the frequency at which the router sends MLD group-specific host query messages. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 mld last-member-query-count <2-7><br>no ipv6 mld last-member-query-count<br>ipv6 mld last-member-query-interval <1000-25500><br>no ipv6 mld last-member-query-interval |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ipv6 mld last-member-query-count 7` |

| ipv6 mld querier-timeout | |
|---|---|
| **Purpose** | Configure the timeout period before the router takes over as the querier for the interface after the previous querier has stopped querying. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 mld querier-timeout <60-300><br>no ipv6 mld querier-timeout |
| **Parameters** | **<60-300>:** Timeout period in seconds |
| **Example usage** | `switch_a(config-if)# ipv6 mld querier-timeout 60` |

| ipv6 mld query-interval | |
|---|---|
| **Purpose** | Configure the frequency of sending MLD host query messages. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 mld query-interval <1-18000><br>no ipv6 mld query-interval |
| **Parameters** | **<1-18000>:** Query Interval value in seconds (Default is 125) |
| **Example usage** | `switch_a(config-if)# ipv6 mld query-interval 200` |

| ipv6 mld query-max-response-time | |
|---|---|
| **Purpose** | Configure the maximum response time advertised in MLD queries |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 mld query-max-response-time <1-240><br>no ipv6 mld query-max-response-time |
| **Parameters** | **<1-240>:** Response time in seconds |
| **Example usage** | `switch_a(config-if)# ipv6 mld query-max-response-time 200` |

| ipv6 mld robustness-variable | |
|---|---|
| **Purpose** | Change the robustness variable value on an interface. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 mld robustness-variable <2-7><br>no ipv6 mld robustness-variable |
| **Parameters** | **<2-7>:** Robustness variable (default is 2) |
| **Example usage** | `switch_a(config-if)# ipv6 mld robustness-variable 5` |

| ipv6 mld ssm-map | |
|---|---|
| **Purpose** | Enable SSM mapping on the switch |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 mld ssm-map enable<br>no ipv6 mld ssm-map enable |
| **Parameters** | None |
| **Example usage** | `switch_a(config-if)# ipv6 mld ssm-map enable` |

| ipv6 mld ssm-map static | |
|---|---|
| **Purpose** | Specify the static mode of defining SSM mapping. SSM mapping statically assigns sources to MLDv1 groups to translate such (*,G) groups' memberships to (S,G) memberships for use with PIM-SSM. |
| **Command Mode** | Global Configuration |
| **Syntax** | ipv6 mld ssm-map static WORD X:X::X:X<br>no ipv6 mld ssm-map static WORD X:X::X:X |
| **Parameters** | **WORD**: IPv6 Named Standard Access list<br>**X:X::X:X**: Source address to use for static map group |
| **Example usage** | `switch_a(config)# ipv6 mld ssm-map static listname ff55::3` |

| ipv6 mld static-group | |
|---|---|
| **Purpose** | "tatically configure IPv6 group membership entries on an interface. To statically add only a group membership, do not specify any parameters. |
| **Command Mode** | Interface Configuration |
| **Syntax** | ipv6 mld static-group X:X::X:X {(source (X:X::X:X \| ssm-map) \|) (interface IFNAME \|)}<br>no ipv6 mld static-group X:X::X:X {(source (X:X::X:X \| ssm-map) \|) (interface IFNAME \|)} |
| **Parameters** | **WORD**: IPv6 Named Standard Access list<br>**X:X::X:X**: Source address to use for static map group |
| **Example usage** | `switch_a(config-if)# ipv6 mld static-group ff55::3` |

| ipv6 ospf display route single-line | |
|---|---|
| **Purpose** | Displays the output of the **show ipv6 ospf route** command with each route entry in a singleline. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 ospf display route single-line |
| **Parameters** | None. |
| **Example usage** | `switch_a(config)# ipv6 ospf display route single-line` |

## IPv6 PIM Configuration

| Ipv6 pim accept-register | |
|---|---|
| **Purpose** | Configure the ability to filter out multicast sources specified by the given access-list at the rendezvous point (RP), so that the RP will accept/refuse to perform the Register mechanism for the packets sent by the specified sources. By default, the RP accepts Register packets from all multicast sources. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim accept-register list (<100-199> \| <2000-2699> \| WORD)<br>[no] ipv6 pim accept-register list (<100-199> \| <2000-2699> \| WORD) |
| **Parameters** | **<100-199>**: IP extended access-list value<br>**<2000-2699>**: IP extended access-list value in the expanded range<br>**WORD**: Name of a standard access list |
| **Example usage** | `switch_a(config)# ipv6 pim accept-register list 121` |

| Ipv6 pim anycast-rp | |
|---|---|
| **Purpose** | Configure the Anycast RP in the RP set. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim anycast-rp X:X::X:X X:X::X:X |
| **Parameters** | **X:X::X:X**: Unicast IP address of the Anycast RP set. An Anycast RP set is a collection of RPs in the same domain.<br>**X:X::X:X**: Destination IP address where Register messages |
| **Example usage** | `switch_a(config)# ipv6 pim anycast-rp 1.1.1.1 10.10.10.10` |

| Ipv6 pim bsr-candidate | |
|---|---|
| **Purpose** | Give the router the candidate BSR status using the specified IPv6 address of the interface. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim bsr-candidate IFNAME<br>ipv6 pim bsr-candidate IFNAME <0-32><br>ipv6 pim bsr-candidate IFNAME <0-32> <0-255> |
| **Parameters** | **IFNAME** Specify the name of the interface<br>**<0-32>**: Hash mask length for RP selection<br>**<0-255>**: Priority for a BSR candidate |
| **Example usage** | `switch_a(config)# ipv6 pim bsr-candidate ge24 20 30` |

| Ipv6 pim cisco-register-checksum | |
|---|---|
| **Purpose** | Configure the option to calculate the register checksum over the whole packet. Use for inter-operation with older Cisco IOS versions. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim cisco-register-checksum<br>[no] ipv6 pim cisco-register-checksum group-list (<1-99> \| <1300-1999> \| WORD) |
| **Parameters** | **group-list**: Use this parameter to configure the option to calculate the register checksum over the whole packet on multicast groups specified by the access-list.<br>**<1-99>**: IP standard access-list.<br>**<1300-1999>**: IP access-list (expanded range).<br>**WORD**: IP named standard access list. |
| **Example usage** | `switch_a(config)# ipv6 pim cisco-register-checksum group-list 34` |

| Ipv6 pim crp-cisco-prefix | |
|---|---|
| **Purpose** | Use this command to interoperate with Cisco devices that conform to an earlierdraft standard. Some Cisco devices might not accept candidate RPs with a groupprefix number of zero. Note that the latest BSR specification prohibits sending |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim crp-cisco-prefix |
| **Parameters** | |
| **Example usage** | `switch_a(config)# ipv6 pim crp-cisco-prefix` |

| Ipv6 pim ignore-rp-set-priority | |
|---|---|
| **Purpose** | This command is used to inter-operate with older Cisco IOS versions. It allows the RP-SET priority value to be ignored, and only the hashing mechanism for RP selection used. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ip pim ignore-rp-set-priority |
| **Parameters** | |
| **Example usage** | `switch_a(config)# ipv6 pim ignore-rp-set-priority` |

| Ipv6 pim jp-timer | |
|---|---|
| **Purpose** | Set a PIM join/prune timer. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ip pim jp-timer <1-65535><br>no ip pim jp-timer |
| **Parameters** | **<1-65535>**: Value of the Join/Prune timer, in seconds |
| **Example usage** | `switch_a(config)# ipv6 pim jp-timer 234` |

| Ipv6 pim register-probe | |
|---|---|
| **Purpose** | Set the register probe interval. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim register-probe <1-65535> |
| **Parameters** | **<1-65535>**: Value of the register probe timer, in seconds |
| **Example usage** | `switch_a(config)# ipv6 pim register-probe 1000` |

| Ipv6 pim register-rate-limit | |
|---|---|
| **Purpose** | Configure the rate of Register packets sent by this designated router (DR), in number of packets per second. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim register-rate-limit <1-65535> |
| **Parameters** | **<1-65535>**: Number of packets sent per second |
| **Example usage** | `switch_a(config)# ipv6 pim register-rate-limit 20000` |

| Ipv6 pim register-rp-reachability | |
|---|---|
| **Purpose** | Enable the RP reachability check for PIM Registers at the designated router. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim register-rp-reachability |
| **Parameters** | |
| **Example usage** | `switch_a(config)# ipv6 pim register-rp-reachability` |

| Ipv6 pim register-source | |
|---|---|
| **Purpose** | Configure the source address of Register packets sent by this DR, overriding the default source address, which is the address of the RPF interface toward the source host.<br>Use the no option to remove the source address of register packets sent by this DR, and reset it to use the default source address, that is, the address of the RPF interface toward the source host.<br>The configured address must be a reachable address so the RP can send corresponding Register-Stop messages in response. This address is usually the loopback interface address, but can also be other physical addresses. The address must be advertised by unicast routing protocols on the DR. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim register-source IFNAME<br>[no] ipv6 pim register-source X:X::X:X |
| **Parameters** | **X:X::X:X**: The IP address to use as the source of the register packets<br>**IFNAME**: The name of the interface to use as the source of the register packets |
| **Example usage** | `switch_a(config)# ipv6 pim register-source 3ffe:406::1` |
| **Note** | The interface configured does not require PIM to be enabled. |

| Ipv6 pim register-suppression | |
|---|---|
| **Purpose** | Configure the register-suppression time, in seconds. Configuring this value modifies register-suppression time at the designated router; configuring this value at the rendezvous point modifies the RPkeepalive-period value if the **ipv6 pim rp-register-kat** command is not used.<br>Default value of register-suppression time is 60 seconds. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim register-suppression <1-65535> |
| **Parameters** | **<1-65535>**: Register suppression time in seconds |
| **Example usage** | `switch_a(config)# ipv6 pim register-suppression 180` |

| Ipv6 pim rp-address | |
|---|---|
| **Purpose** | Statically configure an RP address for multicast groups. To support embedded RP, the router configured as the RP must use a configured access-list that permits the embedded RP group ranges derived from the embedded RP address. If embedded RP support is available, only the RP must be statically configured as the RP for the embedded RP ranges: No additional configuration is required on other PIMv6 routers. The other routers will discover the RP address from the IPv6 group address. For these routers 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, and embedded RP support must be disabled.<br>• If RP-address configured through BSR and RP-address configured statically are both available for a group range, the BSR RP-address is chosen over static RP-address.<br>• A single static-RP can be configured for multiple group ranges using Access Lists. However, configuring multiple static RPs (using ipv6 pim rp-address command) with the same RP address is not allowed. The static-RP can either be configured for the whole multicast group range ff00::/8 (without ACL) or for specific group ranges (using ACL).<br>For example, configuring ipv6 pim rp-address 3ffe:10:10:5::153 will configure static-RP 3ffe:10:10:5::153 for the default group range ff00::/8. Configuring ipv6 pim rp-address 3ffe:20:20:5::153 grp-list will configure static-RP 3ffe:20:20:5::153 for all the group ranges represented by Permit filters in grp-list ACL.<br>• If multiple static-RPs are available for a group range, then one with the highest IP address is chosen.<br>• Only Permit filters in ACL are considered as valid group ranges. |

| | |
|---|---|
| | The default Permit filter ::/0 is converted to default multicast filter ff00::/8.<br>• After configuration, the RP-address is inserted into static-RP group tree based on the configured group ranges. For each group range multiple static-RPs are maintained in a linked list. This list is sorted in a descending order of IP addresses. When selecting static-RPs for a group range, the first element, which is the static-RP with highest IP address, is chosen.<br>• Deletion of RP-address is handled by removing the static-RP from all the existing group ranges and recomputing the RPs for existing TIB states if required.<br>• Group mode and RP address mappings learned through BSR take precedence over mappings statistically defined by the ipv6 pim rp-address command without the override keyword. Commands with the override keyword take precedence over dynamically learned mappings. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim rp-address X:X::X:X (<1-99> \| <1300-1999> \| WORD) (override\|)<br>[no] ipv6 pim rp-address X:X::X:X (override\|) |
| **Parameters** | **X:X::X:X:** IPv6 address for the RP<br>**<1-99>**: IP Standard access-list<br>**<1300-1999>**: IP Standard access-list (expanded range)<br>**WORD**: Access-list name<br>**override**: Static RP overrides dynamically-learned RP |
| **Example usage** | `switch_a(config)# ipv6 pim rp-address 3ffe:30:30:5::153 4` |

| **Ipv6 pim rp-candidate** | |
|---|---|
| **Purpose** | Give the router a candidate RP status using the IP address of the specified interface. Use the **group-list** parameter to give the router a candidate RP status using an access list of the specified interface. Use the **interval** parameter to give the router a candidate RP status using a candidate RP advertisement interval of the specified interface. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim rp-candidate IFNAME<br>[no] ipv6 pim rp-candidate IFNAME group-list (<1-99> \| WORD) interval <1-16383> (priority <0-255> \|)<br>[no] ipv6 pim rp-candidate IFNAME group-list (<1-99> \| WORD) priority <0-255> (interval <1-16383> \|)<br>[no] ipv6 pim rp-candidate IFNAME interval <1-16383> group-list (<1-99> \| WORD) (priority <0-255> \|)<br>[no] ipv6 pim rp-candidate IFNAME interval <1-16383> priority <0-255> (group-list (<1-99>\|WORD) \|) |

| | |
|---|---|
| | [no] ipv6 pim rp-candidate IFNAME priority <0-255> (group-list (<1-99> \| WORD) \|)<br>[no] ipv6 pim rp-candidate IFNAME priority <0-255> group-list (<1-99> \| WORD) (interval <1-16383>\|)<br>[no] ipv6 pim rp-candidate IFNAME priority <0-255> (interval <1-16383> \|)<br>[no] ipv6 pim rp-candidate IFNAME priority <0-255> interval <1-16383> (group-list (<1-99> \| WORD) \|) |
| **Parameters** | **IFNAME**: Interface name<br>**group-list:** The group ranges for this candidate RP<br>**<1-99>:** An IP Standard access-list<br>**WORD:** A named standard access list<br>**Interval:** A candidate-RP advertisement interval<br>**<0-16383>:** Range of values for candidate-RP advertisement interval, in seconds<br>**<0-255>:** Range of values for priority of an RP candidate<br>**priority:** A candidate-RP priority<br>**<0-255>:** Range of values for priority of an RP candidate |
| **Example usage** | `switch_a(config)# ipV6 pim rp-candidate ge10` |

| **ipV6 pim rp-register-kat** | |
|---|---|
| **Purpose** | Configure a Keepalive Timer (KAT) value for (S,G) states at RP to monitor PIM register packets, overriding the generic KAT timer value. |
| **Command Mode** | Global Configuration |
| **Syntax** | ipv6 pim rp-register-kat <1-65535><br>no ipv6 pim rp-register-kat <1-65535> |
| **Parameters** | **<1-65535>**: Keepalive timer in seconds |
| **Example usage** | `switch_a(config)# ipv6 pim rp-register-kat 3454` |

| **Ipv6 pim spt-threshold** | |
|---|---|
| **Purpose** | Configure a SPT (System Posture Token) threshold. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim spt-threshold<br>[no] ipv6 pim spt-threshold group-list (<1-99> \| <1300-1999> \| WORD) |
| **Parameters** | **group-list**: Enable the ability for the last-hop PIM router to switch to SPT for multicast group addresses indicated by the given access-list<br>**<1-99>**: IP Standard access-list<br>**<1300-1999>**: IP Standard access-list (expanded range)<br>**WORD**: Standard access list name |

| | |
|---|---|
| **Example usage** | `switch_a(config)# ip pim spt-threshold group-list LIST1` |

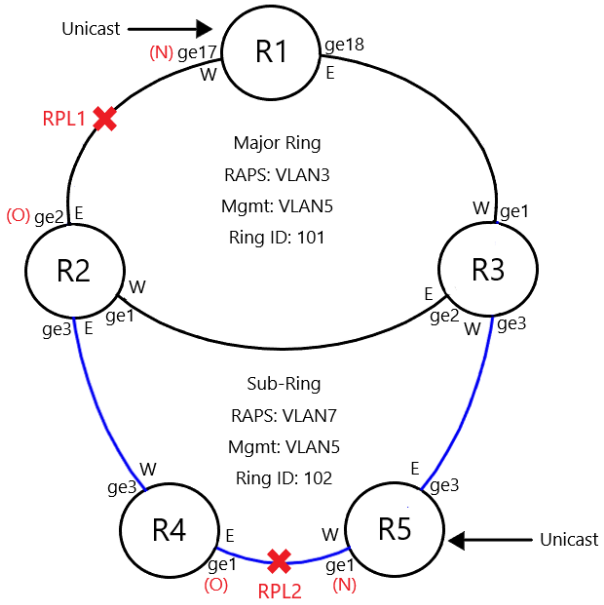
| **Ipv6 pim ssm** | |
|---|---|
| **Purpose** | Configure a Source Specific Multicast (SSM), and define a range of IP multicast addresses. The default keyword defines the SSM range as ff3x::/32. To define the SSM range to be other than the default, use the access-list.<br>When an SSM range of IP multicast addresses is defined with the ipv6 pim ssm command, the no (*,G) or (S,G,rpt) state is initiated for groups in the SSM range. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 pim ssm default<br>[no] ipv6 pim ssm range (<1-99>\|WORD) |
| **Parameters** | **default**: This keyword defines the 232/8 group range for SSM<br>**range**: Define an access-list for group range to use for SSM<br>**<1-99>**: Value for a standard access-list<br>**WORD**: Standard access list name |
| **Example usage** | `switch_a(config)# ipv6 pim ssm range 4` |

| **Ipv6 prefix-list** | |
|---|---|
| **Purpose** | Create an entry for an ipv6 prefix-list.<br>Prefixes are matched from the top of the prefix list, and matching stops whenever a match or deny occurs. To promote efficiency, use the **seq** parameter and place common matches or denials towards the top of the list. The sequence values are generated in the sequence of 5. The parameters GE and LE specify the range of the prefix length to be matched. |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] ipv6 prefix-list WORD (deny \| permit) (X:X::X:X/M \| any)<br>[no] ipv6 prefix-list WORD (deny \| permit) X:X::X:X/M ge <0-128><br>[no] ipv6 prefix-list WORD (deny \| permit) X:X::X:X/M ge <0-128> le <0-128><br>[no] ipv6 prefix-list WORD (deny \| permit) X:X::X:X/M le <0-128><br>[no] ipv6 prefix-list WORD (deny \| permit) X:X::X:X/M le <0-128> ge <0-128><br>[no] ipv6 prefix-list WORD description LINE<br>[no] ipv6 prefix-list WORD seq <1-4294967295> (deny \| permit) (X:X::X:X/M \| any)<br>[no] ipv6 prefix-list WORD seq <1-4294967295> (deny \| permit) X:X::X:X/M ge <0-128> |

| | |
|---|---|
| | [no] ipv6 prefix-list WORD seq <1-4294967295> (deny \| permit) X:X::X:X/M ge <0-128> le <0-128><br>[no] ipv6 prefix-list WORD seq <1-4294967295> (deny \| permit) X:X::X:X/M le <0-128><br>[no] ipv6 prefix-list WORD seq <1-4294967295> (deny \| permit) X:X::X:X/M le <0-128> ge <0-128><br>[no] ipv6 prefix-list sequence-number |
| **Parameters** | **seq:** The sequence number of the prefix list <1-429496725>.<br>**WORD:** Name of a prefix list.<br>**description:** Prefix-list specific description.<br>**LINE:** Up to 80 characters describing this prefix-list<br>**Deny:** Specify that packets are to be rejected.<br>**Permit:** Specify that packets are to be accepted.<br>**IPPREFIX:** The IP address mask and length of the prefix list mask (X:X::X:X/M).<br>**le:** Maximum prefix length to be matched <0-128>.<br>**ge:** Minimum prefix length to be matched <0-128>.<br>**any:** Takes all packets of any length. This parameter is the same as using 0.0.0.0/0 le 32 for IPPREFIX.<br>**sequence-number:** Include and exclude sequence numbers in nonvolatile generation (NVGEN) |
| **Example usage** | `switch_a(config)# ipv6 prefix-list mylist seq 12345 deny 3ffe:345::/16 le 22 ge 14` |

# 27 Ethernet Ring Protection Switching (ERPS)

## ERPS Sample Configuration (Network Topology)




Five switches are connected into one Major-Ring + Sub-Ring. (Shown as above)

# ERPS Sample Configuration (Switch Configuration)

1. **Configure the R1 settings as follows: (Major Ring RPL-neighbor)**

```
switch(config)#vlan database
switch(config-vlan)#vlan 3 bridge 1
switch(config-vlan)#vlan 5 bridge 1
switch(config-vlan)#exit
switch(config)#int ge7
switch(config-if)#switchport mode access
switch(config-if)#switchport access vlan 5
switch(config-if)#exit
switch(config)#int ge17
switch(config-if)#switchport mode trunk
switch(config-if)#switchport trunk allowed vlan add 3
switch(config-if)#switchport trunk allowed vlan add 5
switch(config-if)#exit
switch(config)#int ge18
switch(config-if)#switchport mode trunk
switch(config-if)#switchport trunk allowed vlan add 3
switch(config-if)#switchport trunk allowed vlan add 5
switch(config-if)#exit
switch(config)#bridge 1 erps physical-ring R1 east-interface ge18 west-interface ge17
switch(config)#erps profile P1 bridge 1
switch(erps-profile-config)#timer wait-to-restore 1
switch(erps-profile-config)#timer hold-off 0
switch(erps-profile-config)#exit
switch(config)#erps erp-instance I1 bridge 1
```

```
switch(erps-config-switch)#physical-ring R1
switch(erps-config-switch)#vlan 3 raps-channel
switch(erps-config-switch)#ring-id 101
switch(erps-config-switch)#profile name P1
switch(erps-config-switch)#rpl role neighbor west-interface
switch(erps-config-switch)#level 7
switch(erps-config-switch)#exit
switch(config)#write memory
Building configuration...
[OK]
switch(config)#exit
switch#show erps physical-ring R1 bridge 1

Ring          : R1
==========
Bridge      : 1
East          : ge18
West          : ge17
ERP Inst :I1,
switch#show erps profile P1 bridge 1

Profile : P1
=========
  Wait-To-Restore : 1 mins
  Hold Off Timer    : 0 secs
  Guard Timer         : 500 ms
  Wait-To-Block     : 5500 ms
  Protection Type : Revertive
switch#show erps erp-instance I1 bridge 1

Inst Name             : I1
State                    : G8032_ST_PENDING
Phy Ring               : R1
Role                      : NEIGHBOUR
East Link              : Link_Unblocked
West Link              : Link_Blocked
TCN Propagation : Disabled
Attached               : -
Attached To          : -
Virtual ID            : -:-
RAPS Dest Mac      : 01 : 19 : A7 : 00 : 00 : 65
-----------------------------------------------------------------
         Channel               |              Interface                          |    Profile
  (LEVL, VID, RID)      | (east,ver) ,    (west,ver)             |
=================================================================
  (7,        3,    101)        | (ge18    , V=1), (ge17    , V=1)         | P1
=================================================================

DataTraffic:
switch#
-------------------------------------------------------------------------------------
```

**2. Configure the R2 settings as follows: (Major Ring RPL-owner)**

```
switch(config)#vlan database
switch(config-vlan)#vlan 3 bridge 1
switch(config-vlan)#vlan 5 bridge 1
switch(config-vlan)#vlan 7 bridge 1
switch(config-vlan)#exit
switch(config)#int ge7
switch(config-if)#switchport mode access
switch(config-if)#switchport access vlan 5
switch(config-if)#exit
switch(config)#int ge1
switch(config-if)#switchport mode trunk
switch(config-if)#switchport trunk allowed vlan add 3
switch(config-if)#switchport trunk allowed vlan add 5
switch(config-if)#exit
switch(config)#int ge2
switch(config-if)#switchport mode trunk
switch(config-if)#switchport trunk allowed vlan add 3
switch(config-if)#switchport trunk allowed vlan add 5
switch(config-if)#exit
switch(config)#int ge3
switch(config-if)#switchport mode trunk
switch(config-if)#switchport trunk allowed vlan add 5
switch(config-if)#switchport trunk allowed vlan add 7
switch(config-if)#exit
switch(config)#bridge 1 erps physical-ring R1 east-interface ge2 west-interface ge1
switch(config)#erps profile P1 bridge 1
switch(erps-profile-config)#timer wait-to-restore 1
switch(erps-profile-config)#timer hold-off 0
switch(erps-profile-config)#exit
switch(config)#erps erp-instance I1 bridge 1
switch(erps-config-switch)#physical-ring R1
switch(erps-config-switch)#vlan 3 raps-channel
switch(erps-config-switch)#ring-id 101
switch(erps-config-switch)#profile name P1
switch(erps-config-switch)#rpl role owner east-interface
switch(erps-config-switch)#level 7
switch(erps-config-switch)#exit
switch(config)#bridge 1 erps physical-ring R2 east-interface ge3 west-interface ge1
switch(config)#erps erp-instance I2 bridge 1
switch(erps-config-switch)#physical-ring R2
switch(erps-config-switch)#ring-id 102
switch(erps-config-switch)#profile name P1
switch(erps-config-switch)#rpl role non-owner
switch(erps-config-switch)#level 7
switch(erps-config-switch)#sub-ring block west-interface
switch(erps-config-switch)#vlan 7 raps-channel
switch(erps-config-switch)#non-virtual-channel
switch(erps-config-switch)#exit
switch(config)#write memory
Building configuration...
```

```
[OK]
switch(config)#exit
switch#show erps physical-ring R1 bridge 1

Ring          : R1
==========
Bridge      : 1
East          : ge2
West          : ge1
ERP Inst :I1,
switch#show erps erp-instance I1 bridge 1

Inst Name             : I1
State                 : G8032_ST_IDLE
Phy Ring              : R1
Role                  : OWNER
East Link             : Link_Blocked
West Link             : Link_Unblocked
TCN Propagation : Disabled
Attached              : -
Attached To           : -
Virtual ID            : -:-
RAPS Dest Mac       : 01 : 19 : A7 : 00 : 00 : 65
-----------------------------------------------------------------
        Channel              |            Interface                    |    Profile
  (LEVL, VID, RID)      | (east,ver) ,    (west,ver)            |
=================================================================
  (7,        3,    101)        | (ge2    , V=1), (ge1    , V=1)         | P1
=================================================================

DataTraffic:
switch#show erps physical-ring R2 bridge 1

Ring          : R2
==========
Bridge      : 1
East          : ge3
West          : ge1
ERP Inst :I2,
switch#show erps erp-instance I2 ridge 1

Inst Name             : I2
State                 : G8032_ST_PENDING
Phy Ring              : R2
Role                  : NON-OWNER
East Link             : Link_Blocked
West Link             : -
TCN Propagation : Disabled
Attached              : -
Attached To           : -
Virtual ID            : -:-
RAPS Dest Mac       : 01 : 19 : A7 : 00 : 00 : 66
-----------------------------------------------------------------
```

```
        Channel              |            Interface                    |    Profile
  (LEVL, VID, RID)      | (east,ver) ,    (west,ver)            |
=================================================================
  (7,       7,    102)       | (ge3    , V=1), (-       ,      -)        | P1
=================================================================

DataTraffic:
switch#show erps profile P1 bridge 1

Profile : P1
=========
  Wait-To-Restore : 1 mins
  Hold Off Timer    : 0 secs
  Guard Timer         : 500 ms
  Wait-To-Block      : 5500 ms
  Protection Type : Revertive
switch#
```

---

**3. Configure the R3 settings as follows: (Interconnection node)**

```
switch(config)#vlan database
switch(config-vlan)#vlan 3 bridge 1
switch(config-vlan)#vlan 5 bridge 1
switch(config-vlan)#vlan 7 bridge 1
switch(config-vlan)#exit
switch(config)#int ge7
switch(config-if)#switchport mode access
switch(config-if)#switchport access vlan 5
switch(config-if)#exit
switch(config)#int ge1
switch(config-if)#switchport mode trunk
switch(config-if)#switchport trunk allowed vlan add 3
switch(config-if)#switchport trunk allowed vlan add 5
switch(config-if)#exit
switch(config)#int ge2
switch(config-if)#switchport mode trunk
switch(config-if)#switchport trunk allowed vlan add 3
switch(config-if)#switchport trunk allowed vlan add 5
switch(config-if)#exit
switch(config)#int ge3
switch(config-if)#switchport mode trunk
switch(config-if)#switchport trunk allowed vlan add 5
switch(config-if)#switchport trunk allowed vlan add 7
switch(config-if)#exit
switch(config)#bridge 1 erps physical-ring R1 east-interface ge2 west-interface ge1
switch(config)#erps profile P1 bridge 1
switch(erps-profile-config)#timer wait-to-restore 1
switch(erps-profile-config)#timer hold-off 0
switch(erps-profile-config)#exit
switch(config)#erps erp-instance I1 bridge 1
switch(erps-config-switch)#physical-ring R1
```

```
switch(erps-config-switch)#vlan 3 raps-channel
switch(erps-config-switch)#ring-id 101
switch(erps-config-switch)#profile name P1
switch(erps-config-switch)#rpl role non-owner
switch(erps-config-switch)#level 7
switch(erps-config-switch)#exit
switch(config)#bridge 1 erps physical-ring R2 east-interface ge2 west-interface ge3
switch(config)#erps erp-instance I2 bridge 1
switch(erps-config-switch)#physical-ring R2
switch(erps-config-switch)#ring-id 102
switch(erps-config-switch)#profile name P1
switch(erps-config-switch)#rpl role non-owner
switch(erps-config-switch)#level 7
switch(erps-config-switch)#sub-ring block east-interface
switch(erps-config-switch)#non-virtual-channel
switch(erps-config-switch)#vlan 7 raps-channel
switch(erps-config-switch)#exit
switch(config)#write memory
Building configuration...
[OK]
switch(config)#exit
switch#show erps physical-ring R1 bridge 1

Ring         : R1
==========
Bridge      : 1
East         : ge2
West         : ge1
ERP Inst :I1,
switch#show erps physical-ring R2 bridge 1

Ring         : R2
==========
Bridge      : 1
East         : ge2
West         : ge3
ERP Inst :I2,
switch#show erps profile P1 bridge 1

Profile : P1
=========
  Wait-To-Restore : 1 mins
  Hold Off Timer    : 0 secs
  Guard Timer         : 500 ms
  Wait-To-Block      : 5500 ms
  Protection Type : Revertive
switch#show erps erp-instance I1 bridge 1

Inst Name            : I1
State                   : G8032_ST_PENDING
Phy Ring             : R1
Role                    : NON-OWNER
East Link            : Link_Blocked
```

```
West Link             : Link_Unblocked
TCN Propagation : Disabled
Attached              : -
Attached To         : -
Virtual ID          : -:-
RAPS Dest Mac      : 01 : 19 : A7 : 00 : 00 : 65
-----------------------------------------------------------------
        Channel              |            Interface                        |    Profile
 (LEVL, VID, RID)      | (east,ver) ,    (west,ver)            |
=================================================================
 (7,       3,    101)       | (ge2    , V=1), (ge1    , V=1)         | P1
=================================================================

DataTraffic:
switch#show erps erp-instance I2 bridge 1

Inst Name             : I2
State                 : G8032_ST_PENDING
Phy Ring              : R2
Role                  : NON-OWNER
East Link           : -
West Link             : Link_Blocked
TCN Propagation : Disabled
Attached              : -
Attached To         : -
Virtual ID          : -:-
RAPS Dest Mac      : 01 : 19 : A7 : 00 : 00 : 66
-----------------------------------------------------------------
        Channel              |            Interface                        |    Profile
 (LEVL, VID, RID)      | (east,ver) ,    (west,ver)            |
=================================================================
 (7,       7,    102)       | (-       ,      -), (ge3    , V=1)         | P1
=================================================================

DataTraffic:
switch#
-------------------------------------------------------------------------------------
```

**4. Configure the R4 settings as follows: (Sub-ring RPL-owner)**

```
switch(config)#vlan database
switch(config-vlan)#vlan 5 bridge 1
switch(config-vlan)#vlan 7 bridge 1
switch(config-vlan)#exit
switch(config)#int ge7
switch(config-if)#switchport mode access
switch(config-if)#switchport access vlan 5
switch(config-if)#exit
switch(config)#int ge1
switch(config-if)#switchport mode trunk
switch(config-if)#switchport trunk allowed vlan add 5
switch(config-if)#switchport trunk allowed vlan add 7
```

```
switch(config-if)#exit
switch(config)#int ge3
switch(config-if)#switchport mode trunk
switch(config-if)#switchport trunk allowed vlan add 5
switch(config-if)#switchport trunk allowed vlan add 7
switch(config-if)#exit
switch(config)#bridge 1 erps physical-ring R2 east-interface ge1 west-interface ge3
switch(config)#erps profile P1 bridge 1
switch(erps-profile-config)#timer wait-to-restore 1
switch(erps-profile-config)#timer hold-off 0
switch(erps-profile-config)#exit
switch(config)#erps erp-instance I2 bridge 1
switch(erps-config-switch)#physical-ring R2
switch(erps-config-switch)#vlan 7 raps-channel
switch(erps-config-switch)#ring-id 102
switch(erps-config-switch)#profile name P1
switch(erps-config-switch)#rpl role owner east-interface
switch(erps-config-switch)#level 7
switch(erps-config-switch)#non-virtual-channel
switch(erps-config-switch)#exit
switch(config)#write memory
Building configuration...
[OK]
switch(config)#exit
switch#show erps physical-ring R2 bridge 1

Ring          : R2
==========
Bridge      : 1
East          : ge1
West          : ge3
ERP Inst :I2,
switch#show erps profile P1 bridge 1

Profile : P1
=========
  Wait-To-Restore : 1 mins
  Hold Off Timer    : 0 secs
  Guard Timer         : 500 ms
  Wait-To-Block     : 5500 ms
  Protection Type : Revertive
switch#show erps erp-instance I2 bridge 1

Inst Name             : I2
State                    : G8032_ST_IDLE
Phy Ring              : R2
Role                     : OWNER
East Link             : Link_Blocked
West Link             : Link_Unblocked
TCN Propagation : Disabled
Attached              : -
Attached To         : -
Virtual ID           : -:-
```

```
RAPS Dest Mac      : 01 : 19 : A7 : 00 : 00 : 66
-----------------------------------------------------------------
        Channel              |            Interface                        |    Profile
 (LEVL, VID, RID)      | (east,ver) ,    (west,ver)            |
=================================================================
 (7,       7,    102)       | (ge1    , V=1), (ge3    , V=1)         | P1
=================================================================

DataTraffic:
switch#show erps erp-instance I2 bridge 1

Inst Name             : I2
State                 : G8032_ST_IDLE
Phy Ring              : R2
Role                  : OWNER
East Link             : Link_Blocked
West Link             : Link_Unblocked
TCN Propagation : Disabled
Attached              : -
Attached To           : -
Virtual ID            : -:-
RAPS Dest Mac      : 01 : 19 : A7 : 00 : 00 : 66
-----------------------------------------------------------------
        Channel              |            Interface                        |    Profile
 (LEVL, VID, RID)      | (east,ver) ,    (west,ver)            |
=================================================================
 (7,       7,    102)       | (ge1    , V=1), (ge3    , V=1)         | P1
=================================================================

DataTraffic:
switch#
```

---

**5. Configure the R5 settings as follows: (Sub-ring RPL-neighbor)**

```
switch(config)#vlan database
switch(config-vlan)#vlan 5 bridge 1
switch(config-vlan)#vlan 7 bridge 1
switch(config-vlan)#exit
switch(config)#int ge7
switch(config-if)#switchport mode access
switch(config-if)#switchport access vlan 5
switch(config-if)#exit
switch(config)#int ge1
switch(config-if)#switchport mode trunk
switch(config-if)#switchport trunk allowed vlan add 5
switch(config-if)#switchport trunk allowed vlan add 7
switch(config-if)#exit
switch(config)#int ge3
switch(config-if)#switchport mode trunk
switch(config-if)#switchport trunk allowed vlan add 5
```

```
switch(config-if)#switchport trunk allowed vlan add 7
switch(config-if)#exit
switch(config)#bridge 1 erps physical-ring R2 east-interface ge3 west-interface ge1
switch(config)#erps profile P1 bridge 1
switch(erps-profile-config)#timer wait-to-restore 1
switch(erps-profile-config)#timer hold-off 0
switch(erps-profile-config)#exit
switch(config)#erps erp-instance I2 bridge 1
switch(erps-config-switch)#physical-ring R2
switch(erps-config-switch)#ring-id 102
switch(erps-config-switch)#profile name P1
switch(erps-config-switch)#rpl role neighbor west-interface
switch(erps-config-switch)#level 7
switch(erps-config-switch)#non-virtual-channel
switch(erps-config-switch)#vlan 7 raps-channel
switch(erps-config-switch)#exit
switch(config)#write memory
Building configuration...
[OK]
switch(config)#exit
switch#show erps physical-ring R2 bridge 1

Ring          : R2
==========
Bridge      : 1
East          : ge3
West          : ge1
ERP Inst :I2,
switch#show erps profile P1 bridge 1

Profile : P1
=========
  Wait-To-Restore : 1 mins
  Hold Off Timer    : 0 secs
  Guard Timer         : 500 ms
  Wait-To-Block     : 5500 ms
  Protection Type : Revertive
switch#show erps erp-instance I2 bridge 1

Inst Name             : I2
State                    : G8032_ST_PENDING
Phy Ring               : R2
Role                      : NEIGHBOUR
East Link              : Link_Unblocked
West Link              : Link_Blocked
TCN Propagation : Disabled
Attached               : -
Attached To          : -
Virtual ID            : -:-
RAPS Dest Mac      : 01 : 19 : A7 : 00 : 00 : 66
-----------------------------------------------------------------
         Channel              |            Interface                        |    Profile
  (LEVL, VID, RID)      | (east,ver) ,    (west,ver)             |
```

```
=================================================================
(7,       7,    102)       | (ge3    , V=1), (ge1    , V=1)         | P1
=================================================================

DataTraffic:
switch#
```

**ERPS Sample Configuration (Show ERPS Result)**

```
show erps physical-ring R1 bridge 1
Ring          : R1
==========
Bridge      : 1
East          : ge2
West          : ge1
ERP Inst :I1,
show erps profile P1 bridge 1
Profile : P1
=========
  Wait-To-Restore : 1 mins
  Hold Off Timer    : 0 secs
  Guard Timer          : 500 ms
  Wait-To-Block      : 5500 ms
  Protection Type : Revertive
show erps erp-instance I1 bridge 1
Inst Name             : I1
State                    : G8032_ST_IDLE
Phy Ring               : R1
Role                      : OWNER
East Link              : Link_Blocked
West Link              : Link_Unblocked
TCN Propagation : Disabled
Attached               : -
Attached To          : -
Virtual ID            : -:-
RAPS Dest Mac      : 01 : 19 : A7 : 00 : 00 : 65
-----------------------------------------------------------------
        Channel              |            Interface                          |    Profile
  (LEVL, VID, RID)      | (east,ver) ,    (west,ver)            |
=================================================================
  (7,       3,    101)       | (ge2    , V=1), (ge1    , V=1)         | P1
=================================================================
DataTraffic:
```

The following is an illustration of ERPS commands regarding their setting and configuration.

| **bridge 1 g8032 physical-ring** | |
|---|---|
| **Purpose** | Create a physical ring with its desired east port and west port |
| **Command Mode** | Global Configuration |
| **Syntax** | bridge 1 g8032 physical-ring **<RINGNAME>** east-interface **<IFNAME>** west-interface **<IFNAME>** |
| **Parameters** | **<RINGNAME>**: physical ring name<br>**<IFNAME>:** Interface name |
| **Example usage** | `switch_a(config)#bridge 1 g8032 physical-ring R1 east-interface ge1 west-interface ge3` |

| **g8032 profile** | |
|---|---|
| **Purpose** | Create an ERPS Profile Name and set its related timer |
| **Command Mode** | Global Configuration |
| **Syntax** | g8032 profile **<PROFILENAME>** bridge 1 timer guard-timer **<GUARDTIME>** timer wait-to-restore **<WAIT-TO-RESTORE>** timer hold-off **<HOLD-OFF>** enable {non-revertive \| revertive} |
| **Parameters** | **<PROFILENAME>:** Profile name<br>**<GUARDTIME>:** Guard time, <default, 1-200><br>**<WAIT-TO-RESTORE>:** minutes of wait to restore (in minutes), <default, 1…12><br>**<HOLD-OFF>:** time in million seconds of hold off, <default, 0…100> |
| **Example usage** | `switch_a(config)#g8032 profile P1 bridge 1 timer wait-to-restore 5 timer hold-off 0` |

| **g8032 erp-instance** | |
|---|---|
| **Purpose** | Set an ERPS Instance |
| **Command Mode** | Global Configuration |
| **Syntax** | g8032 erp-instance **<INSTANCENAME>** bridge 1 physical-ring <**RINGNAME>** vlan **VLAN-ID** raps-channel ring-id <**RING-ID>** profile name **<PROFILENAME>** rpl role {owner \| neighbor \| next-neighbor} {east-interface \| west-interface} level **<LEVEL> VLAN-ID** data-traffic |
| **Parameters** | **<INSTANCENAME>:** ERPS instance name<br>**<PROFILENAME>:** Profile name<br>**<RINGNAME>**: physical ring name<br>**RING-NAME:** physical ring name |

| | |
|---|---|
| | **VLAN-ID:** vlan ID, <1…4094><br>**<RING-ID>:** ring ID, <1…65535><br>**<LEVEL>:** Instance level <0...7> |
| **Example usage** | `switch_a(config)#g8032 erp-instance ERP_INST_1 bridge 1 physical-ring R1 vlan 1 raps-channel ring-id 1 profile name P1 rpl role owner east-interface level 2 vlan <ID> data-traffic` |

| **no bridge 1 g8032 physical-ring** | |
|---|---|
| **Purpose** | Delete a physical ring with its desired east port and west port |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] bridge 1 g8032 physical-ring **<RINGNAME>** |
| **Parameters** | **<RINGNAME>**: physical ring name |
| **Example usage** | `switch_a(config)# no bridge 1 g8032 physical-ring R1` |

| **no g8032 profile** | |
|---|---|
| **Purpose** | Delete an ERPS Profile |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] g8032 profile **<PROFILENAME>** bridge 1 |
| **Parameters** | **<PROFILENAME>:** Profile name |
| **Example usage** | `switch_a(config)# no g8032 profile P1 bridge 1` |

| **no g8032 erp-instance** | |
|---|---|
| **Purpose** | Delete an ERPS Instance Setting |
| **Command Mode** | Global Configuration |
| **Syntax** | [no] g8032 erp-instance **<INSTANCENAME>** bridge 1 |
| **Parameters** | **<INSTANCENAME>:** ERPS instance name |
| **Example usage** | `switch_a(config)# no g8032 erp-instance ERP_INST_1 bridge 1` |

| **show g8032 physical-ring** | |
|---|---|
| **Purpose** | Show an ERPS Physical Ring Configuration |
| **Command Mode** | Global Configuration |

| | |
|---|---|
| **Syntax** | show g8032 physical-ring **<RINGNAME>** bridge 1 |
| **Parameters** | **<RINGNAME>:** physical ring name |
| **Example usage** | `switch_a(config)# show g8032 physical-ring R1 bridge 1` |

| **show g8032 physical-ring** | |
|---|---|
| **Purpose** | Show an ERPS Profile Configuration |
| **Command Mode** | Global Configuration |
| **Syntax** | show g8032 profile **<PROFILENAME>** bridge 1 |
| **Parameters** | **<PROFILENAME>:** profile name |
| **Example usage** | `switch_a(config)# show g8032 profile P1 bridge 1` |

| **Show ERPS erp-instance** | |
|---|---|
| **Purpose** | Show an ERPS Instance Setting |
| **Command Mode** | Global Configuration |
| **Syntax** | show 8032 erp-instance **<INSTANCENAME>** bridge 1 |
| **Parameters** | **<INSTANCENAME>:** ERPS instance name |
| **xample usage** | `switch_a(config)# show g8032 erp-instance ERP_INST_1 bridge 1` |

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